## Product Summary

| Device | $BV_{DSS}$ | $R_{DS(ON)}$ | $I_D$ $T_A$ = +25°C |
|---|---|---|---|
| Q1 N-Channel | 12V | 25mΩ @ $V_{GS}$ = 4.5V | 6.1A |
| | | 32mΩ @ $V_{GS}$ = 2.5V | 5.4A |
| | | 40mΩ @ $V_{GS}$ = 1.8V | 4.9A |
| Q2 P-Channel | -20V | 80mΩ @ $V_{GS}$ = -4.5V | -3.5A |
| | | 100mΩ @ $V_{GS}$ = -2.5V | -3.1A |
| | | 140mΩ @ $V_{GS}$ = -1.8V | -2.6A |
| | | 210mΩ @ $V_{GS}$ = -1.5V | -2.1A |

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected Gate**
- **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 contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

## 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

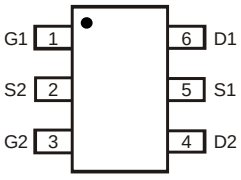
- Backlighting
- DC-DC Converters
- Power Management Functions

## Mechanical Data

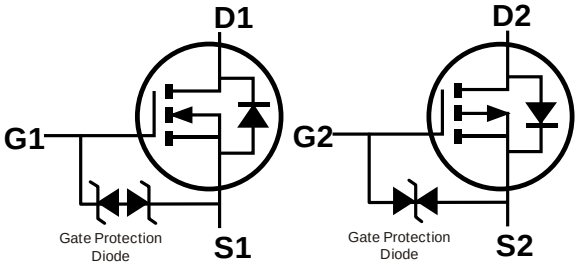
- Case: TSOT26
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.013 grams (Approximate)


TSOT26

Top View




Top View




Q1 N-Channel

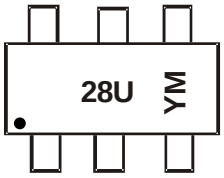
Q2 P-Channel

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMC1028UVT-7 | TSOT26 | 3,000/Tape & Reel |
| DMC1028UVT-13 | TSOT26 | 10,000/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




28U = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$= Year (ex: G = 2019)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|
| Code | E | F | G | H | I | J | K | L | M |

| 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 (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Q1 N-Channel | Q2 P-Channel | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 12 | -20 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±8 | ±8 | V |
| Continuous Drain Current (Note 6)<br>N-Channel: $V_{GS}$ = 4.5V<br>P-Channel: $V_{GS}$ = -4.5V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 6.1<br>4.7 | -3.5<br>-2.7 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | $I_S$ | 1.4 | -1.4 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{DM}$ | 35 | -20 | A |

## Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | | $P_D$ | 0.8 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | $R_{\theta JA}$ | 157 | °C/W |
| | t<5s | | 102 | |
| Total Power Dissipation (Note 6) | | $P_D$ | 1.2 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | $R_{\theta JA}$ | 108 | °C/W |
| | t<5s | | 64 | |
| Thermal Resistance, Junction to Case (Note 6) | | $R_{\theta JC}$ | 18 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics – Q1 N-CHANNEL (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 12 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current $T_J$ = +25°C | $I_{DSS}$ | — | — | 1.0 | µA | $V_{DS}$ = 12V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±10 | µA | $V_{GS}$ = ±8V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS** (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 0.4 | — | 1 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 17 | 25 | mΩ | $V_{GS}$ = 4.5V, $I_D$ = 5.2A |
| | | — | 21 | 32 | | $V_{GS}$ = 2.5V, $I_D$ = 4.8A |
| | | — | 30 | 40 | | $V_{GS}$ = 1.8V, $I_D$ = 2.5A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.7 | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 1A |
| **DYNAMIC CHARACTERISTICS** (Note 8) | | | | | | |
| Input Capacitance | $C_{ISS}$ | — | 787 | — | pF | $V_{DS}$ = 6V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{OSS}$ | — | 203 | — | pF | |
| Reverse Transfer Capacitance | $C_{RSS}$ | — | 177 | — | pF | |
| Gate Resistance | $R_G$ | — | 4.8 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge ($V_{GS}$ = 4.5V) | $Q_G$ | — | 10.5 | — | nC | $V_{DS}$ = 6V, $I_D$ = 6.8A |
| Total Gate Charge ($V_{GS}$ = 8V) | | — | 18.5 | — | nC | |
| Gate-Source Charge | $Q_{GS}$ | — | 1.2 | — | nC | |
| Gate-Drain Charge | $Q_{GD}$ | — | 2.9 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 4.6 | — | ns | $V_{DD}$ = 6V, $V_{GS}$ = 4.5V, $R_L$ = 1.1Ω, $R_G$ = 1Ω |
| Turn-On Rise Time | $t_R$ | — | 9.4 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 15.7 | — | ns | |
| Turn-Off Fall Time | $t_F$ | — | 3.7 | — | ns | |
| Body Diode Reverse Recovery Time | $t_{RR}$ | — | 12.0 | — | ns | $I_S$ = 5.4A, di/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | $Q_{RR}$ | — | 1.8 | — | nC | $I_S$ = 5.4A, di/dt = 100A/µs |

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

## Electrical Characteristics – Q2 P-CHANNEL (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -20 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current $T_J$ = +25°C | $I_{DSS}$ | — | — | -1.0 | µA | $V_{DS}$ = -20V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±10 | µA | $V_{GS}$ = ±8V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS** (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | -0.4 | — | -1 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 55 | 80 | mΩ | $V_{GS}$ = -4.5V, $I_D$ = -3.8A |
| | | — | 70 | 100 | | $V_{GS}$ = -2.5V, $I_D$ = -3.3A |
| | | — | 88 | 140 | | $V_{GS}$ = -1.8V, $I_D$ = -1.0A |
| | | — | 110 | 210 | | $V_{GS}$ = -1.5V, $I_D$ = -0.5A |
| Diode Forward Voltage | $V_{SD}$ | — | -0.7 | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -1A |
| **DYNAMIC CHARACTERISTICS** (Note 8) | | | | | | |
| Input Capacitance | $C_{ISS}$ | — | 576 | — | pF | $V_{DS}$ = -10V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{OSS}$ | — | 87 | — | pF | |
| Reverse Transfer Capacitance | $C_{RSS}$ | — | 71 | — | pF | |
| Gate Resistance | $R_G$ | — | 15 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge ($V_{GS}$ = -4.5V) | $Q_G$ | — | 6.7 | — | nC | $V_{DS}$ = -10V, $I_D$ = -4.9A |
| Total Gate Charge ($V_{GS}$ = -8V) | | — | 11.5 | — | nC | |
| Gate-Source Charge | $Q_{GS}$ | — | 1.0 | — | nC | |
| Gate-Drain Charge | $Q_{GD}$ | — | 2.0 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 3.5 | — | ns | $V_{DD}$ = -10V, $V_{GS}$ = -4.5V, $R_L$ = 2.6Ω, $R_G$ = 1Ω |
| Turn-On Rise Time | $t_R$ | — | 3.6 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 20.8 | — | ns | |
| Turn-Off Fall Time | $t_F$ | — | 12.7 | — | ns | |
| Body Diode Reverse Recovery Time | $t_{RR}$ | — | 13.1 | — | ns | $I_S$ = -3.9A, di/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | $Q_{RR}$ | — | 3.9 | — | nC | $I_S$ = -3.9A, di/dt = 100A/µs |

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

## Typical Characteristics – Q1 N-CHANNEL

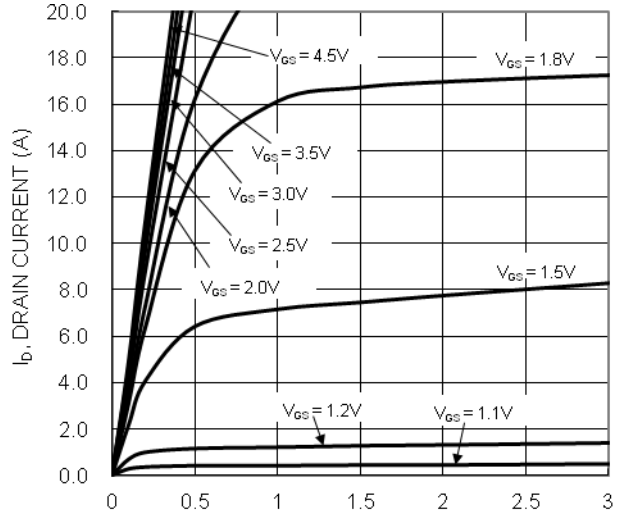


Figure 1 Typical Output Characteristic

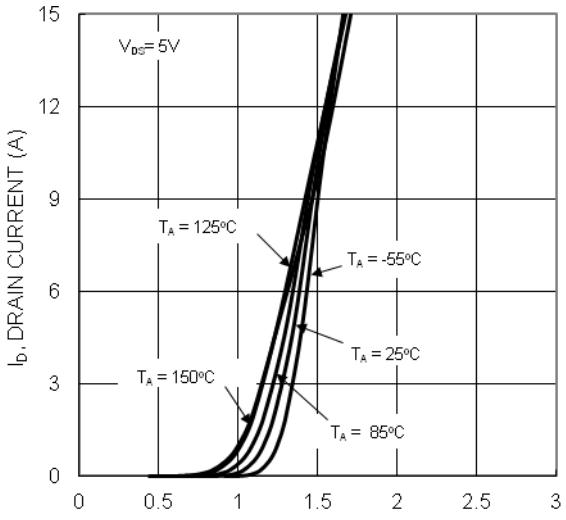


Figure 2 Typical Transfer Characteristic

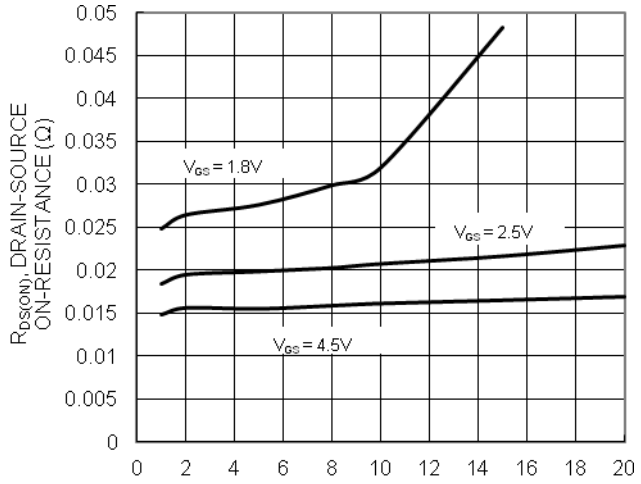


Figure 3 Typical On-Resistance vs Drain Current and Gate Voltage

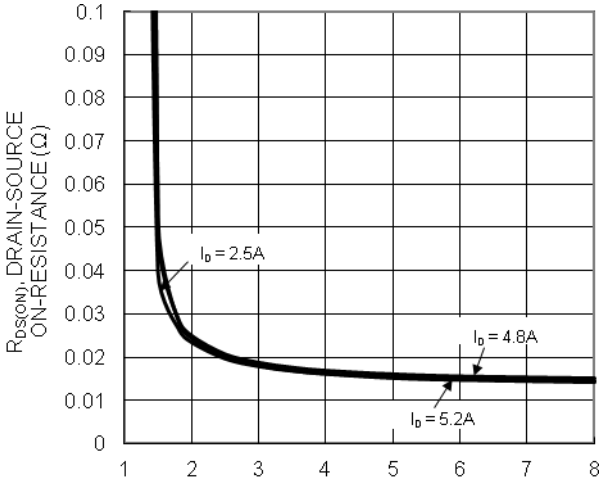


Figure 4 Typical Transfer Characteristic

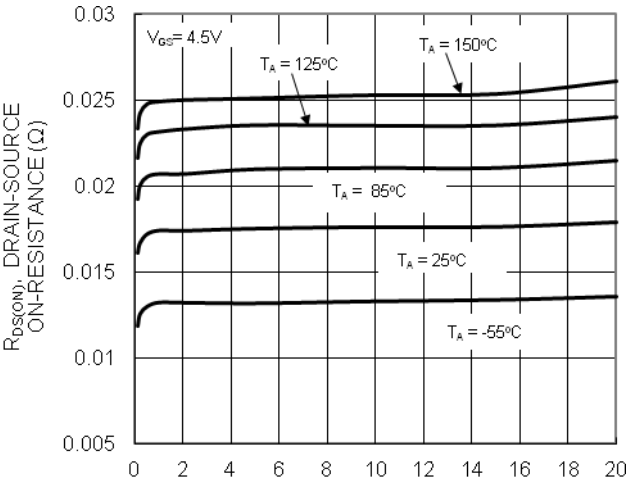


Figure 5 Typical On-Resistance vs Drain Current and Temperature

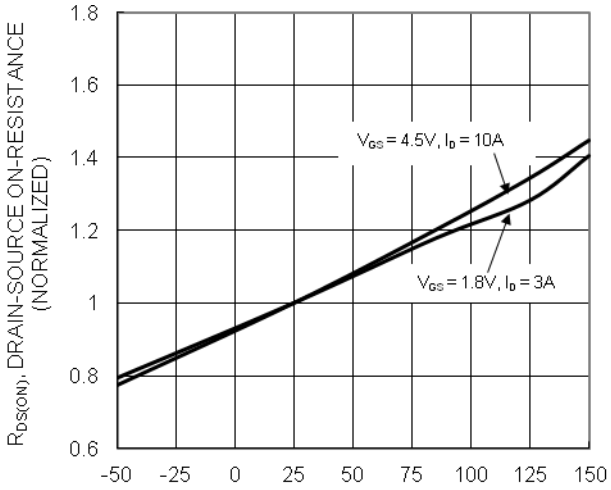


Figure 6 On-Resistance Variation with Temperature

## Typical Characteristics – Q1 N-CHANNEL (continued)

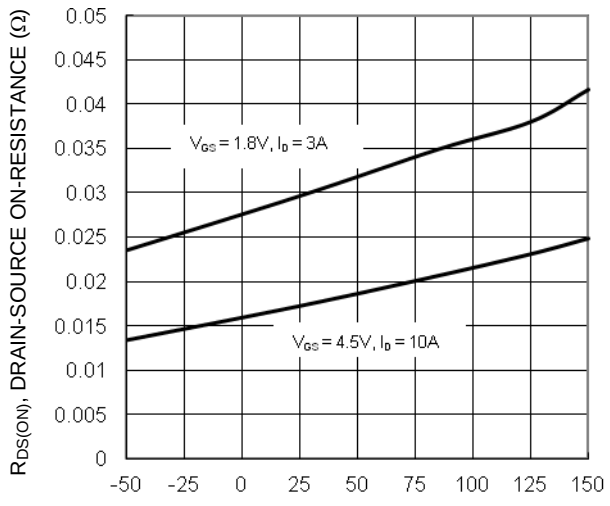



Figure 7 On-Resistance Variation with Temperature

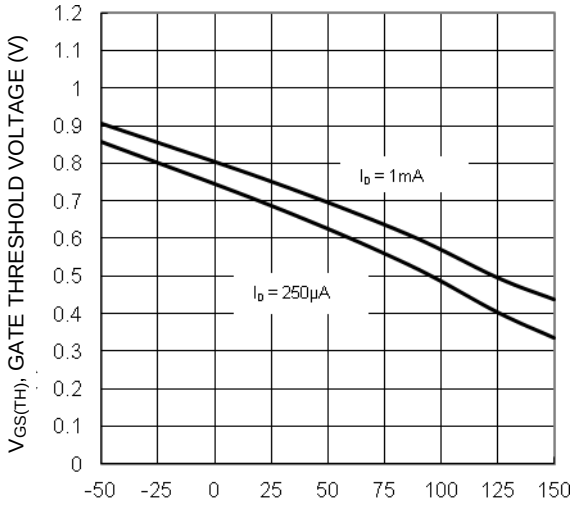



Figure 8 Gate Threshold Variation vs Junction Temperature

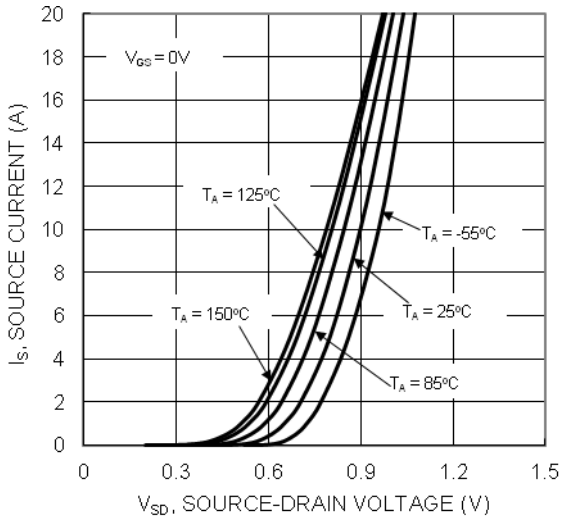



Figure 9 Diode Forward Voltage vs. Current

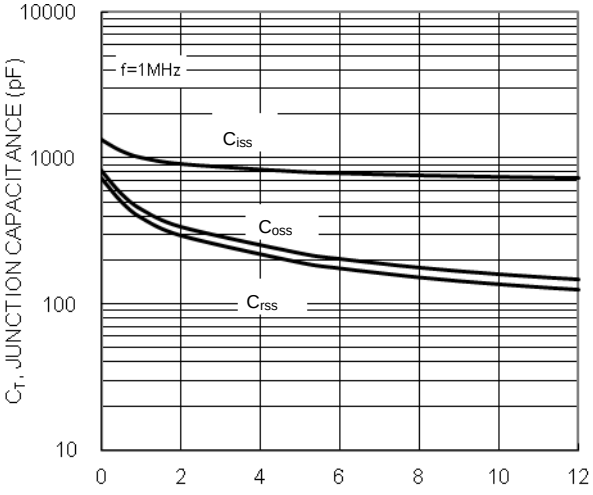
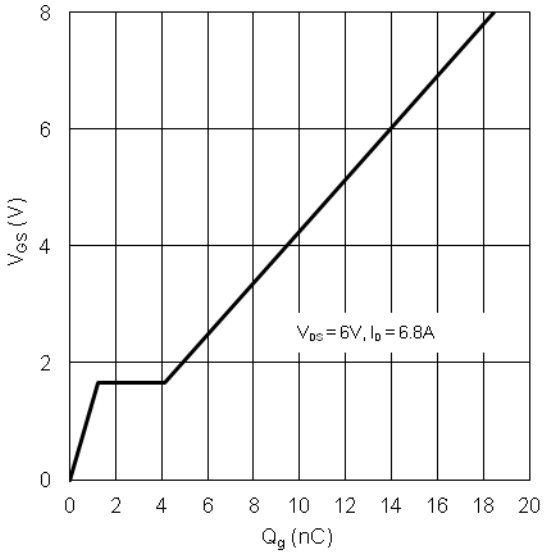



Figure 10 Typical Junction Capacitance




Fiure 11 Gate Charge

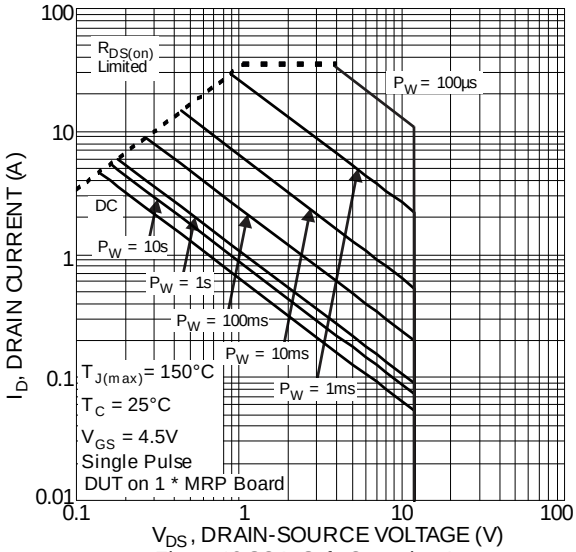



Figure 12 SOA, Safe Operation Area

## Typical Characteristics – Q2 P-CHANNEL

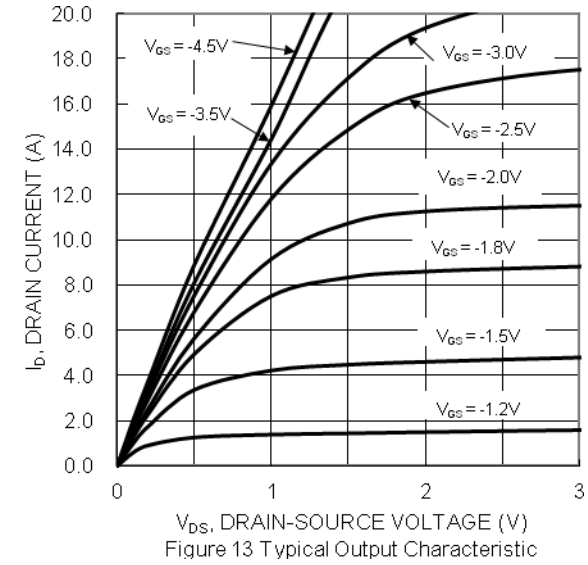


Figure 13 Typical Output Characteristic

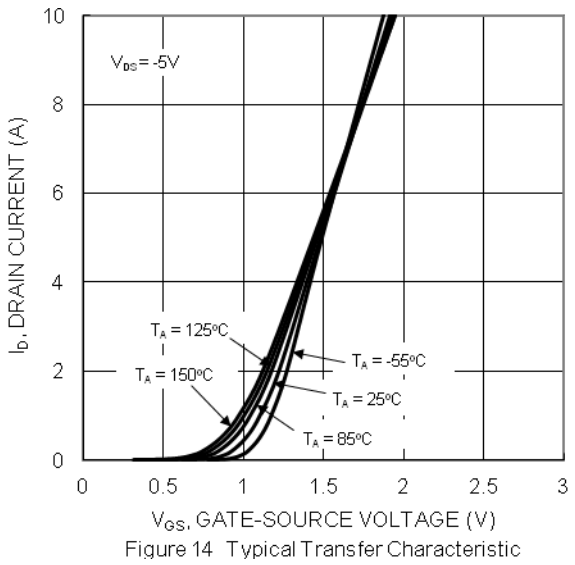


Figure 14 Typical Transfer Characteristic

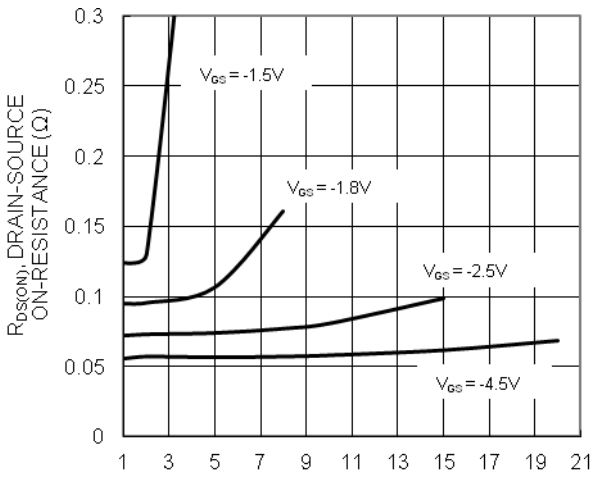


Figure 15 Typical On-Resistance vs Drain Current and Gate Voltage

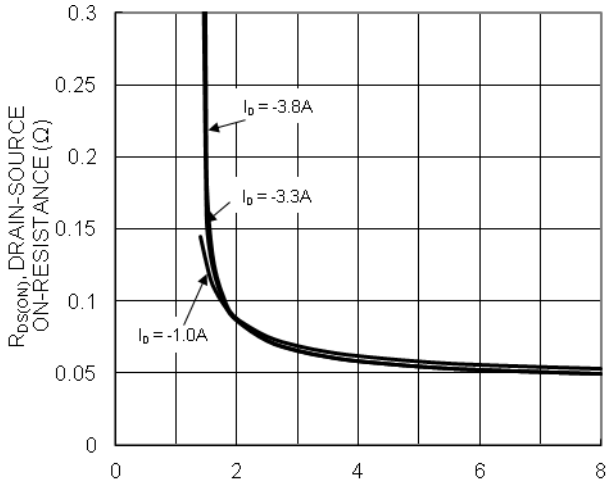


Figure 16 Typical Transfer Characteristic

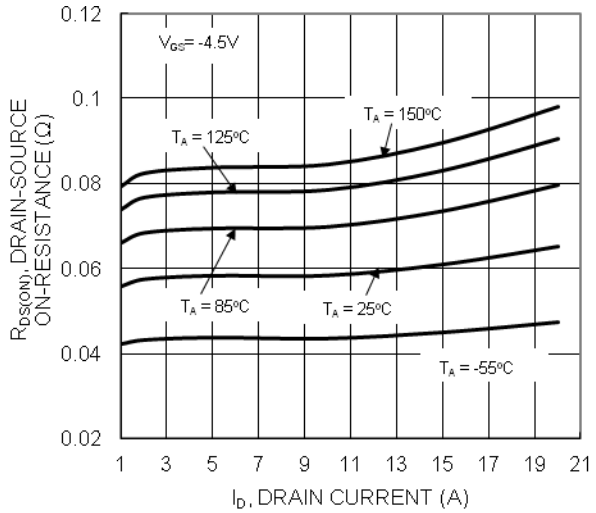


Figure 17 Typical On-Resistance vs Drain Current and Temperature

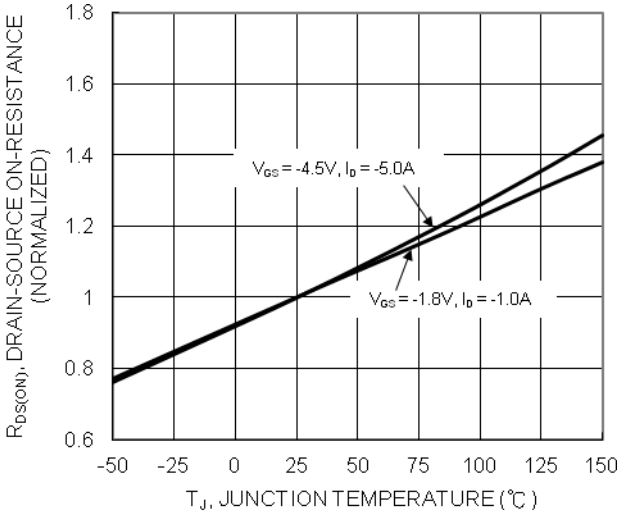


Figure 18 On-Resistance Variation with Temperature

## Typical Characteristics – Q2 P-CHANNEL (continued)

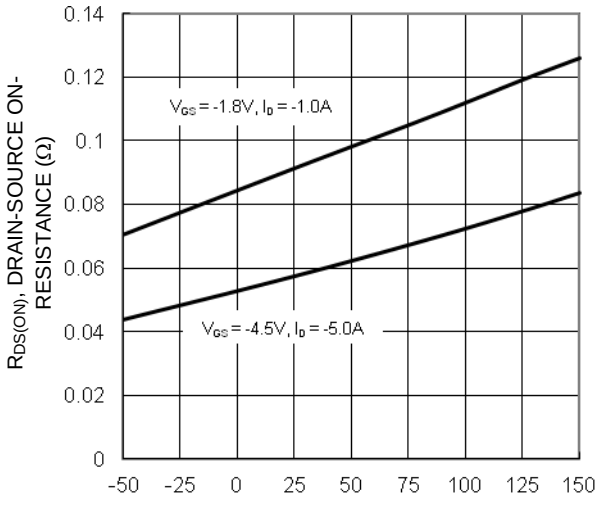



Figure 19 On-Resistance Variation with Temperature

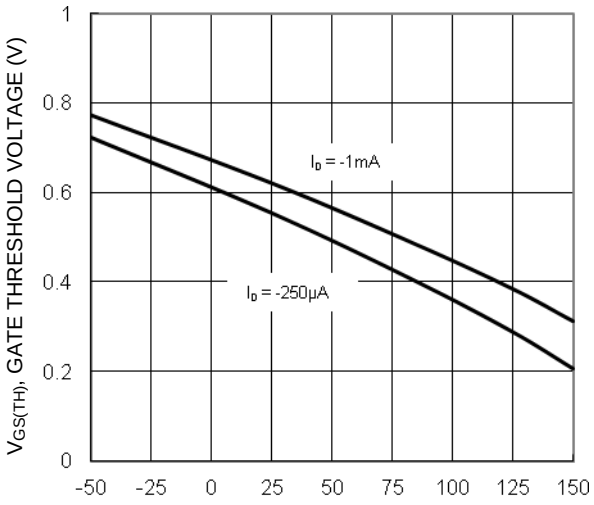



Figure 20 Gate Threshold Variation vs Junction Temperature

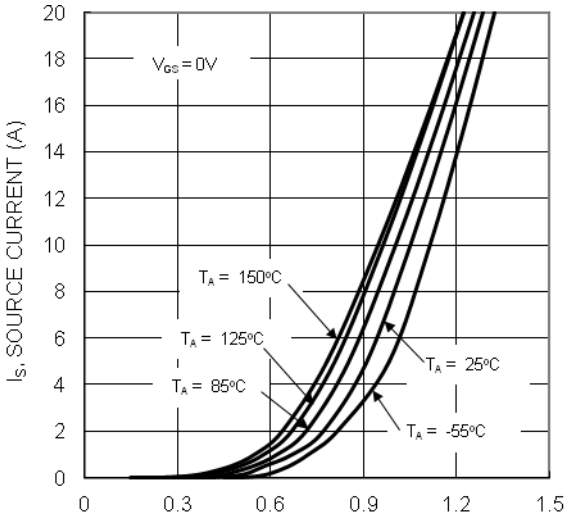



Figure 21 Diode Forward Voltage vs. Current

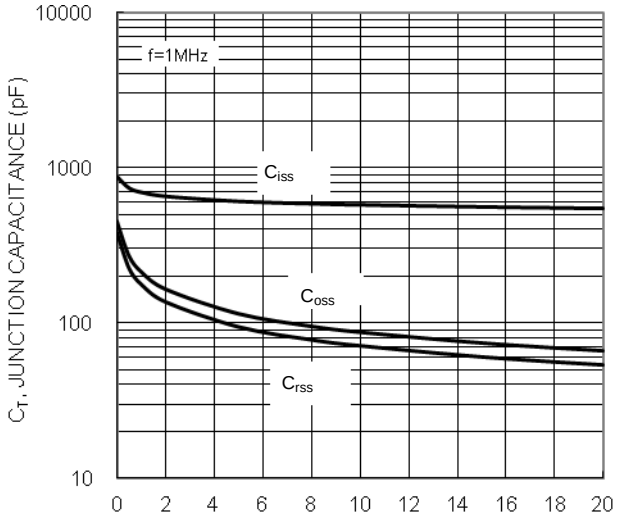



Figure 22 Typical Junction Capacitance

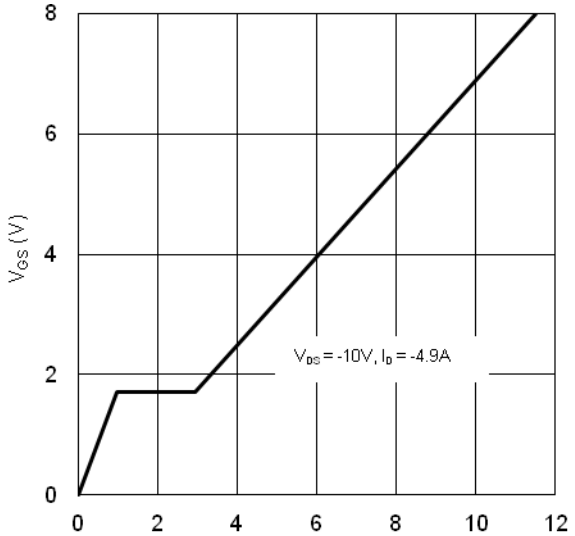



Figure 23 Gate Charge

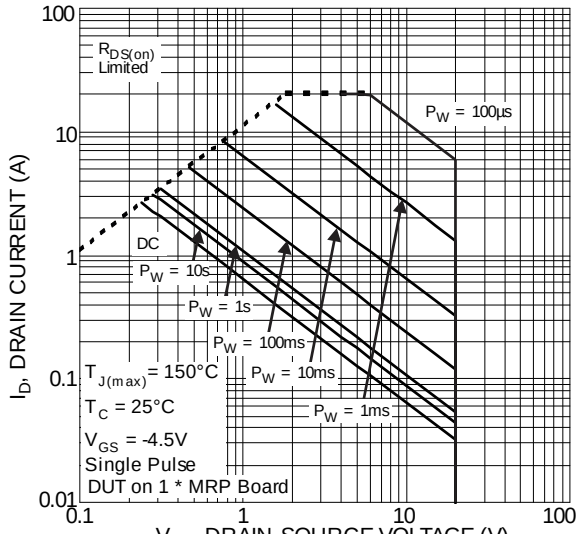



Figure 24 SOA, Safe Operation Area

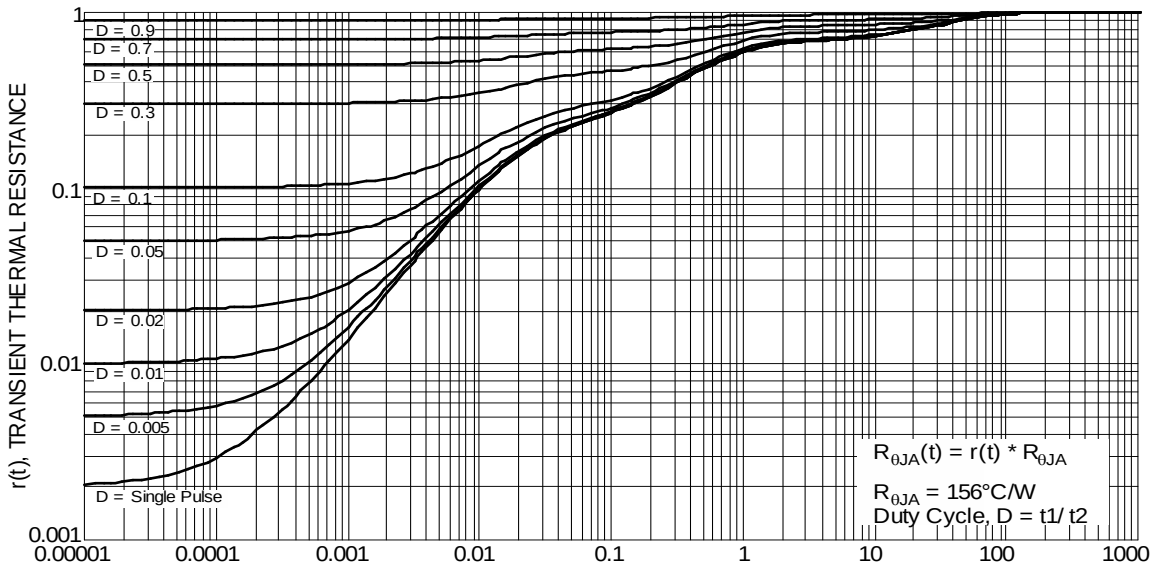
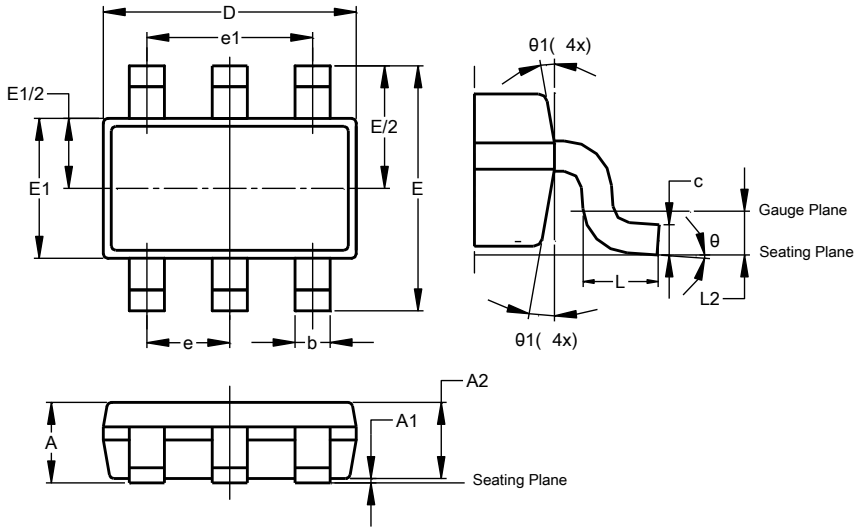



Figure 25 Transient Thermal Resistance

## Package Outline Dimensions

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

**TSOT26**

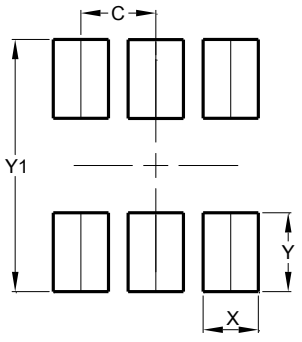



| TSOT26 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | – | 1.00 | – |
| **A1** | 0.010 | 0.100 | – |
| **A2** | 0.840 | 0.900 | – |
| **D** | 2.800 | 3.000 | 2.900 |
| **E** | 2.800 BSC | | |
| **E1** | 1.500 | 1.700 | 1.600 |
| **b** | 0.300 | 0.450 | – |
| **c** | 0.120 | 0.200 | – |
| **e** | 0.950 BSC | | |
| **e1** | 1.900 BSC | | |
| **L** | 0.30 | 0.50 | – |
| **L2** | 0.250 BSC | | |
| **θ** | 0° | 8° | 4° |
| **θ1** | 4° | 12° | – |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**TSOT26**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.950 |
| **X** | 0.700 |
| **Y** | 1.000 |
| **Y1** | 3.199 |

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