

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

| Device | $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_A = +25^\circ\text{C}$ |
|--------|---------------|---------------------------------|------------------------------------|
| Q1 | 25V | 4Ω @ $V_{GS} = 4.5\text{V}$ | 0.4 A |
| Q2 | -30V | 80mΩ @ $V_{GS} = -12\text{V}$ | -3.2 A |
| | | 125mΩ @ $V_{GS} = -4.5\text{V}$ | -2.6 A |

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

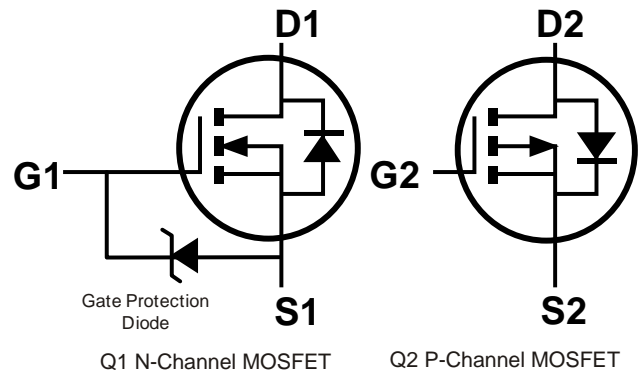
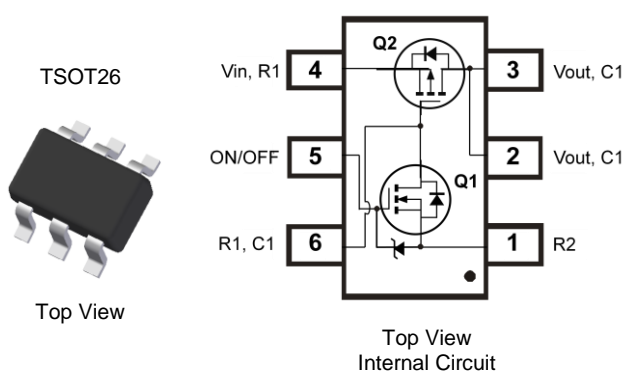
- DC-DC Converters
- Power Management Functions
- Load Switch

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Gate on N-Channel (>6kV Human Body Model)
- **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: TSOT26
- 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 Leadframe.
Solderable per MIL-STD-202, Method 208 
- Weight: 0.013 grams (Approximate)

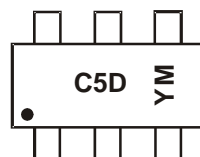


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|--------|---------------------|
| DMC25D0UVT-7 | TSOT26 | 3000 / Tape & Reel |
| DMC25D0UVT-13 | TSOT26 | 10000 / 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



C5D = Product Type Marking Code
YM or YM = Date Code Marking
Y or Y = Year (ex: C = 2015)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|------|------|------|------|------|------|------|------|
| Code | C | D | E | F | G | H | I |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

Maximum Ratings – Q1 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|------------------|------------|------|
| Drain-Source Voltage | V _{DSS} | 25 | V |
| Gate-Source Voltage | V _{GSS} | -0.5 +8 | V |
| Continuous Drain Current (Note 5) V _{GS} = 4.5V | I _D | 0.4 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | I _S | 1.2 | A |
| Pulsed Drain Current (Note 6) | I _{DM} | 1.5 | A |

Maximum Ratings – Q2 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|------------------|------------------------|------------|
| Drain-Source Voltage | V _{DSS} | -30 | V |
| Gate-Source Voltage | V _{GSS} | ±12 | V |
| Continuous Drain Current (Note 5) V _{GS} = -10V | I _D | Steady State Note 9 | -3.2 A |
| | | | -14.4 A |
| Continuous Drain Current (Note 5) V _{GS} = -4.5V | I _D | -2.6 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | I _S | -1.2 | A |
| Pulsed Drain Current (Note 6) | I _{DM} | -20 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|------------------------|-------------|
| Power Dissipation (Note 5) | P _D | 1.2 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | Steady State Note 9 | 101 °C/W |
| | | | 5 °C/W |
| Thermal Resistance, Junction to Case (Note 5) | R _{θJC} | 37 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics – Q1 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|------|------|-----|------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 25 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | 100 | nA | V _{GS} = 8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 0.65 | 0.85 | 1.5 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 3.8 | 4 | Ω | V _{GS} = 4.5V, I _D = 0.4A |
| Diode Forward Voltage | V _{SD} | — | 0.76 | 1.2 | V | V _{GS} = 0V, I _S = 0.29A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 26.2 | — | pF | V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 7.1 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 2.7 | — | | |
| Gate Resistance | R _g | — | 84.5 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 0.4 | — | nC | V _{DS} = 5V, I _D = 0.2A |
| Total Gate Charge (V _{GS} = 8V) | Q _g | — | 0.7 | — | | |
| Gate-Source Charge | Q _{gs} | — | 0.1 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 0.1 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 3 | — | ns | V _{GS} = 4.5V, V _{DS} = 6V, R _G = 50Ω, I _D = 0.5A |
| Turn-On Rise Time | t _R | — | 2.3 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 7.7 | — | | |
| Turn-Off Fall Time | t _F | — | 3.7 | — | | |

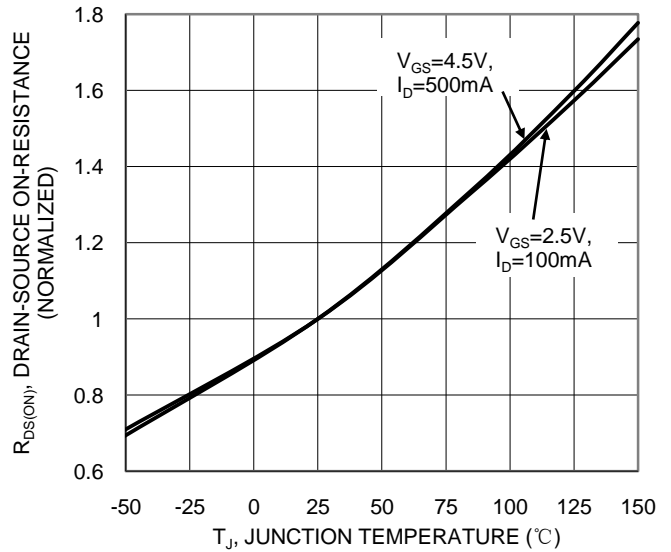
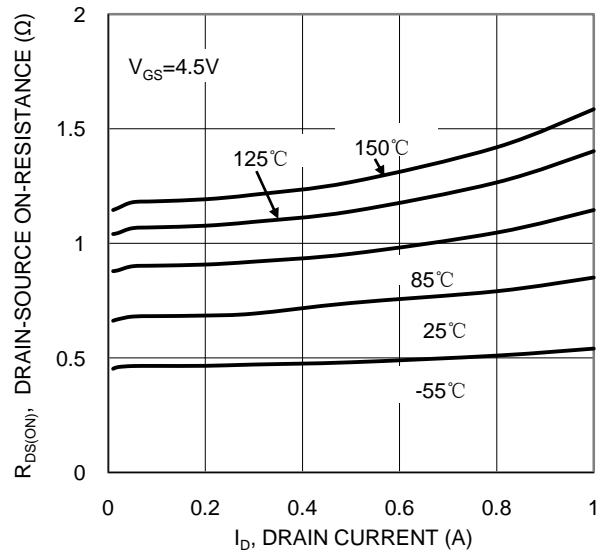
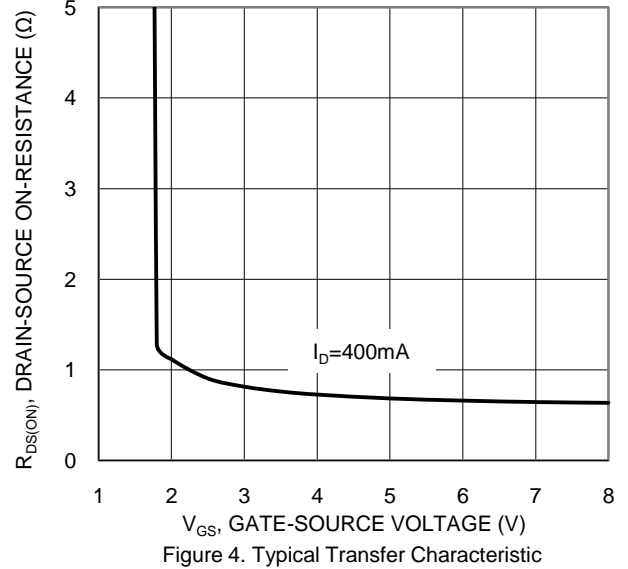
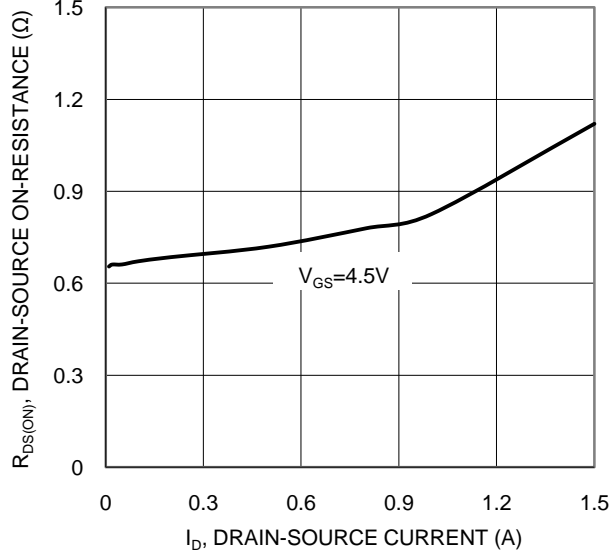
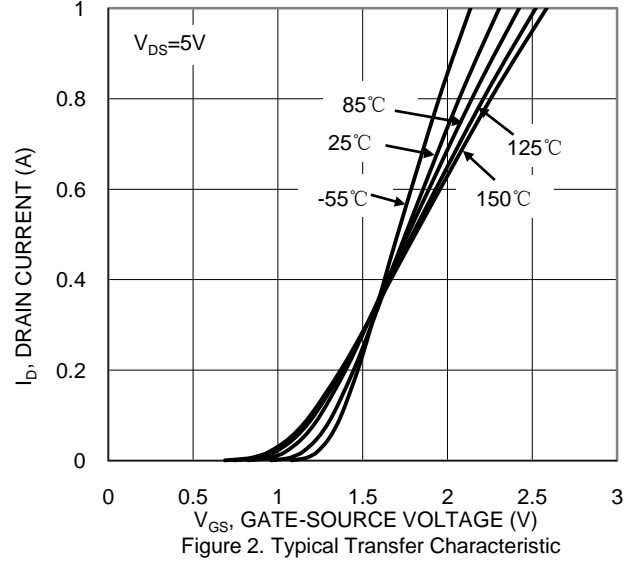
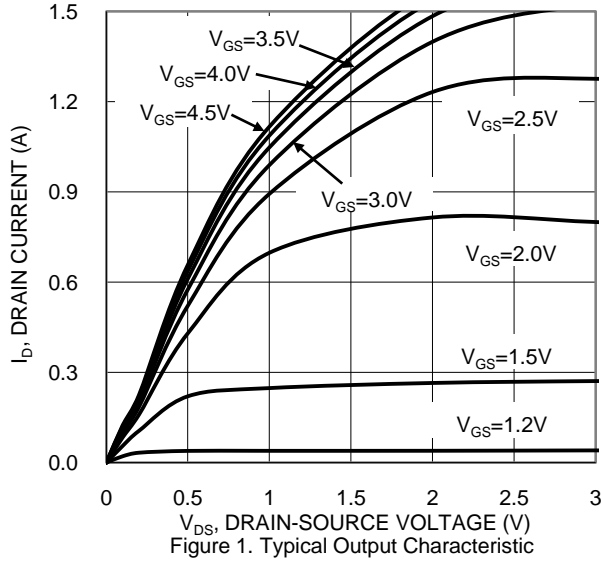
- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Repetitive rating, pulse width limited by junction temperature.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.
 - Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%.

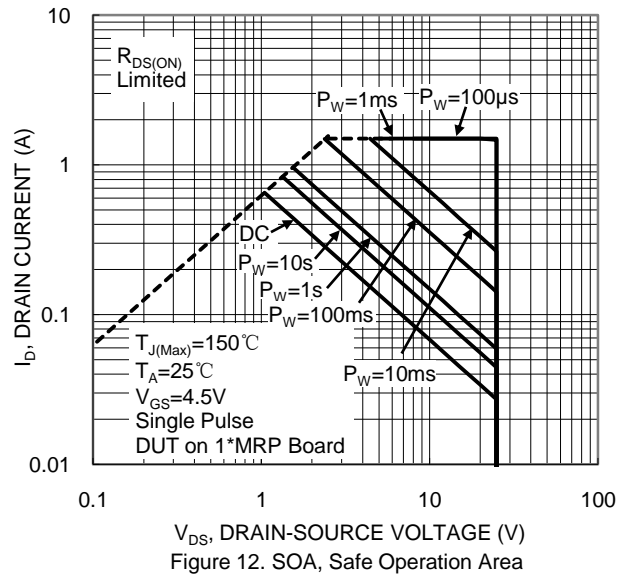
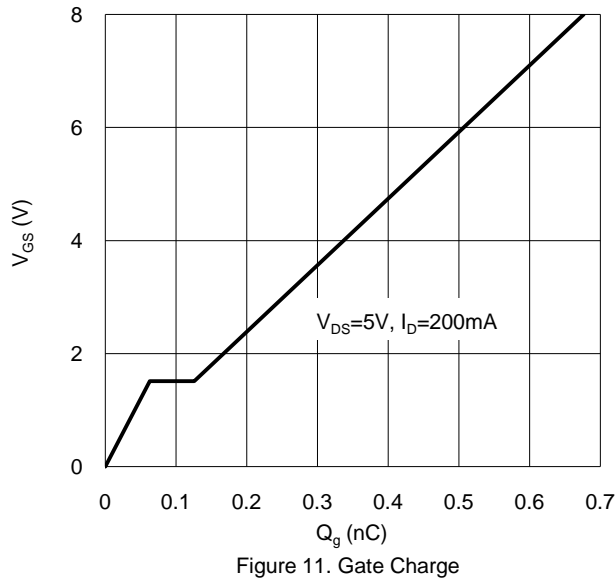
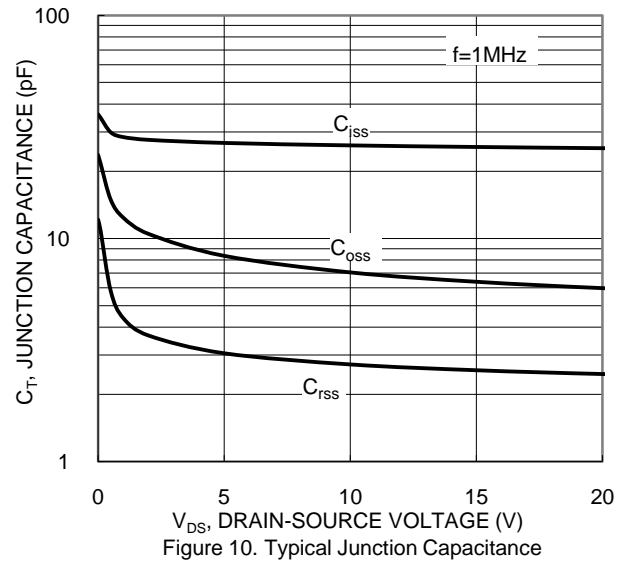
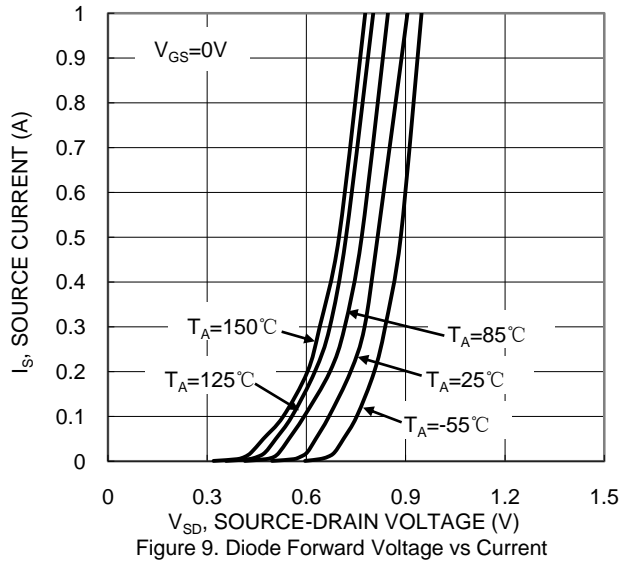
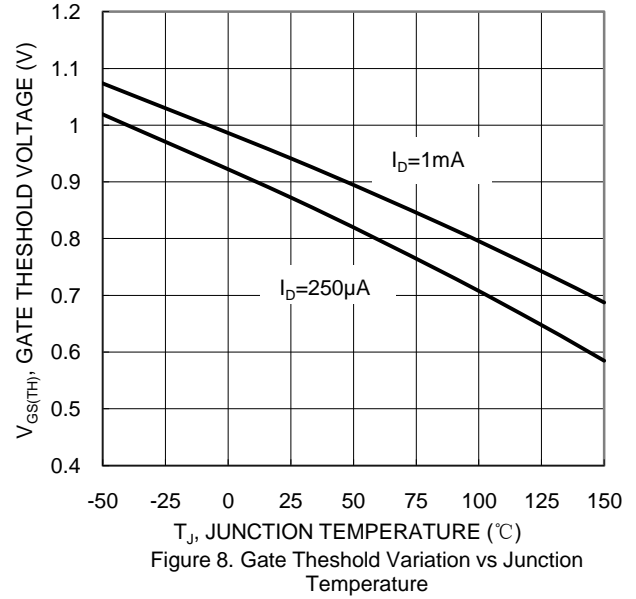
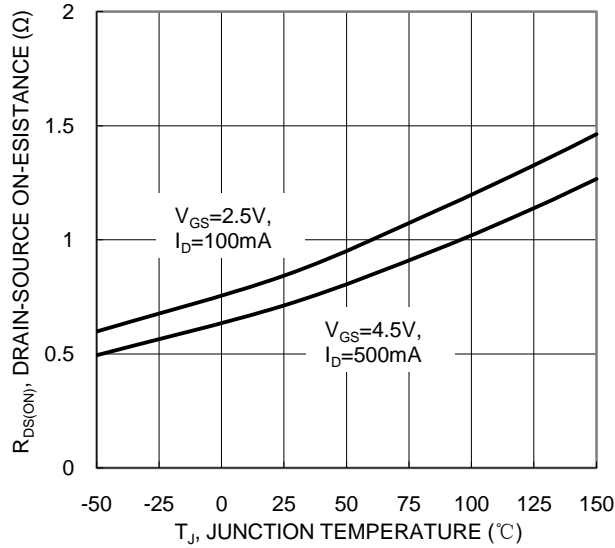
Electrical Characteristics – Q2 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|------|------|------|------|--|
| OFF CHARACTERISTICS (Note 10) | | | | | | |
| 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} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 10) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -0.5 | -0.9 | -1.5 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 59 | 80 | mΩ | V _{GS} = -12V, I _D = -2.3A |
| | | — | 75 | 125 | | V _{GS} = -4.5V, I _D = -1.9A |
| | | — | — | 300 | | V _{GS} = -2.5V, I _D = -1A |
| Diode Forward Voltage | V _{SD} | — | -0.7 | -1.2 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 11) | | | | | | |
| Input Capacitance | C _{iss} | — | 854 | — | pF | V _{DS} = -15V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | — | 53 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 47 | — | | |
| Gate Resistance | R _g | — | 11 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 10 | — | nC | V _{DS} = -15V, I _D = -4A |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 21 | — | | |
| Gate-Source Charge | Q _{gs} | — | 1.5 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 2.8 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 3.5 | — | ns | V _{GS} = -10V, V _{DS} = -15V, R _G = 6Ω, I _D = -1A |
| Turn-On Rise Time | t _R | — | 3.3 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 61.4 | — | | |
| Turn-Off Fall Time | t _F | — | 14.6 | — | | |

Notes: 10. Short duration pulse test used to minimize self-heating effect.
11. Guaranteed by design. Not subject to production testing.

Typical Characteristics - N-CHANNEL





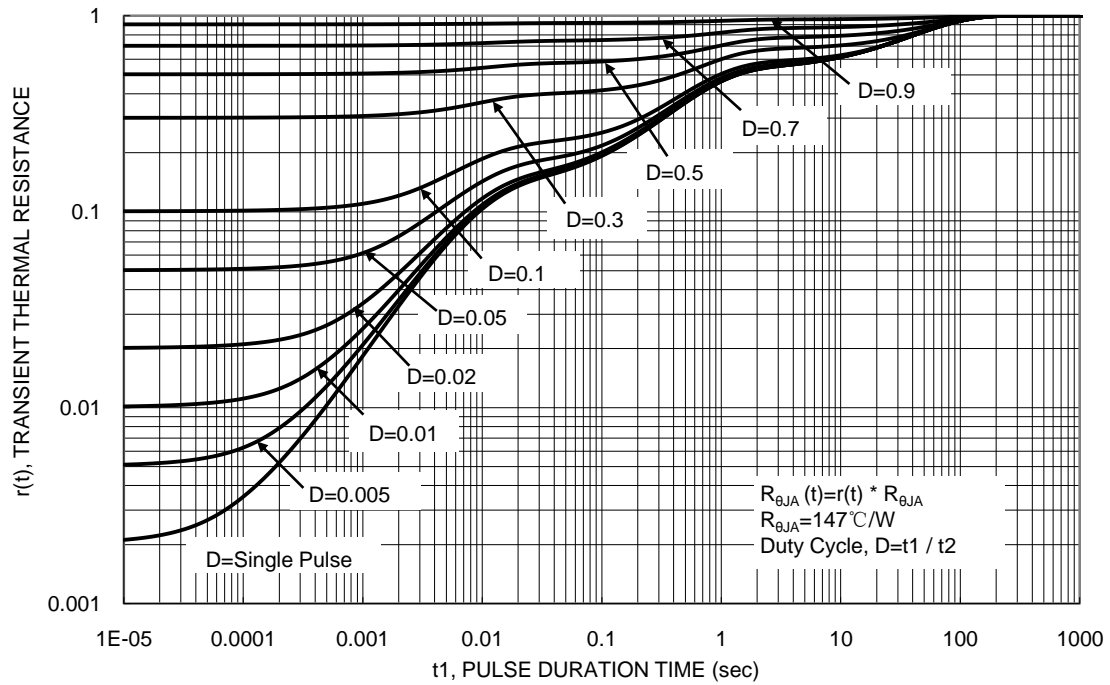


Figure 13. Transient Thermal Resistance

Typical Characteristics - P-CHANNEL

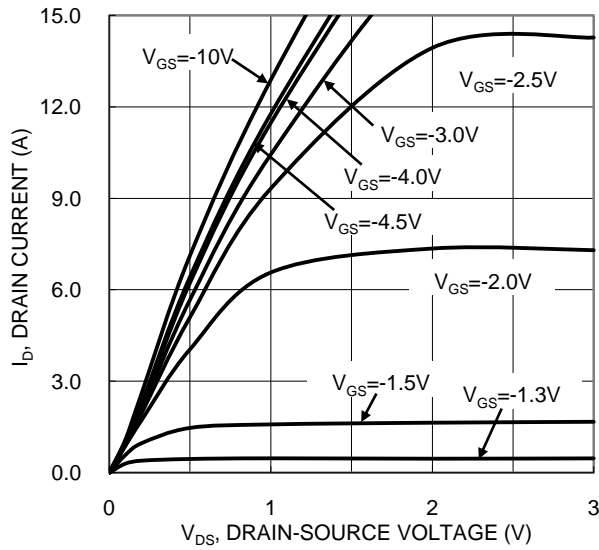


Figure 14. Typical Output Characteristic

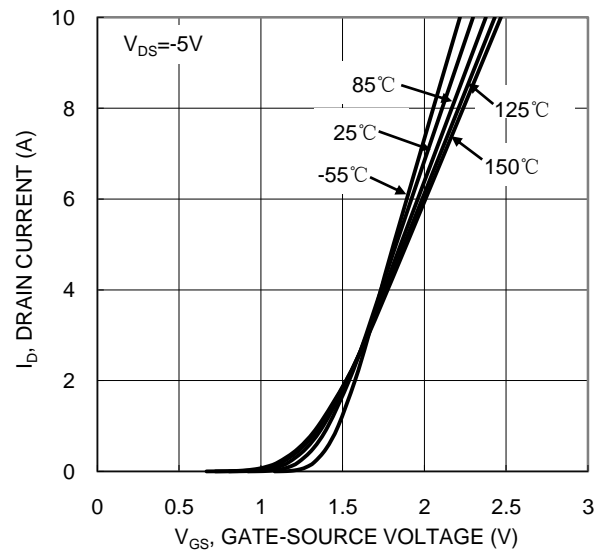


Figure 15. Typical Transfer Characteristic

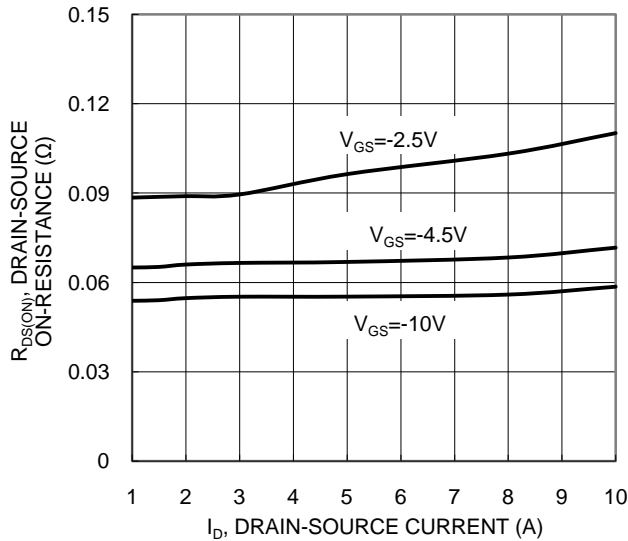


Figure 16. Typical On-Resistance vs. Drain Current and Gate Voltage

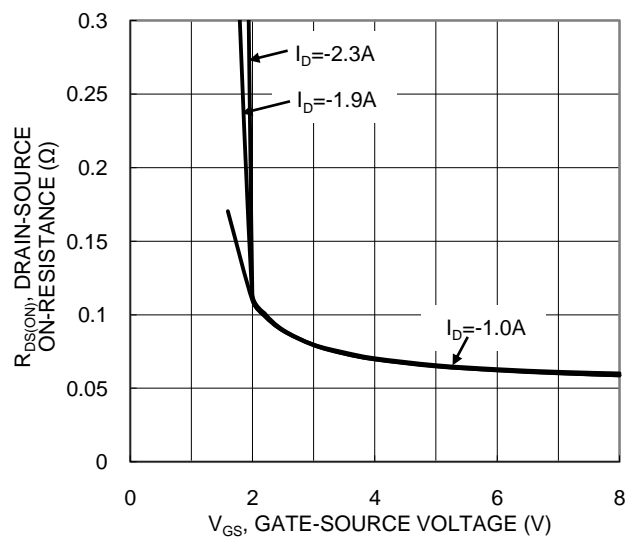


Figure 17. Typical Transfer Characteristic

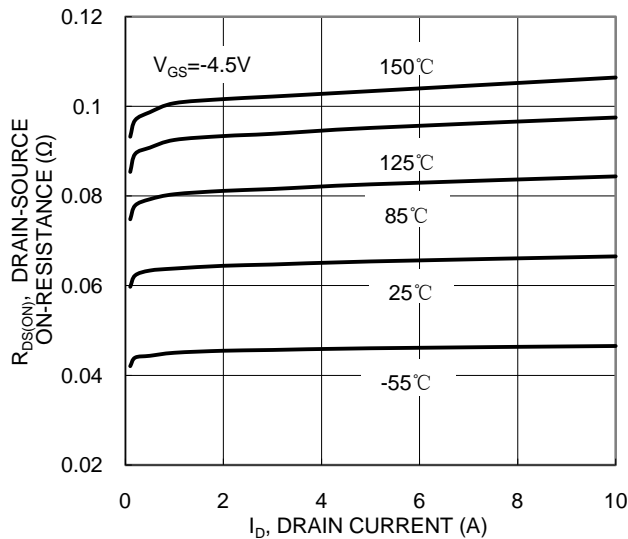


Figure 18. Typical On-Resistance vs. Drain Current and Temperature

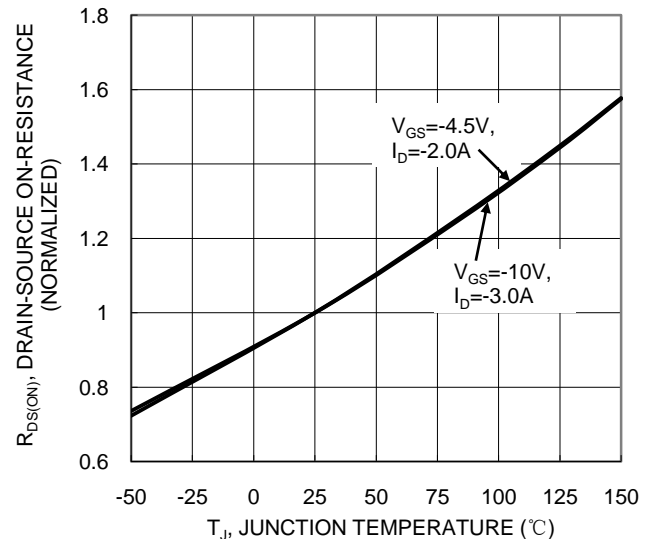


Figure 19. On-Resistance Variation with Temperature

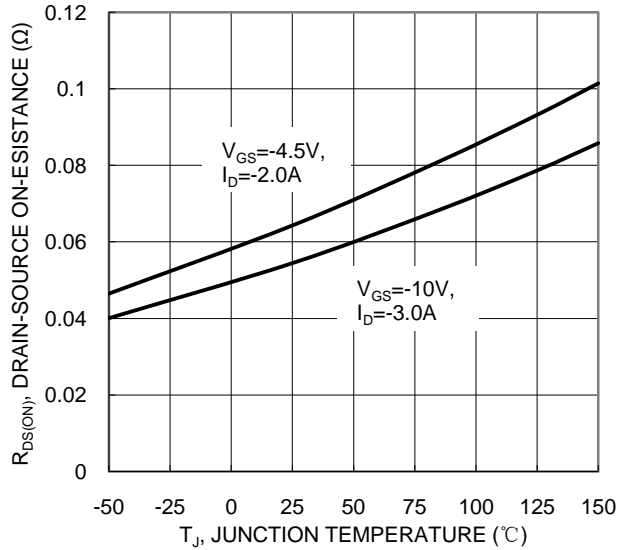


Figure 20. On-Resistance Variation with Temperature

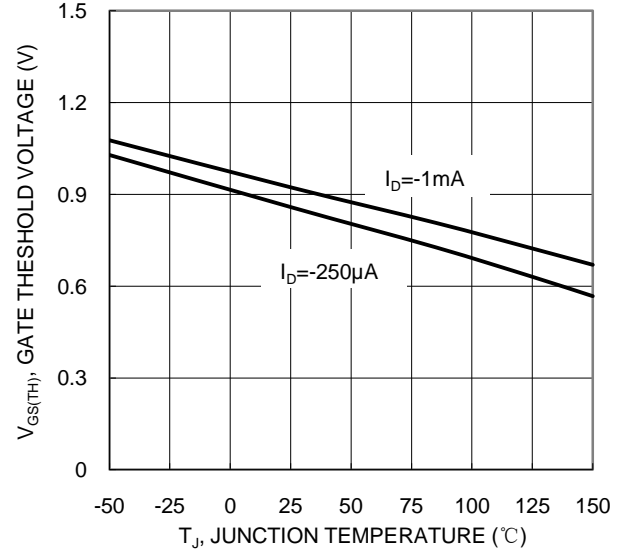


Figure 21. Gate Threshold Variation vs Junction Temperature

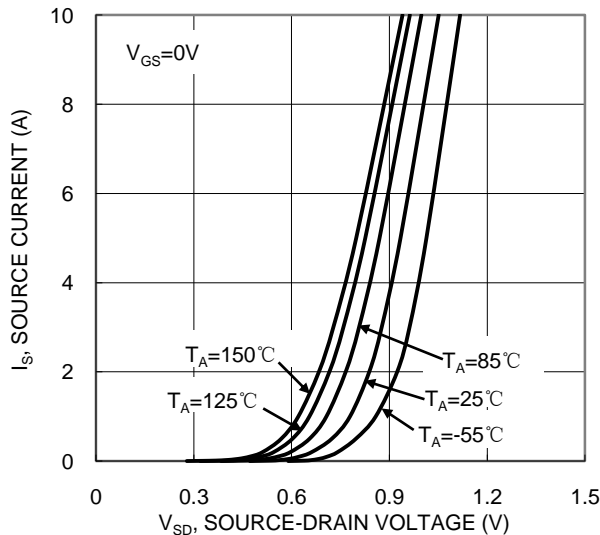


Figure 22. Diode Forward Voltage vs Current

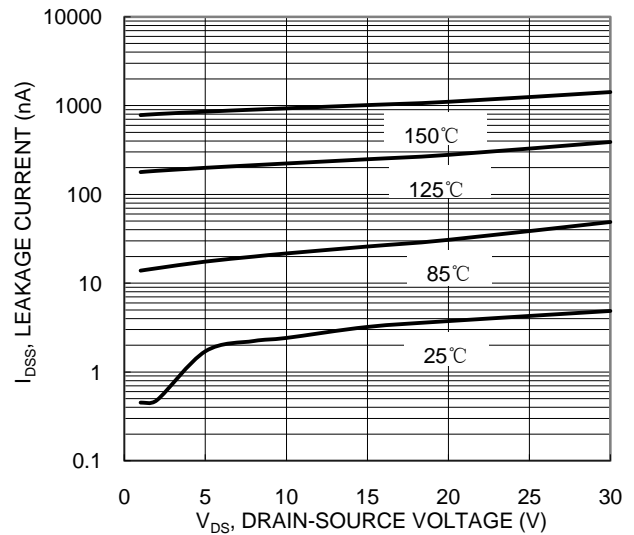


Figure 23. Typical Drain-Source Leakage Current vs Voltage

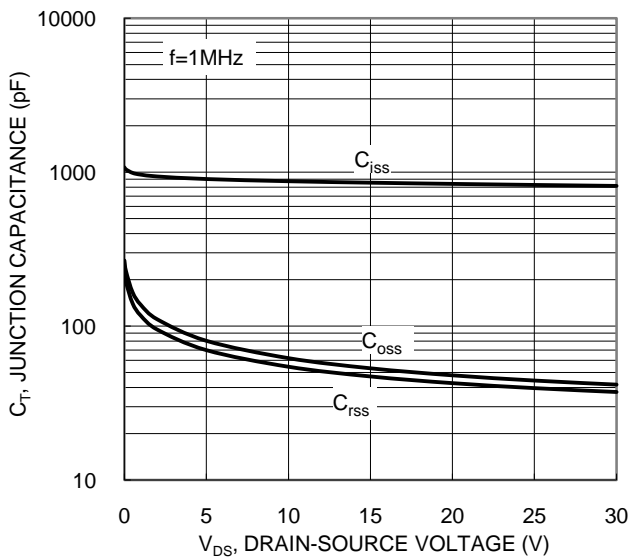


Figure 24. Typical Junction Capacitance

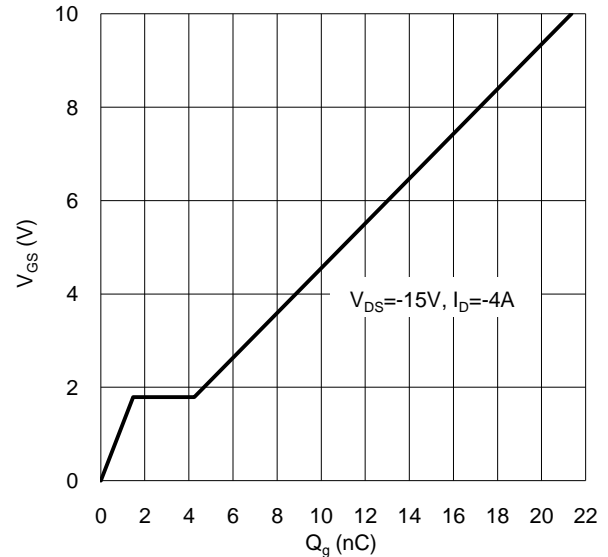
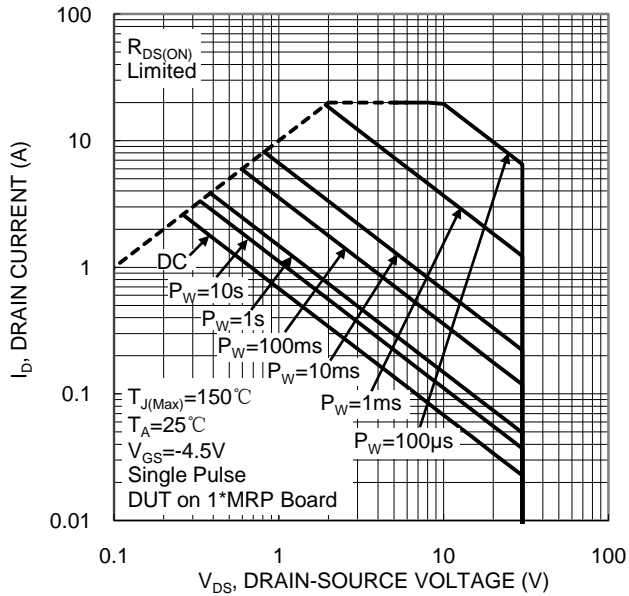
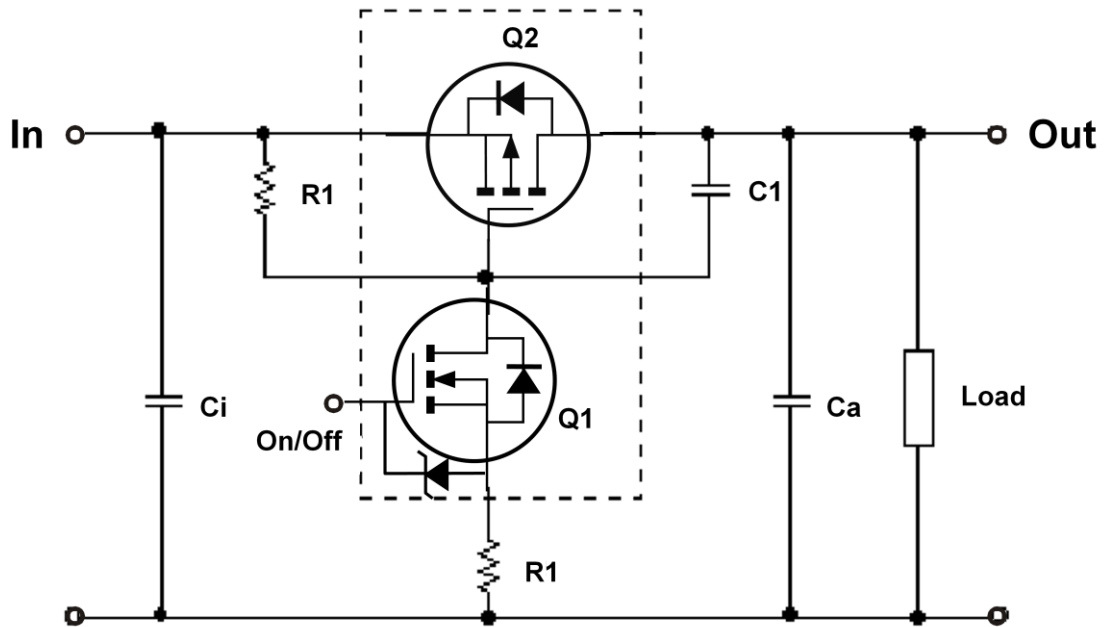


Figure 25. Gate Charge

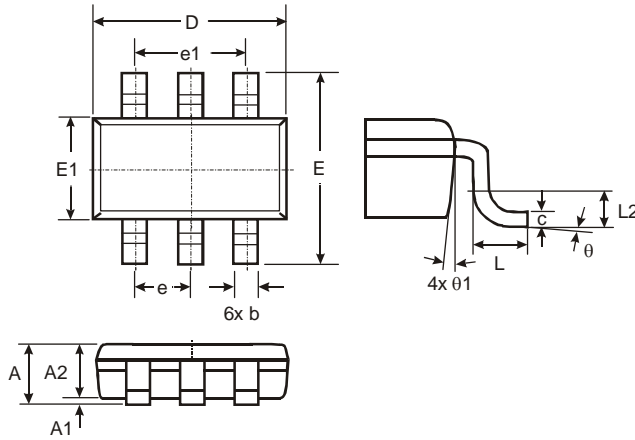


Application Circuit



Package Outline Dimensions

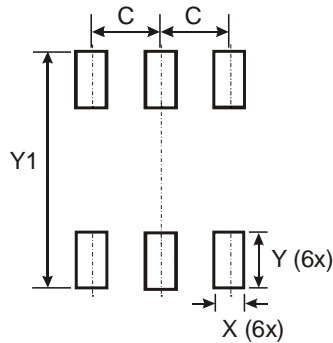
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| TSOT26 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | — | 1.00 | — |
| A1 | 0.01 | 0.10 | — |
| A2 | 0.84 | 0.90 | — |
| D | — | — | 2.90 |
| E | — | — | 2.80 |
| E1 | — | — | 1.60 |
| b | 0.30 | 0.45 | — |
| c | 0.12 | 0.20 | — |
| e | — | — | 0.95 |
| e1 | — | — | 1.90 |
| L | 0.30 | 0.50 | — |
| L2 | — | — | 0.25 |
| θ | 0° | 8° | 4° |
| θ1 | 4° | 12° | — |
| 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) |
|------------|---------------|
| C | 0.950 |
| X | 0.700 |
| Y | 1.000 |
| Y1 | 3.199 |

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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