# COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

## Product Summary

| Device | $V_{(BR)DSS}$ | $R_{DS(ON)\ max}$ | Package | $I_D$ $T_A$ = +25°C |
|---|---|---|---|---|
| N-CH | 30V | 36mΩ @ $V_{GS}$ = 10V | SO-8 | 6.9A |
| | | 61mΩ @ $V_{GS}$ = 4.5V | | 5.1A |
| P-CH | -30V | 36mΩ @ $V_{GS}$ = -10V | | -6.0A |
| | | 64mΩ @ $V_{GS}$ = -4.5V | | -5.0 |

## Features

- 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**

## Description

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.

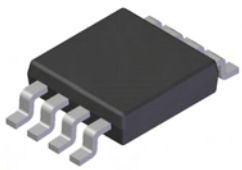
## Mechanical Data

- 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 Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072g (approximate)

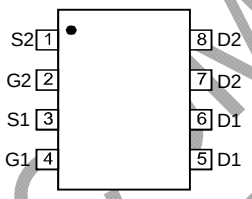
## Applications

- Motor control
- Power Management Functions
- DC-DC Converters
- Inverter

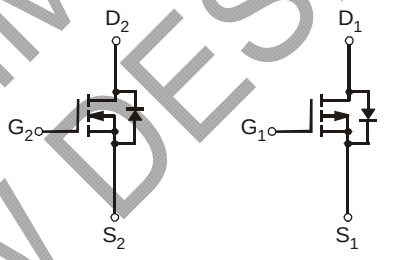
SO-8



Top View




Top View
Internal Schematic




N-Channel MOSFET P-Channel MOSFET

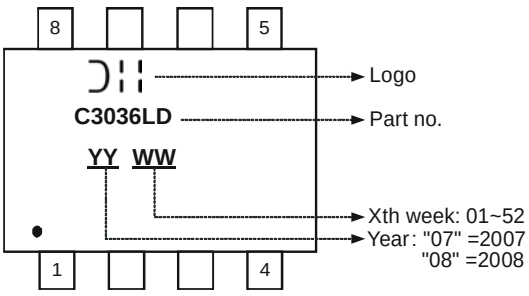
## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMC3036LSD-13 | SO-8 | 2500/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 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.

## Marking Information

( Top View )



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

| Characteristic | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 5) $V_{GS}$ = 10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 5.0<br>4.0 | A |
| | t<10s | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 6.9<br>5.8 | A |
| Maximum Continuous Body Diode Forward Current (Note 5) | | | $I_S$ | 2 | A |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | | $I_{DM}$ | 24 | A |

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

| Characteristic | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 5) $V_{GS}$ = -10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -4.5<br>-3.5 | A |
| | t<10s | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -6<br>-5 | A |
| Maximum Continuous Body Diode Forward Current (Note 5) | | | $I_S$ | -2 | A |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | | $I_{DM}$ | -21 | A |

## Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | Steady State | $P_D$ | 1.5 | W |
| | t<10s | | 2.5 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | $R_{\theta JA}$ | 83 | °C/W |
| | t<10s | | 49 | |
| Thermal Resistance, Junction to Case (Note 5) | | $R_{\theta JC}$ | 15 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | °C |

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

## Electrical Characteristics N-CHANNEL (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 6)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | µA | $V_{DS}$ = 24V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ± 100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 6)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1 | — | 2.1 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | —<br>— | 28<br>51 | 36<br>61 | mΩ | $V_{GS}$ = 10V, $I_D$ = 6.9A<br>$V_{GS}$ = 4.5V, $I_D$ = 5.0A |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | — | 7.7 | — | S | $V_{DS}$ = 5V, $I_D$ = 6.9A |
| Diode Forward Voltage | $V_{SD}$ | 0.5 | — | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 1A |
| **DYNAMIC CHARACTERISTICS (Note 7)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 431 | — | pF | $V_{DS}$ = 15V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 55 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 48 | — | pF | |
| Gate Resistance | $R_G$ | — | 1.3 | — | Ω | $V_{GS}$ = 0V $V_{DS}$ = 0V, f = 1MHz |
| **SWITCHING CHARACTERISTICS (Note 7)** | | | | | | |
| Total Gate Charge | $Q_g$ | — | 3.8<br>7.9 | — | nC | $V_{DS}$ = 10V, $V_{GS}$ = 4.5V, $I_D$ = 10A<br>$V_{DS}$ = 10V, $V_{GS}$ = 10V, $I_D$ = 10A |
| Gate-Source Charge | $Q_{gs}$ | — | 1.4 | — | | $V_{DS}$ = 10V, $V_{GS}$ = 10V, $I_D$ = 10A |
| Gate-Drain Charge | $Q_{gd}$ | — | 1.7 | — | | $V_{DS}$ = 10V, $V_{GS}$ = 10V, $I_D$ = 10A |

## Electrical Characteristics P-CHANNEL (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 6)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | -1.0 | µA | $V_{DS}$ = -24V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ± 100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 6)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -1 | — | -2.2 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | —<br>— | 30<br>53 | 36<br>64 | mΩ | $V_{GS}$ = -10V, $I_D$ = -6A<br>$V_{GS}$ = -4.5V, $I_D$ = -5A |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | — | 8.8 | — | S | $V_{DS}$ =-5V, $I_D$ = -6A |
| Diode Forward Voltage | $V_{SD}$ | -0.5 | — | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -1A |
| **DYNAMIC CHARACTERISTICS (Note 7)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 977 | — | pF | $V_{DS}$ = -15V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 129 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 116 | — | pF | |
| Gate Resistance | $R_G$ | — | 13.1 | — | Ω | $V_{GS}$ = 0V, $V_{DS}$ = 0V, f = 1MHz |
| **SWITCHING CHARACTERISTICS (Note 7)** | | | | | | |
| Total Gate Charge | $Q_g$ | — | 10.1<br>21.1 | — | nC | $V_{DS}$ = 15V, $V_{GS}$ = -4.5V, $I_D$ = 6A<br>$V_{DS}$ = 15V, $V_{GS}$ = -10V, $I_D$ = 6A |
| Gate-Source Charge | $Q_{gs}$ | — | 2.8 | — | | $V_{DS}$ = 15V, $V_{GS}$ = -10V, $I_D$ = 6A |
| Gate-Drain Charge | $Q_{gd}$ | — | 3.2 | — | | $V_{DS}$ = 15V, $V_{GS}$ = -10V, $I_D$ = 6A |

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

## N-CHANNEL

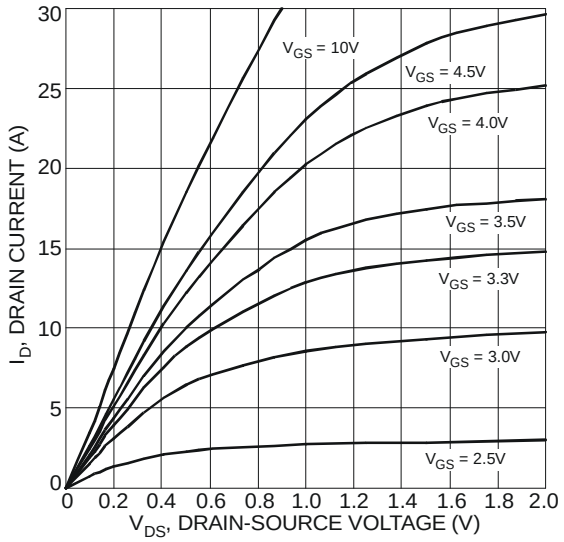



Figure 1 Typical Output Characteristic

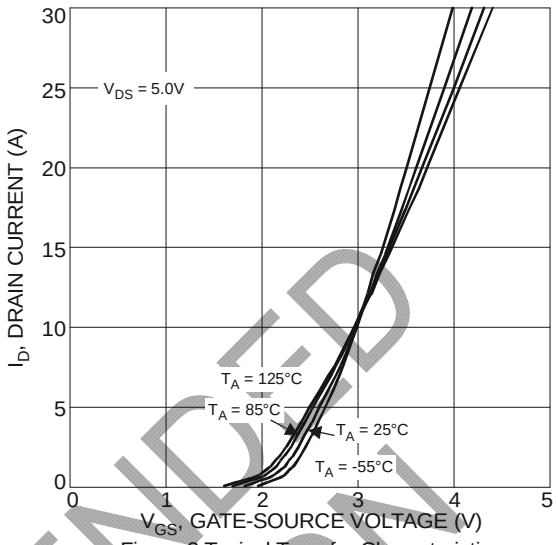



Figure 2 Typical Transfer Characteristics

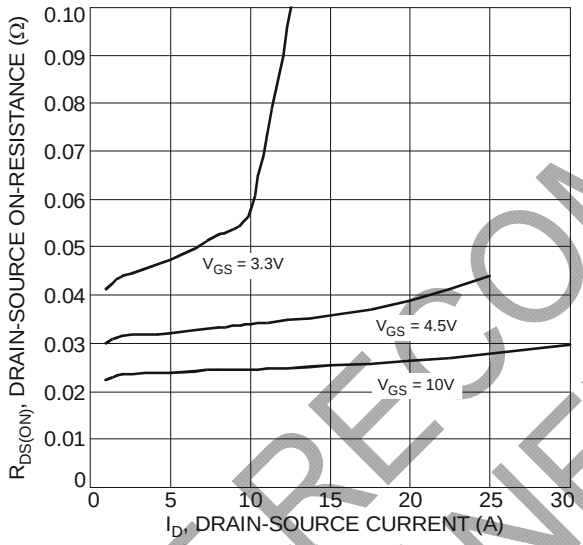



Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

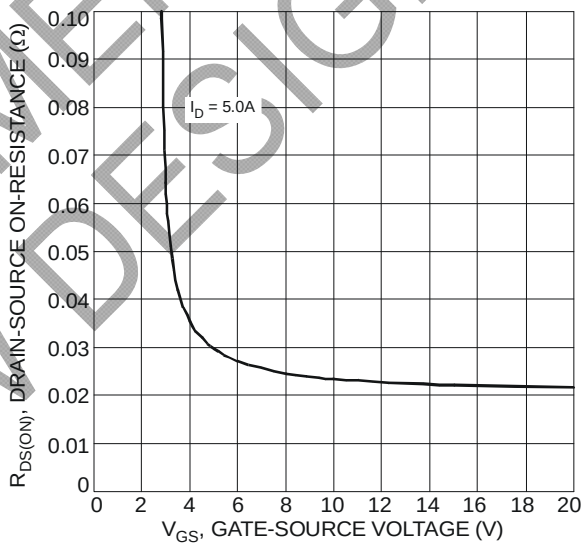



Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

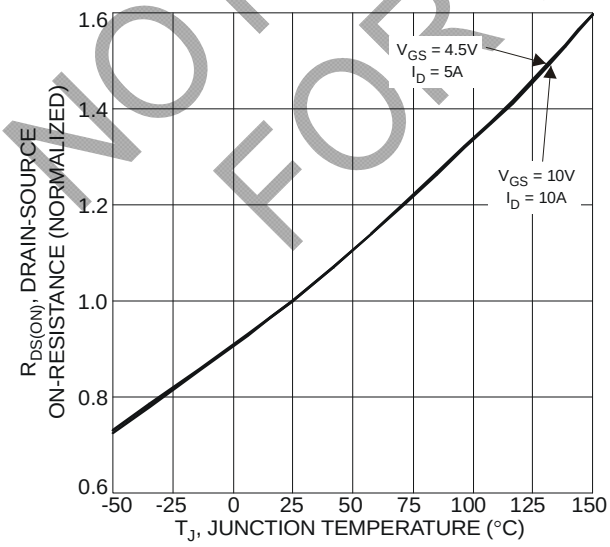



Figure 5 On-Resistance Variation with Temperature

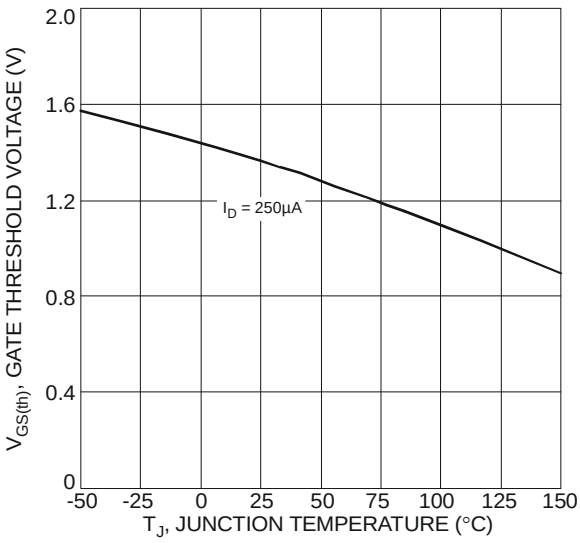



Figure 6 Gate Threshold Variation vs. Ambient Temperature

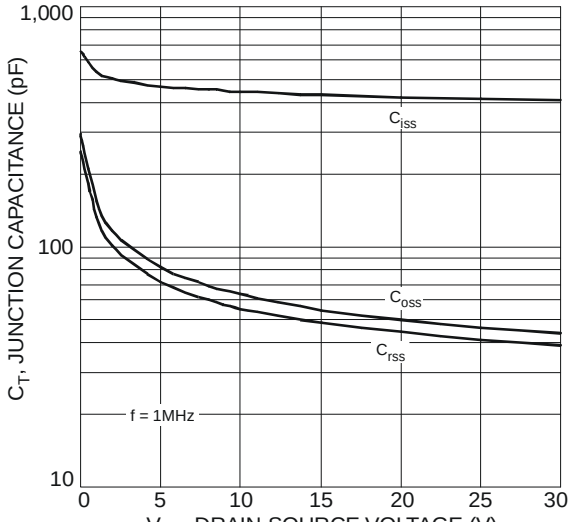



Figure 7 Typical Junction Capacitance

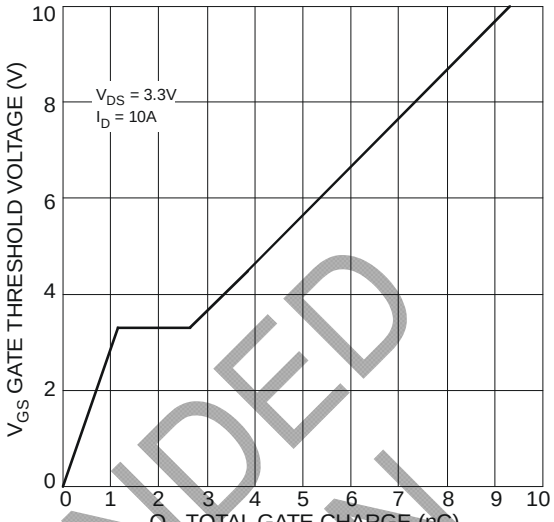



Figure 8 Gate Charge

## P-CHANNEL

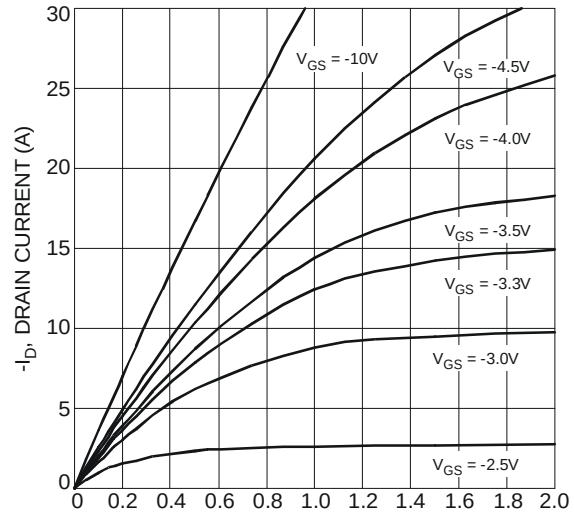



Figure 9 Typical Output Characteristics

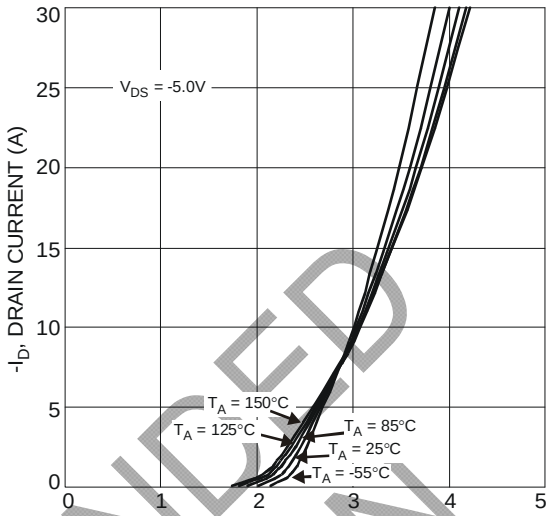



Figure 10 Typical Transfer Characteristics

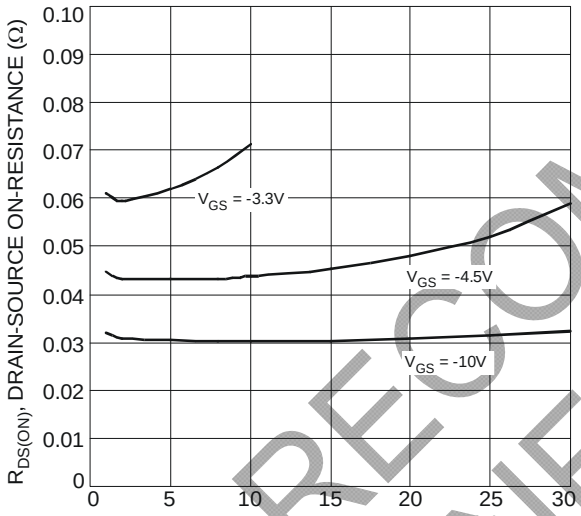



Figure 11 Typical On-Resistance vs. Drain Current and Gate Voltage

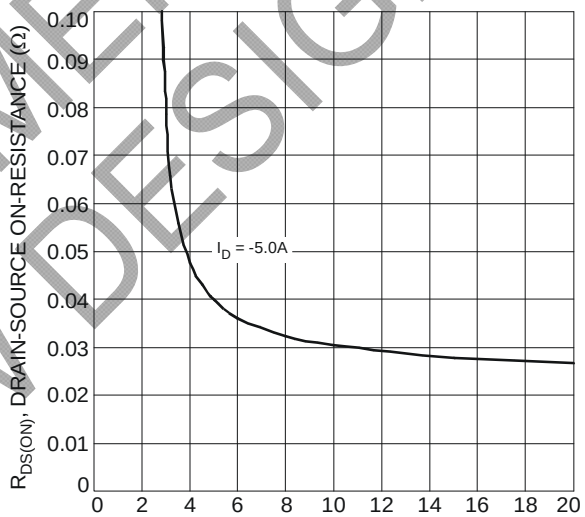



Figure 12 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

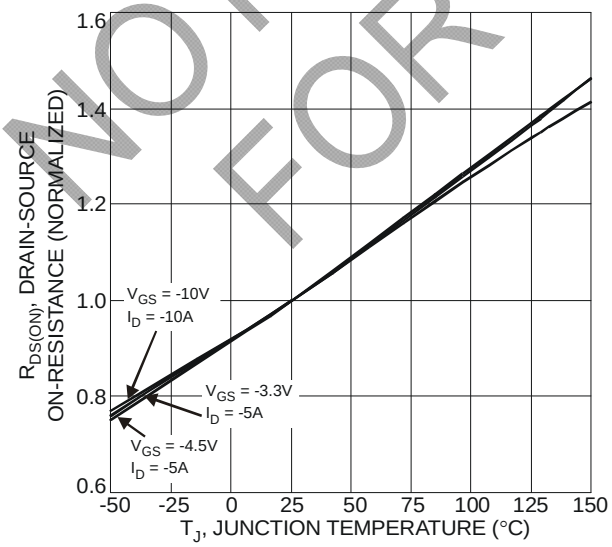



Figure 13 On-Resistance Variation with Temperature

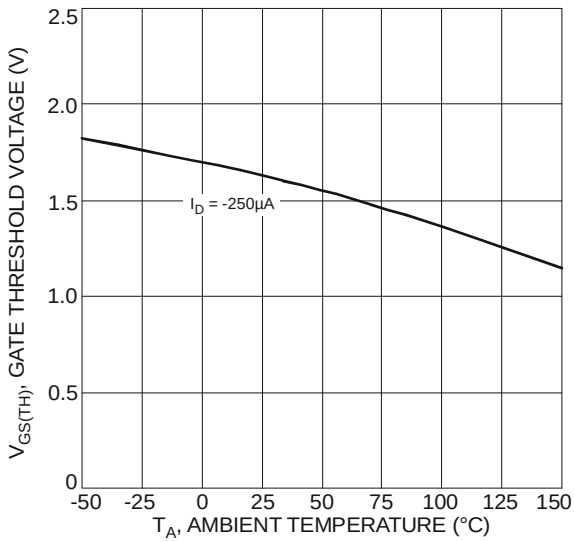



Figure 14 Gate Threshold Variation vs. Ambient Temperature

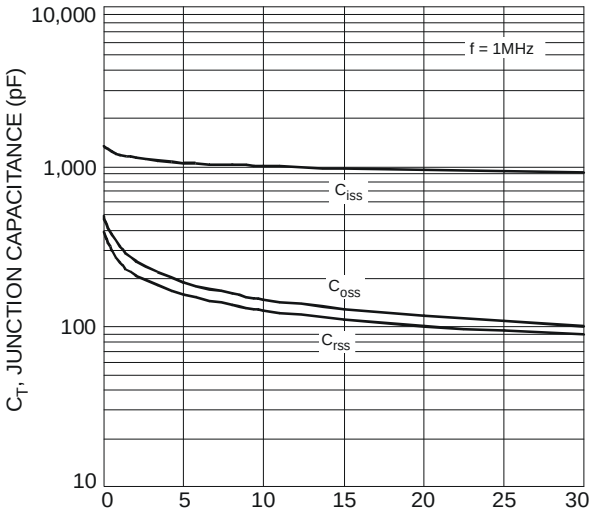



Figure 15 Typical Junction Capacitance

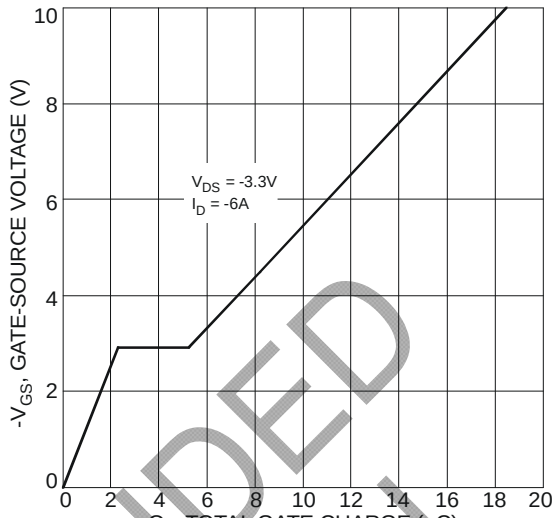
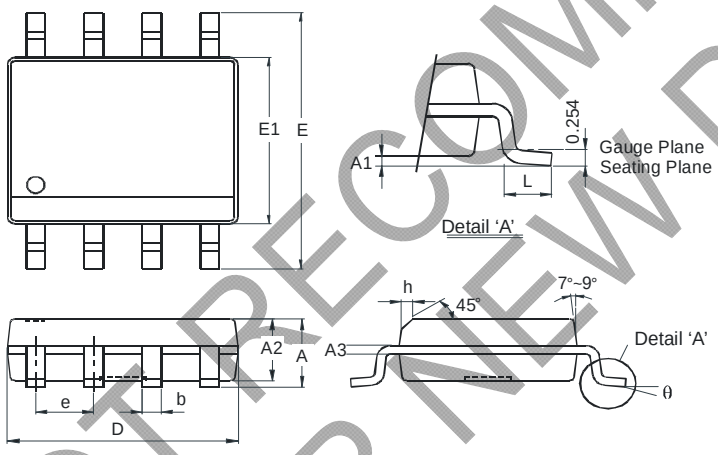



Figure 16 Gate-Charge Characteristics

## Package Outline Dimensions

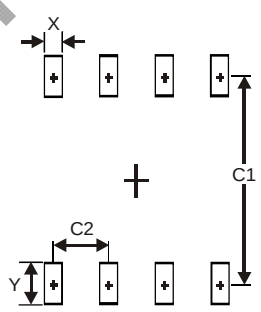
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| 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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