

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

| Device | V _{(BR)DSS} | R _{DS(ON)} Max | I _D T _A = +25°C |
|--------|----------------------|--------------------------------|--|
| Q1 | 30V | 16mΩ @ V _{GS} = 10V | 8.2A |
| | | 20mΩ @ V _{GS} = 4.5V | 7.3A |
| Q2 | -30V | 28mΩ @ V _{GS} = -10V | -6.2A |
| | | 38mΩ @ V _{GS} = -4.5V | -5.2A |

Description

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

Applications

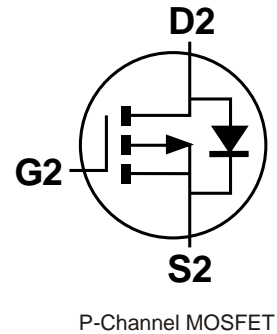
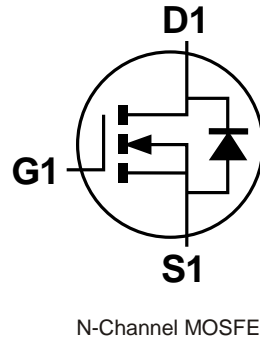
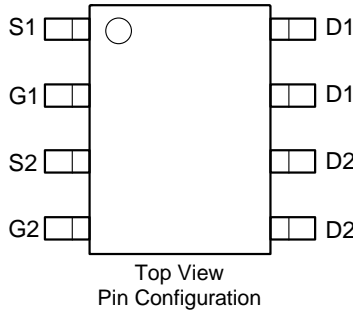
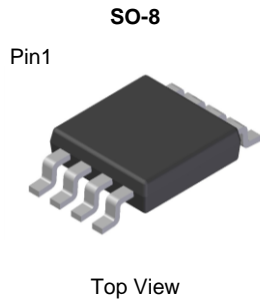
- DC-DC Converters
- Power Management Functions
- Backlighting

Features and Benefits

- Low Input Capacitance
- Low On-Resistance
- 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: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.074 grams (Approximate)

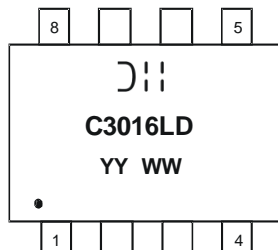


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|------|-------------------|
| DMC3016LSD-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



⌋|| = Manufacturer's Marking
C3016LD = Product Type Marking Code
YYWW = Date Code Marking
YY or YY = Year (ex: 15 = 2015)
WW = Week (01 - 53)

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

| Characteristic | | Symbol | Value Q1 | Value Q2 | Units | |
|---|--------------|------------------|--|-------------|--------------|---|
| Drain-Source Voltage | | V _{DSS} | 30 | -30 | V | |
| Gate-Source Voltage | | V _{GSS} | ±20 | ±20 | V | |
| Continuous Drain Current (Note 6) V _{GS} = 10V | Steady State | I _D | T _A = +25°C T _A = +70°C | 8.2 6.5 | -6.2 -5.0 | A |
| | t < 10s | | T _A = +25°C T _A = +70°C | 10.5 8.4 | -8.0 -6.4 | A |
| Maximum Body Diode Forward Current (Note 6) | | I _S | 2.5 | -2.5 | A | |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | I _{DM} | 80 | -40 | A | |
| Avalanche Current (Note 7) L = 0.1mH | | I _{AS} | 22 | -22 | A | |
| Avalanche Energy (Note 7) L = 0.1mH | | E _{AS} | 25 | 25 | mJ | |

Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|--|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | T _A = +25°C | P _D | 1.2 | W |
| | T _A = +70°C | | 0.8 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R _{θJA} | 102 | °C/W |
| | t < 10s | | 62 | |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 1.6 | W |
| | T _A = +70°C | | 1.0 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R _{θJA} | 78 | °C/W |
| | t < 10s | | 47 | |
| Thermal Resistance, Junction to Case (Note 6) | | R _{θJC} | 12 | |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics (N-Channel Q1) (@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} | 30 | — | — | V | V _{GS} = 0V, I _D = 250µA |
| Zero Gate Voltage Drain Current | 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 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 1.0 | — | 3.0 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 12 | 16 | mΩ | V _{GS} = 10V, I _D = 12A |
| | | — | 15 | 20 | | V _{GS} = 4.5V, I _D = 10A |
| Diode Forward Voltage | V _{SD} | — | 0.7 | 1.0 | V | V _{GS} = 0V, I _S = 1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{ISS} | — | 1,415 | — | pF | V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 119 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 82 | — | | |
| Gate Resistance | R _G | — | 2.6 | 3.2 | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _G | — | 11.3 | — | nC | V _{DS} = 15V, I _D = 12A |
| Total Gate Charge (V _{GS} = 10V) | Q _G | — | 25.1 | — | | |
| Gate-Source Charge | Q _{GS} | — | 3.5 | — | | |
| Gate-Drain Charge | Q _{GD} | — | 3.6 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 4.8 | — | ns | V _{DD} = 15V, V _{GS} = 10V, R _L = 1.25Ω, R _G = 3Ω, |
| Turn-On Rise Time | t _R | — | 16.5 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 26.1 | — | | |
| Turn-Off Fall Time | t _F | — | 5.6 | — | | |

- 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 1-inch square copper plate.
 - UIS in production with L = 0.1mH, starting T_A = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

Electrical Characteristics (Continued) (P-Channel Q2) (@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} | -30 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | 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 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -1.0 | — | -3.0 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 21 | 28 | mΩ | V _{GS} = -10V, I _D = -7A |
| | | — | 30 | 38 | | V _{GS} = -4.5V, I _D = -6.2A |
| Diode Forward Voltage | V _{SD} | — | -0.7 | -1.2 | V | V _{GS} = 0V, I _S = -2.1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{ISS} | — | 1,241 | — | pF | V _{DS} = -15V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 147 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 110 | — | | |
| Gate Resistance | R _G | — | 15 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _G | — | 10.9 | — | nC | V _{DS} = -15V, I _D = -7A |
| Total Gate Charge (V _{GS} = -10V) | Q _G | — | 22 | — | | |
| Gate-Source Charge | Q _{GS} | — | 3.5 | — | | |
| Gate-Drain Charge | Q _{GD} | — | 4.7 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 9.7 | — | ns | V _{DS} = -15V, I _D = -7A V _{GS} = -10V, R _G = 6Ω |
| Turn-On Rise Time | t _R | — | 17.1 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 60.5 | — | | |
| Turn-Off Fall Time | t _F | — | 40.4 | — | | |

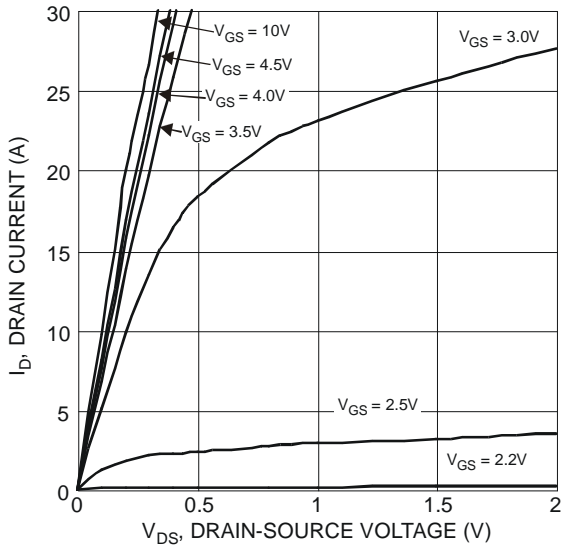


Figure 1 Typical Output Characteristics

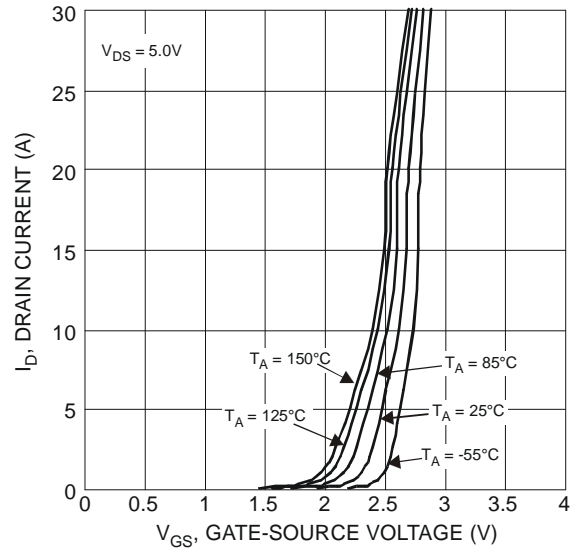


Figure 2 Typical Transfer Characteristics

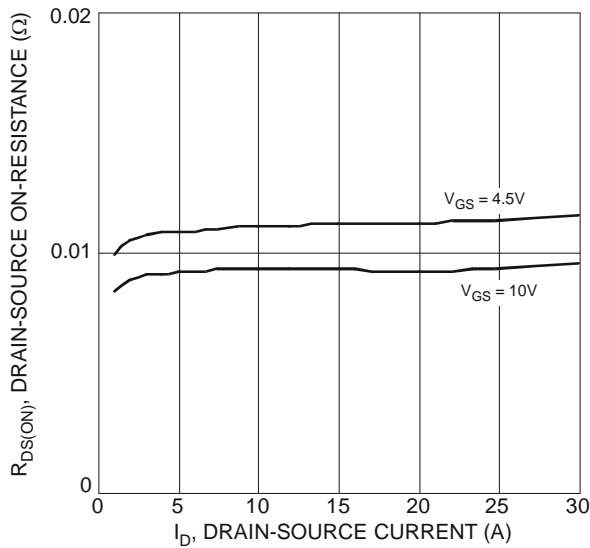


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

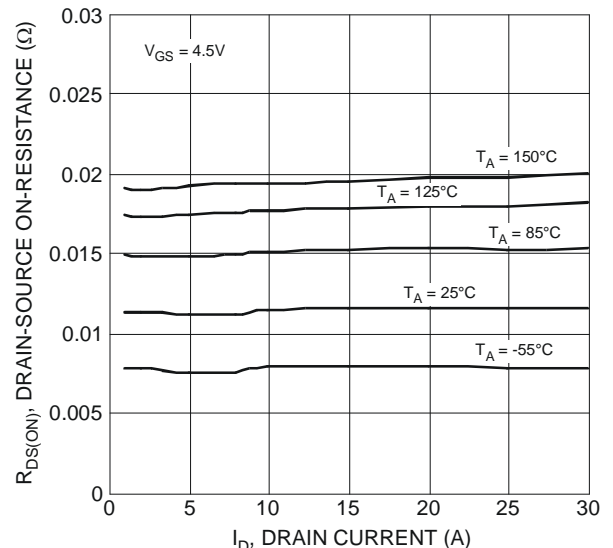


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

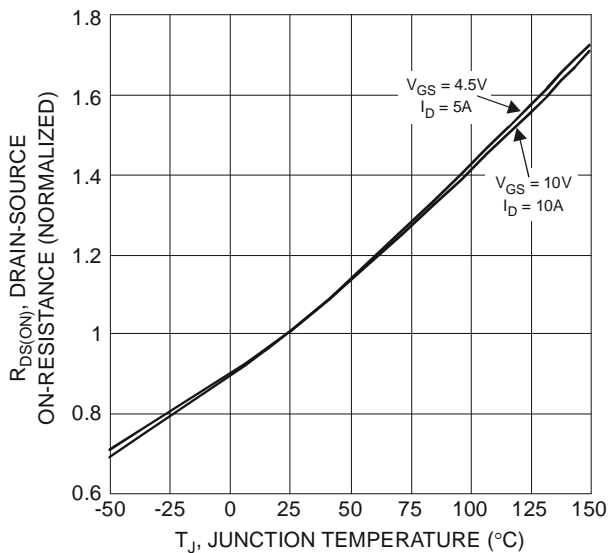


Figure 5 On-Resistance Variation with Temperature

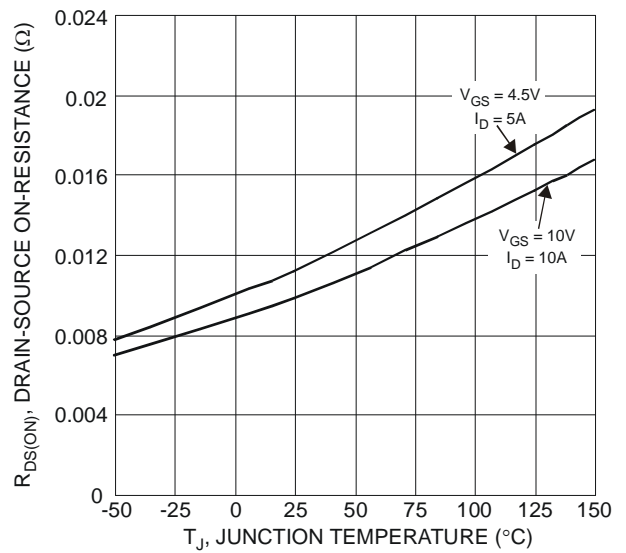


Figure 6 On-Resistance Variation with Temperature

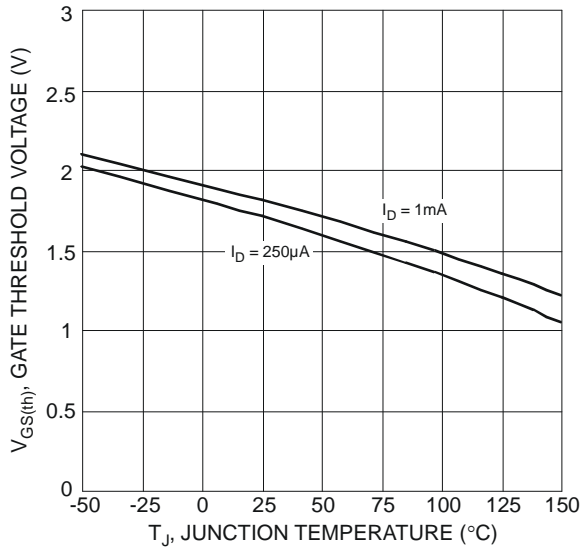


Figure 7 Gate Threshold Variation vs. Ambient Temperature

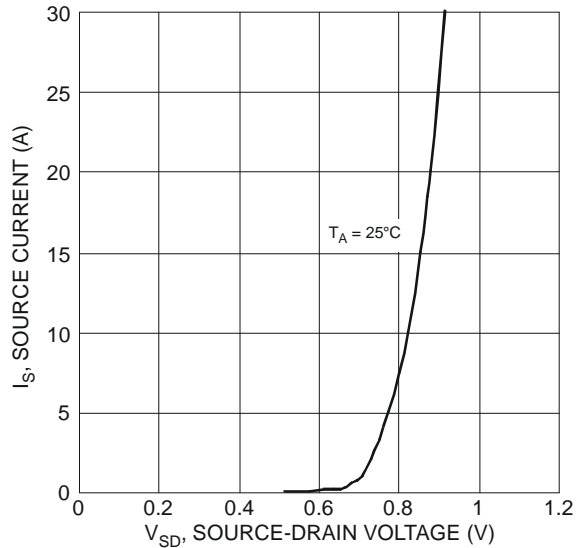


Figure 8 Diode Forward Voltage vs. Current

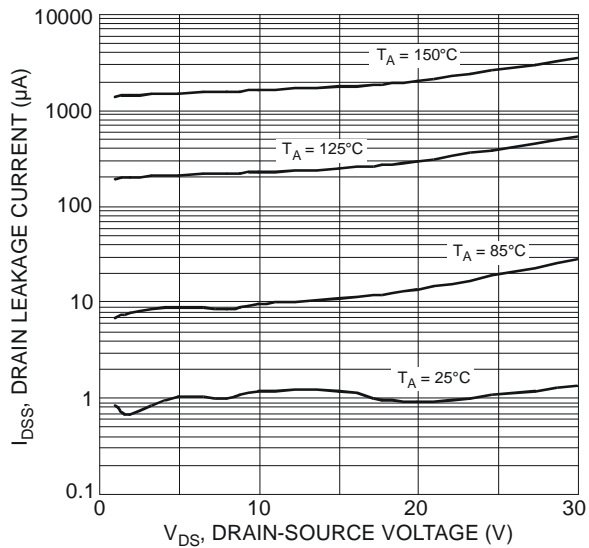


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

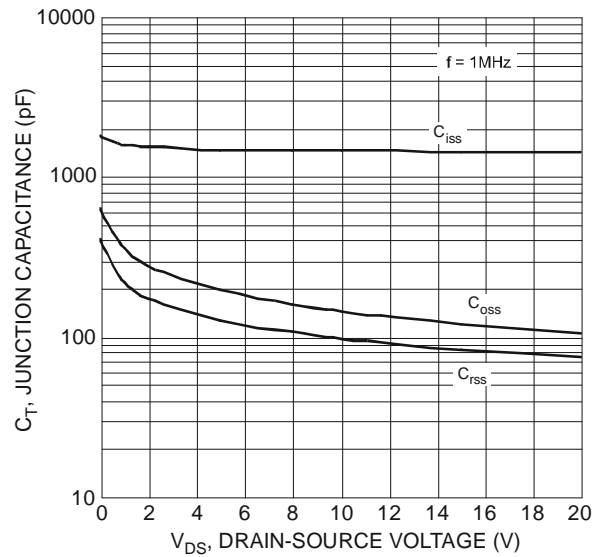


Figure 10 Typical Junction Capacitance

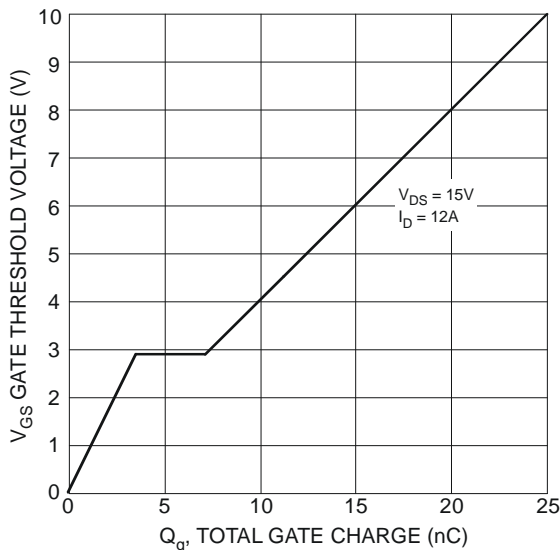


Figure 11 Gate Charge

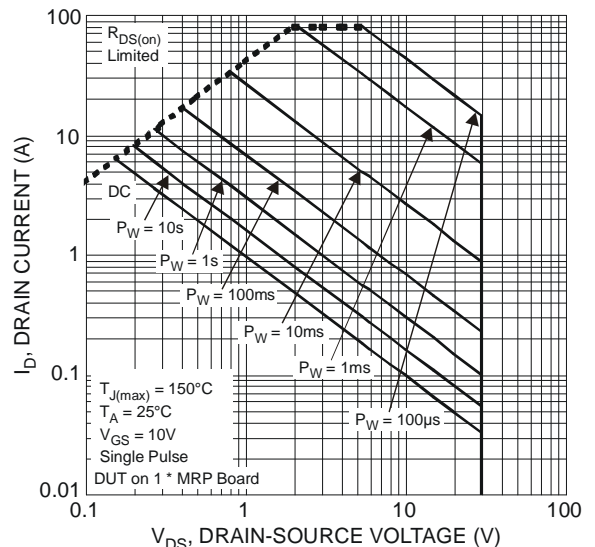


Figure 12 SOA, Safe Operation Area

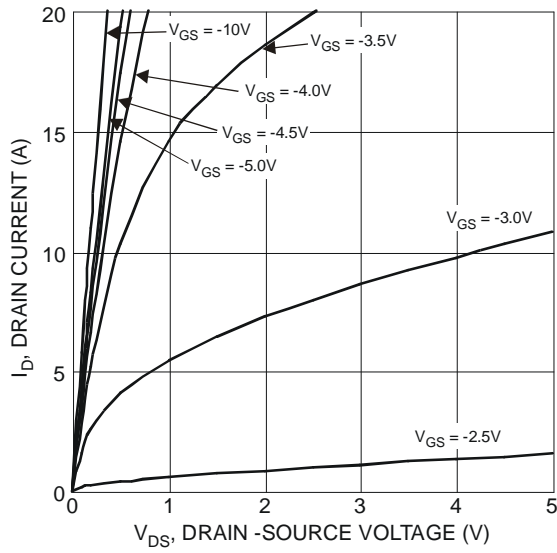


Figure 13 Typical Output Characteristics

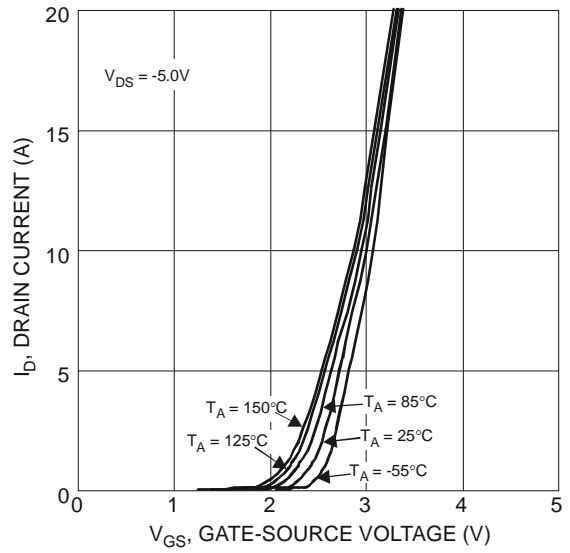


Figure 14 Typical Transfer Characteristics

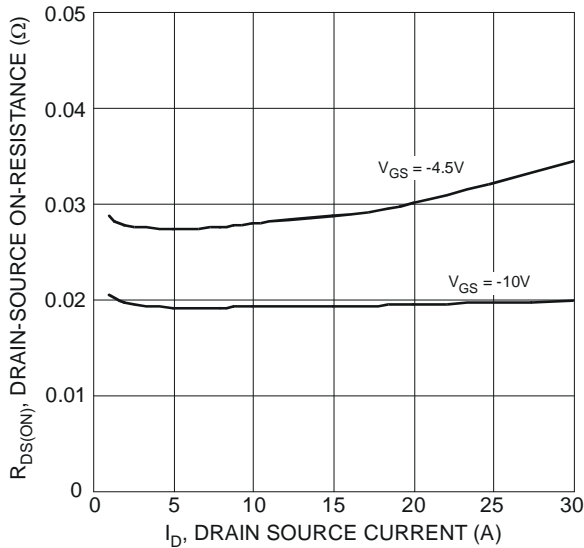


Figure 15 Typical On-Resistance vs. Drain Current and Gate Voltage

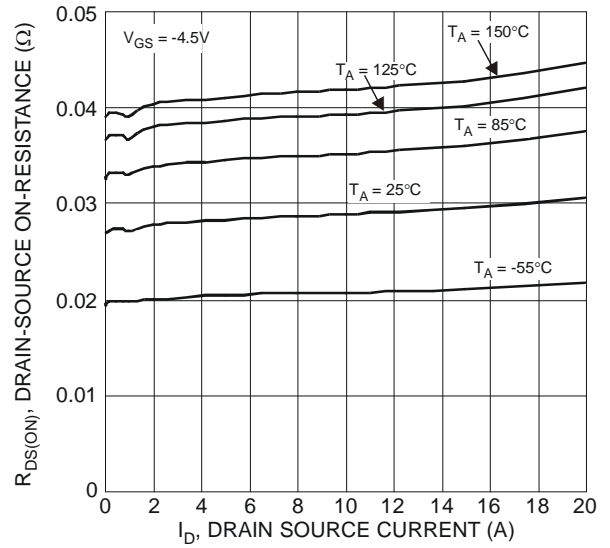


Figure 16 Typical On-Resistance vs. Drain Current and Temperature

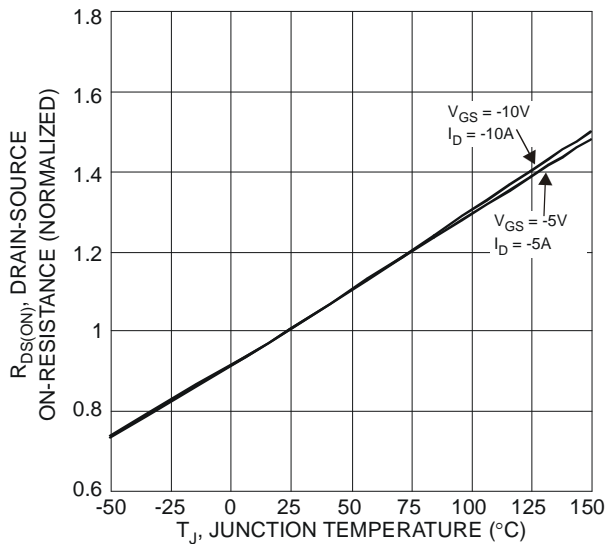


Figure 17 On-Resistance Variation with Temperature

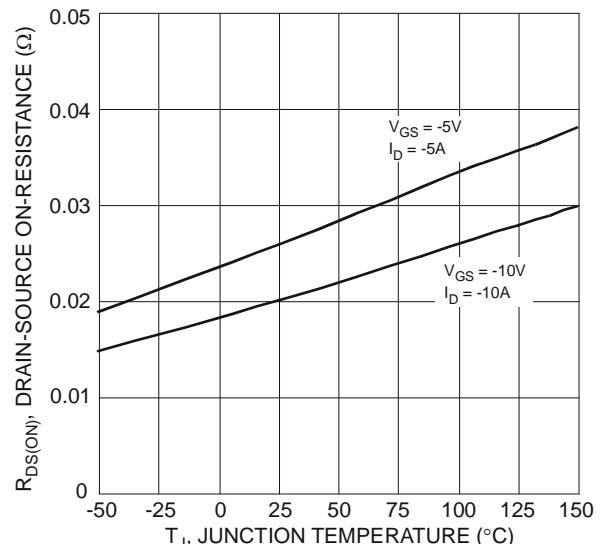


Figure 18 On-Resistance Variation with Temperature

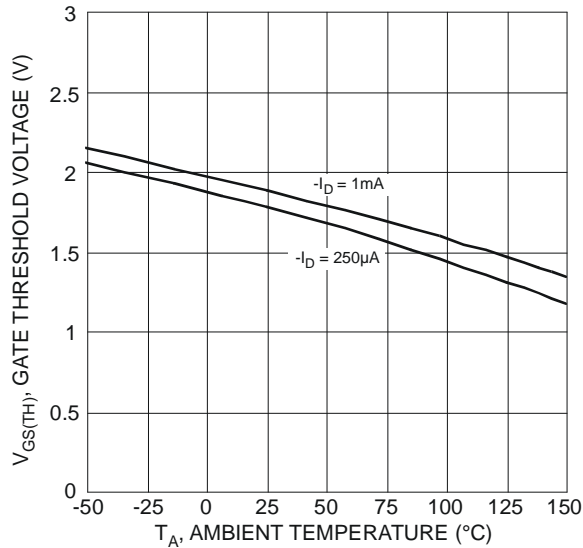


Figure 19 Gate Threshold Variation vs. Ambient Temperature

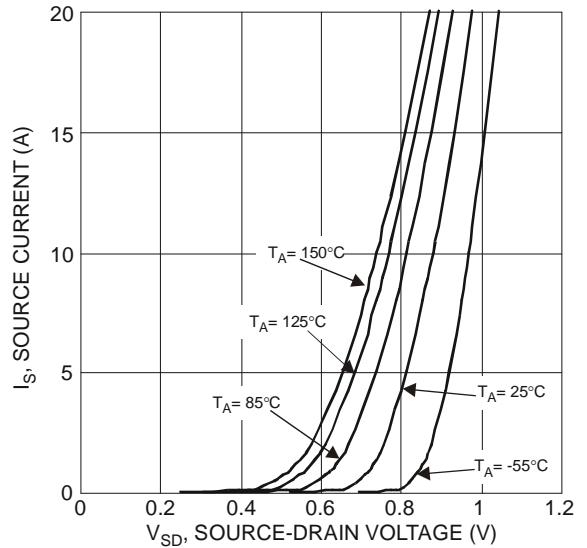


Figure 20 Diode Forward Voltage vs. Current

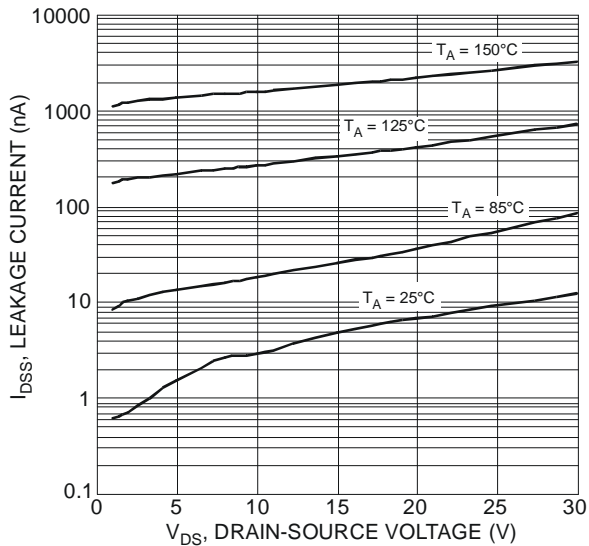


Figure 21 Typical Drain-Source Leakage Current vs. Voltage

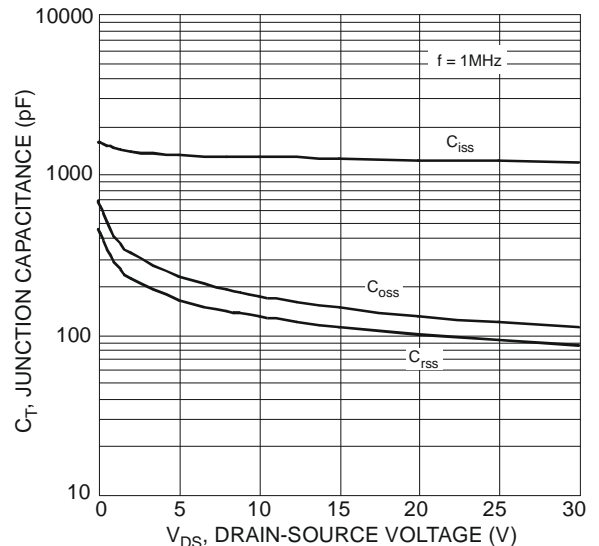


Figure 22 Typical Junction Capacitance

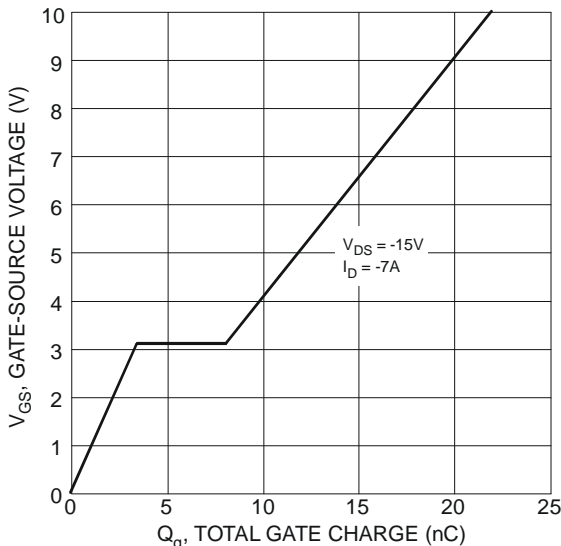


Figure 23 Gate-Charge Characteristics

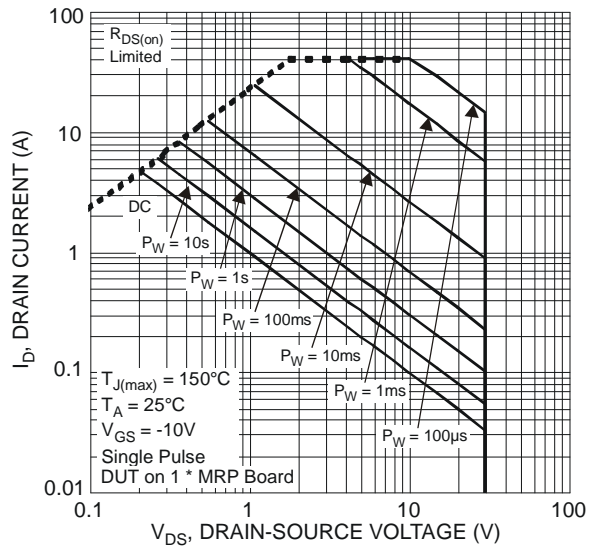
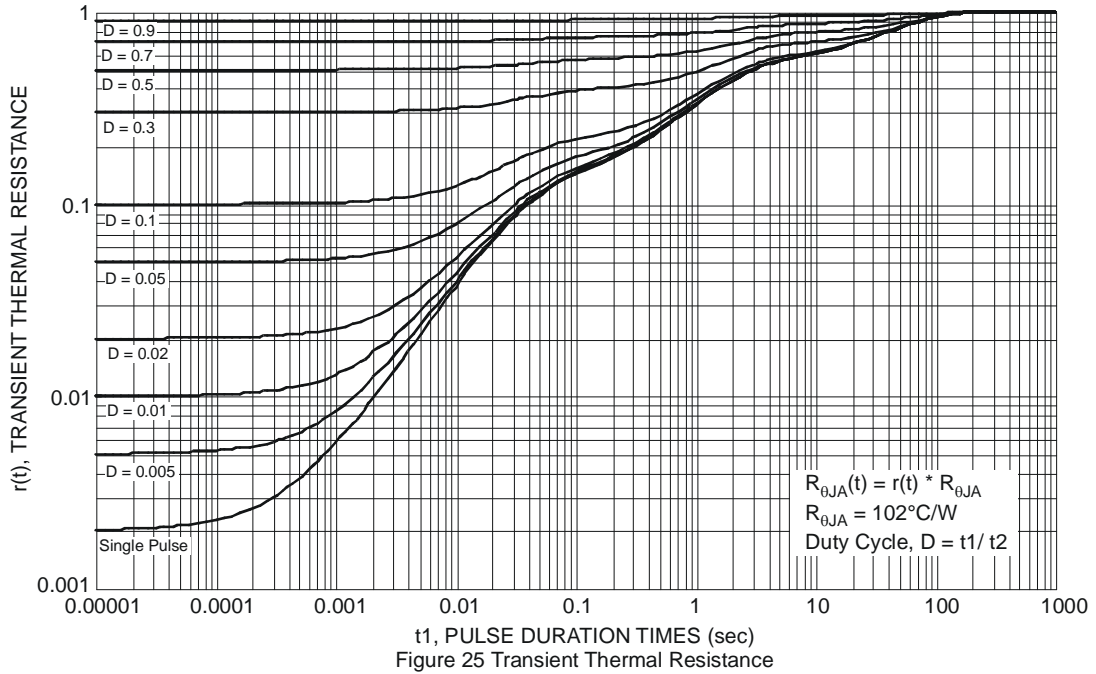


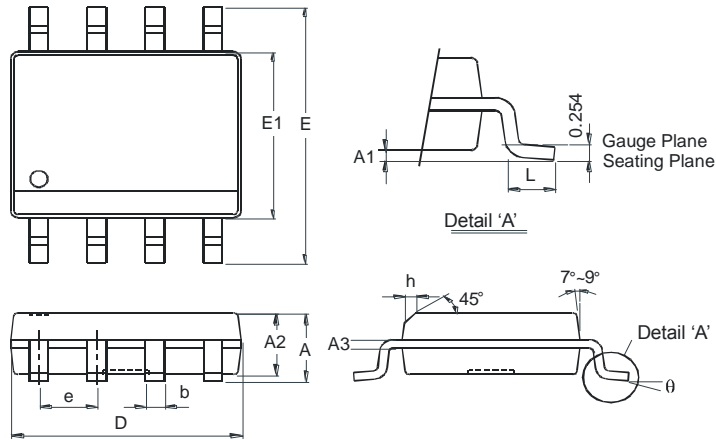
Figure 24 SOA, Safe Operation Area



Package Outline Dimensions

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

SO-8

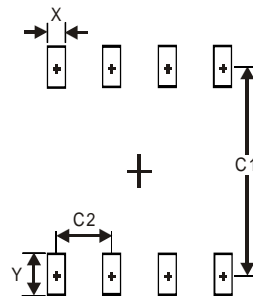


| SO-8 | | |
|-----------------------------|----------|------|
| Dim | Min | Max |
| A | — | 1.75 |
| A1 | 0.10 | 0.20 |
| A2 | 1.30 | 1.50 |
| A3 | 0.15 | 0.25 |
| b | 0.3 | 0.5 |
| D | 4.85 | 4.95 |
| E | 5.90 | 6.10 |
| E1 | 3.85 | 3.95 |
| e | 1.27 Typ | |
| h | — | 0.35 |
| L | 0.62 | 0.82 |
| θ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

Suggested Pad Layout

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

SO-8



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

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