

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max        | I <sub>D</sub> Max<br>T <sub>A</sub> = +25°C |
|-------------------|--------------------------------|----------------------------------------------|
| -40V              | 25mΩ @ V <sub>GS</sub> = -10V  | -7.6A                                        |
|                   | 45mΩ @ V <sub>GS</sub> = -4.5V | -6.0A                                        |

## Description and Applications

This MOSFET has been designed to minimize the on-state resistance yet maintain superior switching performance, making it ideal for high efficiency power management applications.

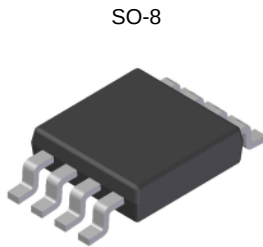
- Motor Control
- Backlighting
- DC-DC Converters
- Printer Equipment

## Features and Benefits

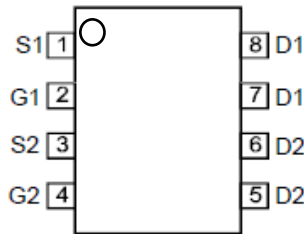
- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low R<sub>DS(ON)</sub> – Minimizes Conduction Losses
- Fast Switching Speed – Minimizes Switching Losses
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>

## Mechanical Data

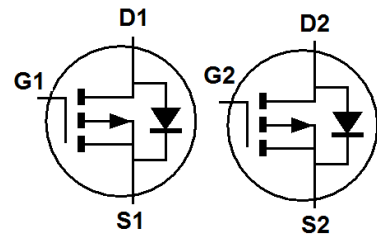
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.074 grams (Approximate)



Top View



Top View  
Pin-Out



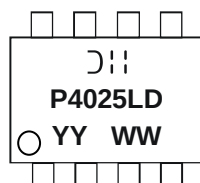
Device symbol

## Ordering Information (Note 4)

| Part Number   | Case | Packaging          |
|---------------|------|--------------------|
| DMP4025LSD-13 | SO-8 | 2500 / Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



☐☐☐ = Manufacturer's Marking  
 P4025LD = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 21 = 2021)  
 WW = Week (01 to 53)

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

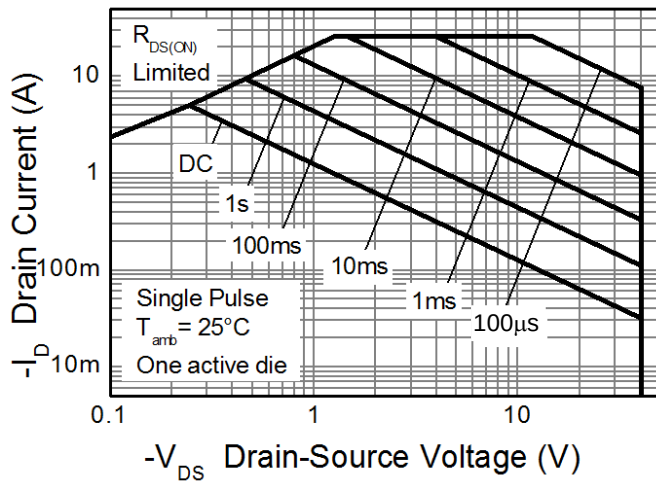
| Characteristic                         |                        |                                      | Symbol           | Value | Unit |
|----------------------------------------|------------------------|--------------------------------------|------------------|-------|------|
| Drain-Source Voltage                   |                        |                                      | V <sub>DSS</sub> | -40   | V    |
| Gate-Source Voltage                    |                        |                                      | V <sub>GSS</sub> | ±20   |      |
| Continuous Drain Current               | V <sub>GS</sub> = -10V | (Notes 6 & 8)                        | I <sub>D</sub>   | -7.6  | A    |
|                                        |                        | T <sub>A</sub> = +70°C (Notes 6 & 8) |                  | -6.1  |      |
|                                        |                        | (Notes 5 & 8)                        |                  | -5.8  |      |
|                                        |                        | (Notes 5 & 9)                        |                  | -6.9  |      |
| Pulsed Drain Current                   | V <sub>GS</sub> = -10V | (Notes 7 & 8)                        | I <sub>DM</sub>  | -28.0 |      |
| Continuous Source Current (Body Diode) |                        | (Notes 6 & 8)                        | I <sub>S</sub>   | -7.6  |      |
| Pulsed Source Current (Body Diode)     |                        | (Notes 7 & 8)                        | I <sub>SM</sub>  | -28.0 |      |
| Avalanche Current (Note 8) L = 0.3mH   |                        | (Note 11)                            | I <sub>AS</sub>  | -23   | A    |
| Avalanche Energy (Note 8) L = 0.3mH    |                        | (Note 11)                            | E <sub>AS</sub>  | 79    | mJ   |

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

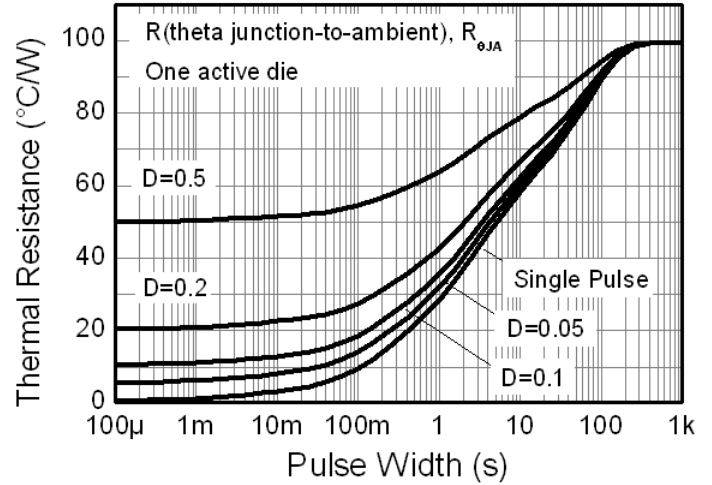
| Characteristic                              |                | Symbol                            | Value       | Unit |
|---------------------------------------------|----------------|-----------------------------------|-------------|------|
| Power Dissipation<br>Linear Derating Factor | (Notes 6 & 8)  | P <sub>D</sub>                    | 2.14        | W    |
|                                             | (Notes 5 & 8)  |                                   | 1.25        |      |
|                                             | (Notes 5 & 9)  |                                   | 1.8         |      |
| Thermal Resistance, Junction to Ambient     | (Notes 6 & 8)  | R <sub>θJA</sub>                  | 58          | °C/W |
|                                             | (Notes 5 & 8)  |                                   | 100         |      |
|                                             | (Notes 5 & 9)  |                                   | 70          |      |
| Thermal Resistance, Junction to Lead        | (Notes 8 & 10) | R <sub>θJL</sub>                  | 51          | °C   |
| Operating and Storage Temperature Range     |                | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 |      |

- Notes:
5. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  6. Same as note (5), except the device is measured at t ≤ 10 sec.
  7. Same as note (5), except the device is pulsed with D = 0.02 and pulse width 300μs.
  8. For a dual device with one active die.
  9. For a device with two active die running at equal power.
  10. Thermal resistance from junction to solder-point (at the end of the drain lead).
  11. I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.

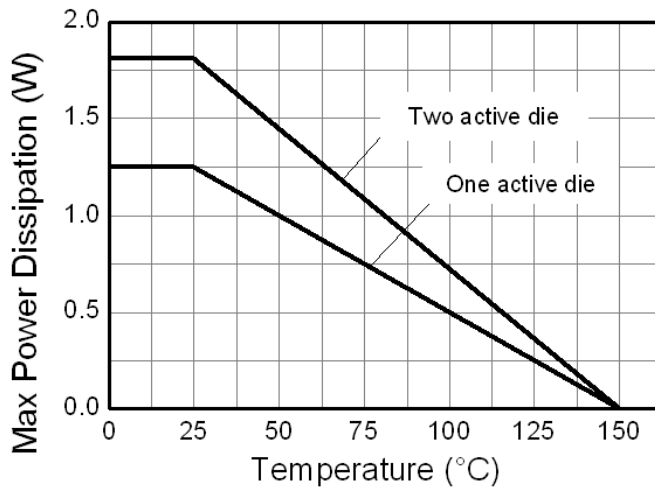
## Thermal Characteristics



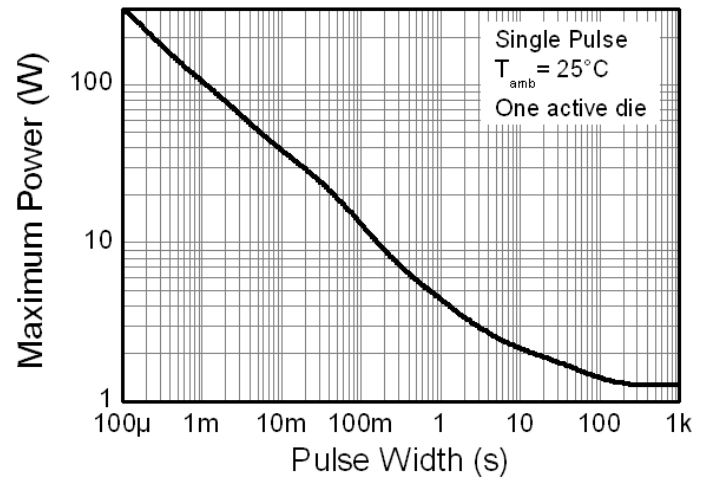
**P-channel Safe Operating Area**



**Transient Thermal Impedance**



**Derating Curve**



**Pulse Power Dissipation**

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

| Characteristic                              | Symbol              | Min  | Typ  | Max  | Unit | Test Condition                                                                                      |
|---------------------------------------------|---------------------|------|------|------|------|-----------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS</b>                  |                     |      |      |      |      |                                                                                                     |
| Drain-Source Breakdown Voltage              | BV <sub>DSS</sub>   | -40  | —    | —    | V    | I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V                                                       |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>    | —    | —    | -1.0 | μA   | V <sub>DS</sub> = -40V, V <sub>GS</sub> = 0V                                                        |
| Gate-Source Leakage                         | I <sub>GSS</sub>    | —    | —    | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                        |
| <b>ON CHARACTERISTICS</b>                   |                     |      |      |      |      |                                                                                                     |
| Gate Threshold Voltage                      | V <sub>GS(TH)</sub> | -0.8 | -1.3 | -1.8 | V    | I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>                                          |
| Static Drain-Source On-Resistance (Note 12) | R <sub>DS(ON)</sub> | —    | 18   | 25   | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -3A                                                        |
|                                             |                     |      | 30   | 45   |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3A                                                       |
| Forward Transconductance (Notes 12 & 13)    | g <sub>FS</sub>     | —    | 16.6 | —    | S    | V <sub>DS</sub> = -5V, I <sub>D</sub> = -3A                                                         |
| Diode Forward Voltage (Note 12)             | V <sub>SD</sub>     | —    | -0.7 | -1.0 | V    | I <sub>S</sub> = -1A, V <sub>GS</sub> = 0V                                                          |
| <b>DYNAMIC CHARACTERISTICS (Note 13)</b>    |                     |      |      |      |      |                                                                                                     |
| Input Capacitance                           | C <sub>iss</sub>    | —    | 1640 | —    | pF   | V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V<br>f = 1MHz                                            |
| Output Capacitance                          | C <sub>oss</sub>    | —    | 179  | —    |      |                                                                                                     |
| Reverse Transfer Capacitance                | C <sub>rss</sub>    | —    | 128  | —    |      |                                                                                                     |
| Gate Resistance                             | R <sub>g</sub>      | —    | 6.43 | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                                |
| Total Gate Charge (Note 14)                 | Q <sub>g</sub>      | —    | 14.0 | —    | nC   | V <sub>GS</sub> = -4.5V<br>V <sub>GS</sub> = -10V<br>V <sub>DS</sub> = -20V<br>I <sub>D</sub> = -3A |
| Total Gate Charge (Note 14)                 | Q <sub>g</sub>      | —    | 33.7 | —    |      |                                                                                                     |
| Gate-Source Charge (Note 14)                | Q <sub>gs</sub>     | —    | 5.5  | —    |      |                                                                                                     |
| Gate-Drain Charge (Note 14)                 | Q <sub>gd</sub>     | —    | 7.3  | —    |      |                                                                                                     |
| Turn-On Delay Time (Note 14)                | t <sub>D(ON)</sub>  | —    | 6.9  | —    | ns   | V <sub>DD</sub> = -20V, V <sub>GS</sub> = -10V<br>I <sub>D</sub> = -3A                              |
| Turn-On Rise Time (Note 14)                 | t <sub>R</sub>      | —    | 14.7 | —    |      |                                                                                                     |
| Turn-Off Delay Time (Note 14)               | t <sub>D(OFF)</sub> | —    | 53.7 | —    |      |                                                                                                     |
| Turn-Off Fall Time (Note 14)                | t <sub>F</sub>      | —    | 30.9 | —    |      |                                                                                                     |

Notes: 12. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.  
13. For design aid only, not subject to production testing.  
14. Switching characteristics are independent of operating junction temperatures.

## Typical Characteristics

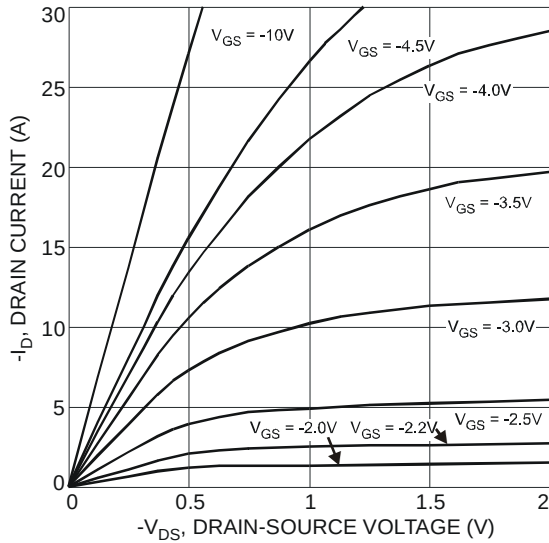


Fig. 1 Typical Output Characteristic

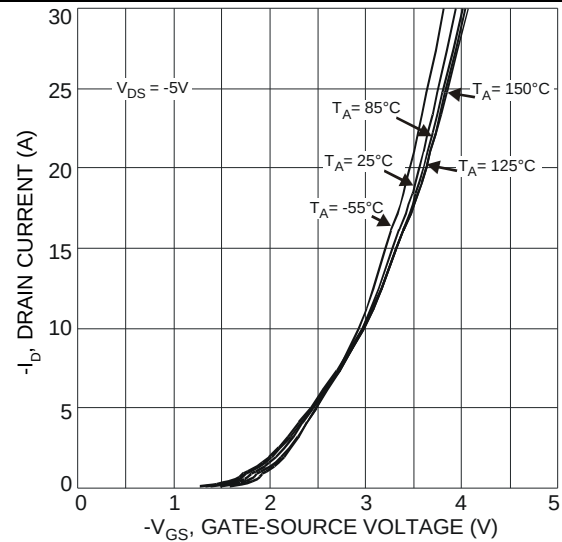


Fig. 2 Typical Transfer Characteristic

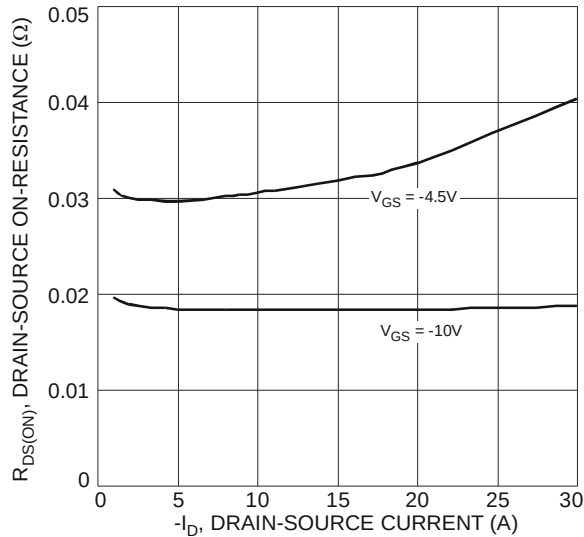


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

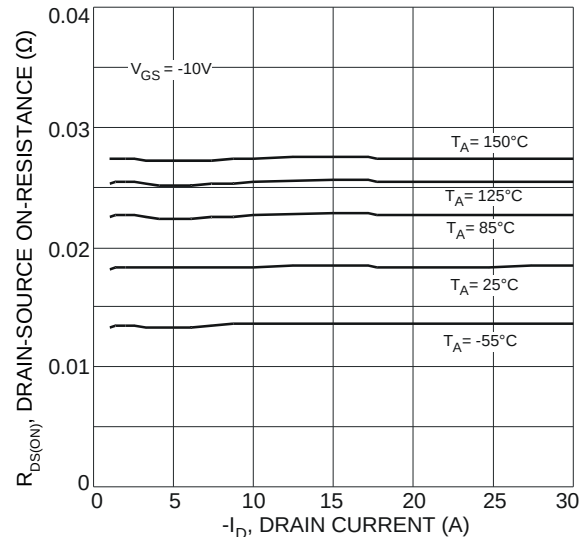


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

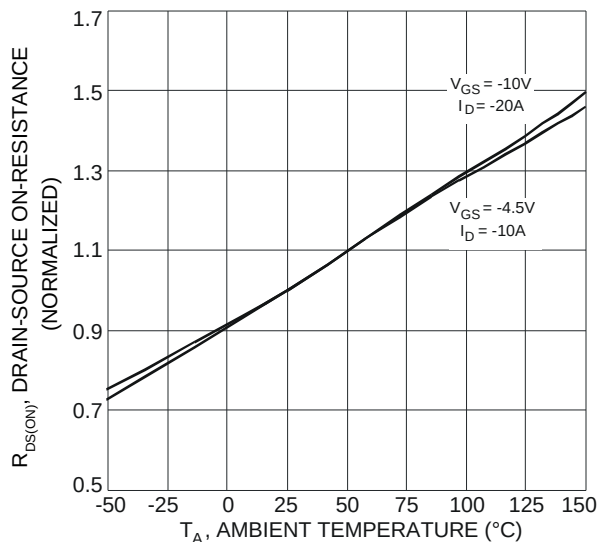


Fig. 5 On-Resistance Variation with Temperature

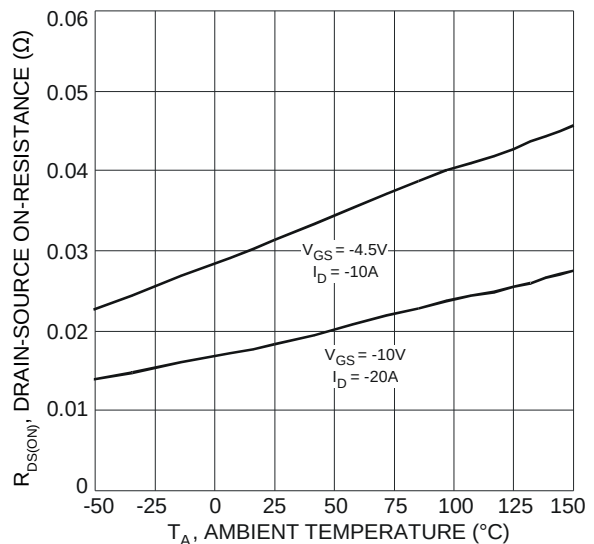


Fig. 6 On-Resistance Variation with Temperature

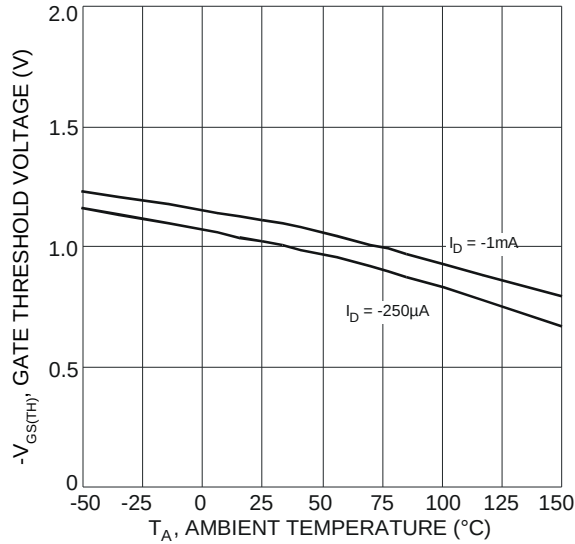


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

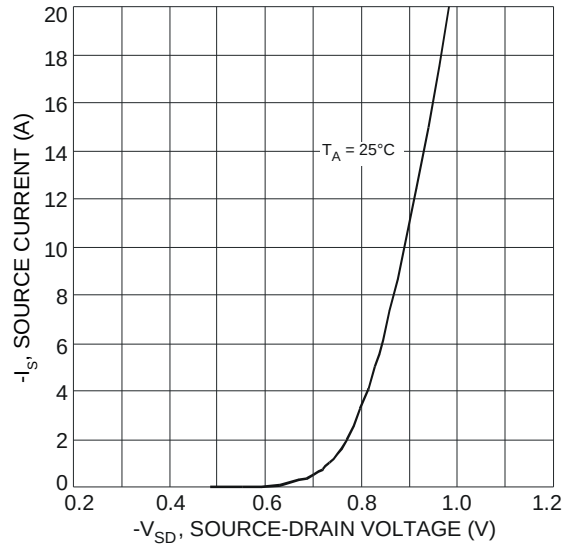


Fig. 8 Diode Forward Voltage vs. Current

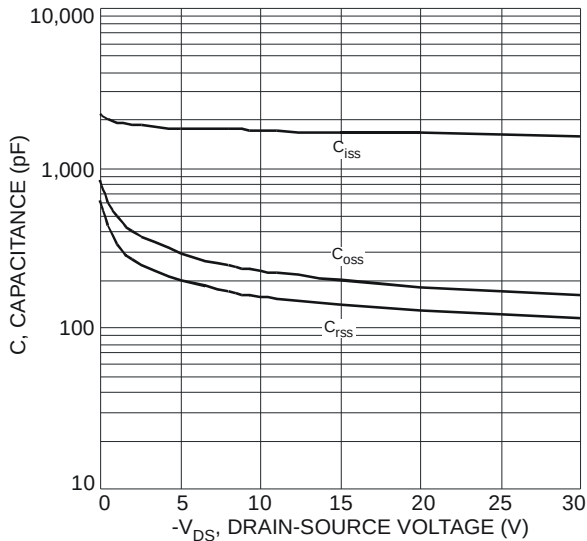


Fig. 9 Typical Total Capacitance

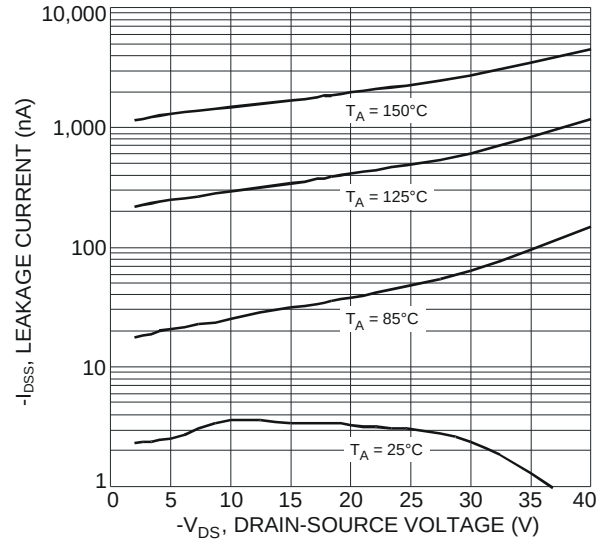


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

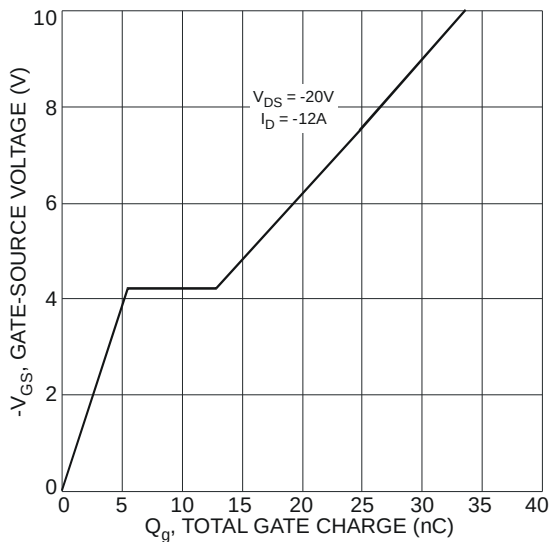
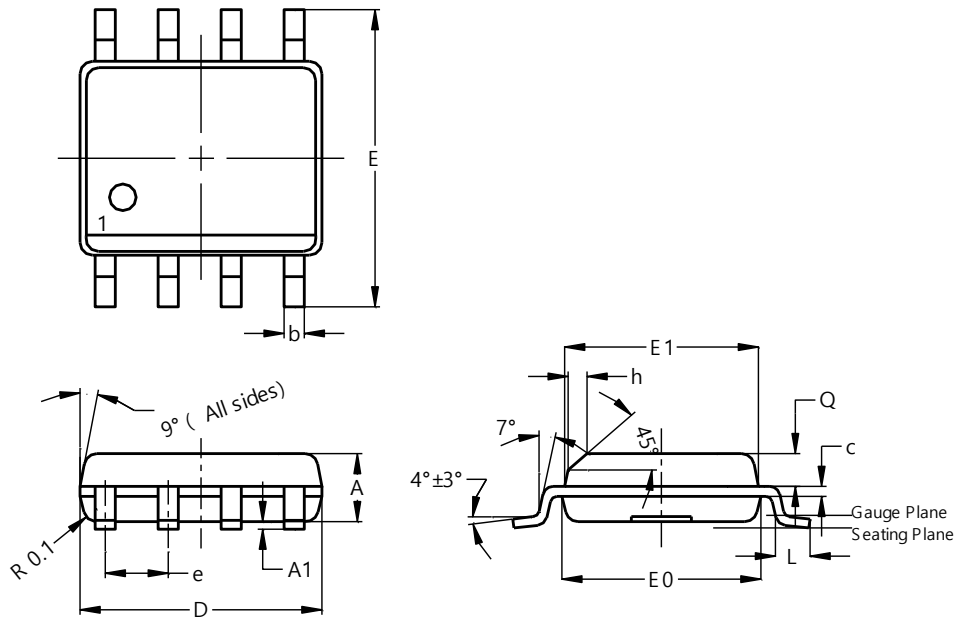


Fig. 11 Gate-Charge Characteristics

## Package Outline Dimensions

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

**SO-8**

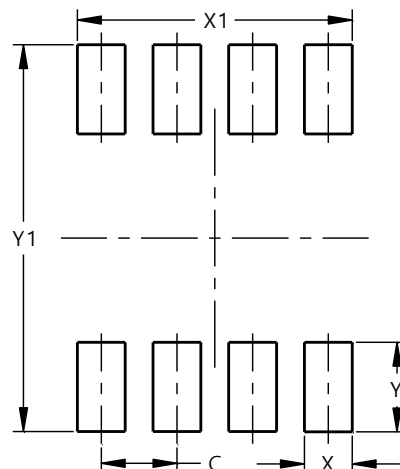


| SO-8                 |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 1.40 | 1.50 | 1.45 |
| A1                   | 0.10 | 0.20 | 0.15 |
| b                    | 0.30 | 0.50 | 0.40 |
| c                    | 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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