

Product Summary

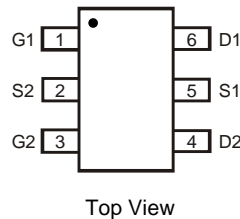
| Device | BV_{DSS} | $R_{DS(ON) MAX}$ | I_D $T_A = +25^\circ C$ |
|-----------|------------|----------------------------------|------------------------------|
| N-Channel | 20V | 35m Ω @ $V_{GS} = 4.5V$ | 4.6A |
| | | 43m Ω @ $V_{GS} = 2.5V$ | 4.2A |
| P-Channel | -20V | 74m Ω @ $V_{GS} = -4.5V$ | -3.2A |
| | | 110m Ω @ $V_{GS} = -2.5V$ | -2.7A |

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

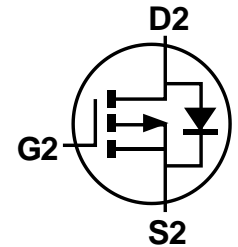
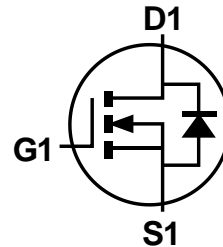


Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMC2053UVTQ is suitable for automotive applications requiring specific change control and is AEC-Q101 qualified, is PPAP capable, and is manufactured in IATF16949:2016 certified facilities.**

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)

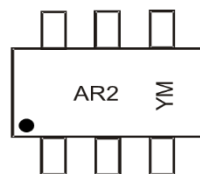


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|----------------|--------|---------------------|
| DMC2053UVTQ-7 | TSOT26 | 3000 / Tape & Reel |
| DMC2053UVTQ-13 | TSOT26 | 10000 / 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



AR2 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: G = 2019)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|------|------|------|------|------|------|------|------|------|
| Code | G | H | I | J | K | L | M | N |

| 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 Value | Q2 Value | Unit |
|--|--------------|------------------------|------------------|----------|----------|------|
| Drain-Source Voltage | | | V _{DSS} | 20 | -20 | V |
| Gate-Source Voltage | | | V _{GSS} | ±12 | ±12 | V |
| Continuous Drain Current (Note 6) N-Channel: V _{GS} = 4.5V P-Channel: V _{GS} = -4.5V | Steady State | T _A = +25°C | I _D | 4.6 | -3.2 | A |
| | | T _A = +70°C | | 3.7 | -2.6 | |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | I _S | 1.4 | -1.3 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | I _{DM} | 22 | -20 | A |

Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|--|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | T _A = +25°C | P _D | 0.7 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R _{θJA} | 173 | °C/W |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 1.1 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R _{θJA} | 108 | °C/W |
| Thermal Resistance, Junction to Case | | R _{θJC} | 37 | |
| 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} | 20 | — | — | V | V _{GS} = 0V, I _D = 250µA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1.0 | µA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 0.4 | — | 1.0 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | — | 35 | mΩ | V _{GS} = 4.5V, I _D = 5.0A |
| | | | | 43 | | V _{GS} = 2.5V, I _D = 4.0A |
| | | | | 56 | | V _{GS} = 1.8V, I _D = 2.0A |
| Diode Forward Voltage | V _{SD} | — | 0.7 | 1.2 | V | V _{GS} = 0V, I _S = 1A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 369 | — | pF | V _{DS} = 10V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 54 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 32 | — | | |
| Gate Resistance | R _g | — | 4.1 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 3.6 | — | nC | V _{GS} = 4.5V, V _{DS} = 10V, I _D = 6A |
| Gate-Source Charge | Q _{gs} | — | 0.4 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 1.0 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 2.6 | — | ns | V _{DS} = 10V, V _{GS} = 5V, R _G = 6Ω, I _D = 6A |
| Turn-On Rise Time | t _R | — | 3.0 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 12.5 | — | | |
| Turn-Off Fall Time | t _F | — | 3.6 | — | | |
| Reverse Recovery Time | t _{RR} | — | 6.0 | — | ns | I _F = 1A, di/dt = 100A/µs |
| Reverse Recovery Charge | Q _{RR} | — | 0.9 | — | nC | |

- 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 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production 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 | I _{DSS} | — | — | -1.0 | μA | V _{DS} = -20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -0.45 | — | -1.0 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | — | 74 | mΩ | V _{GS} = -4.5V, I _D = -3.5A |
| | | | | 110 | | V _{GS} = -2.5V, I _D = -3.0A |
| | | | | 168 | | V _{GS} = -1.8V, I _D = -2.0A |
| Diode Forward Voltage | V _{SD} | — | -0.8 | -1.2 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 440 | — | pF | V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 60 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 48 | — | | |
| Gate Resistance | R _g | — | 8.5 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 5.9 | — | nC | V _{DS} = -4V, I _D = -3.5A |
| Gate-Source Charge | Q _{gs} | — | 0.6 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 2.1 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 3.2 | — | ns | V _{GS} = -4.5V, V _{DS} = -4V, R _G = 6Ω, R _L = 4Ω |
| Turn-On Rise Time | t _R | — | 7.8 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 31 | — | | |
| Turn-Off Fall Time | t _F | — | 18 | — | | |
| Reverse Recovery Time | t _{RR} | — | 10.5 | — | ns | I _F = -2.0A, di/dt = -100A/μs |
| Reverse Recovery Charge | Q _{RR} | — | 3.0 | — | nC | I _F = -2.0A, di/dt = -100A/μs |

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

Typical Characteristics - N-CHANNEL

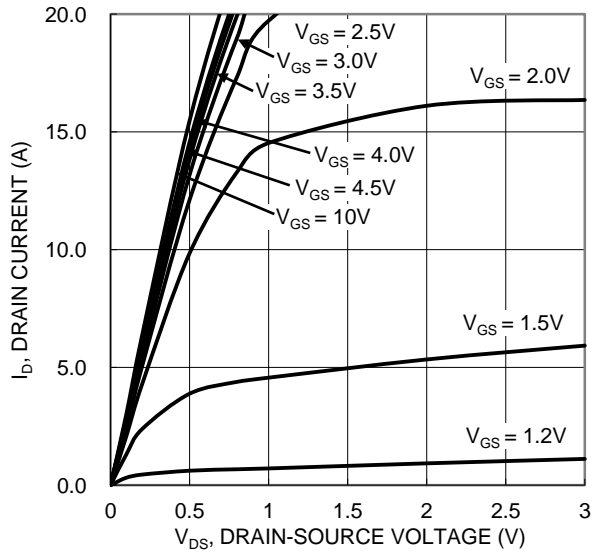


Figure 1. Typical Output Characteristic

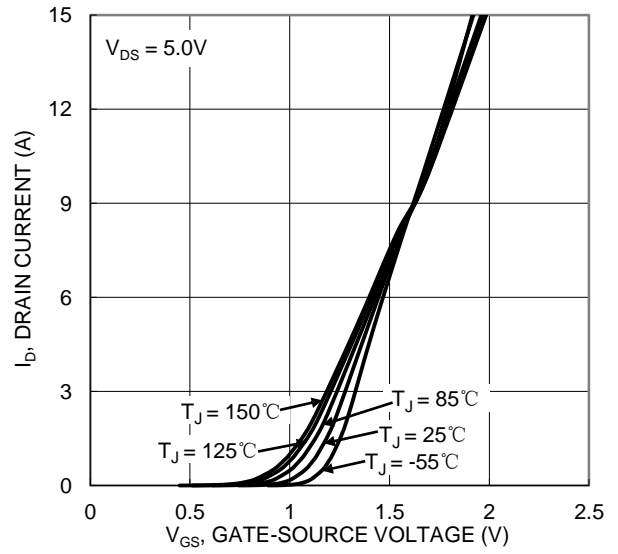


Figure 2. Typical Transfer Characteristic

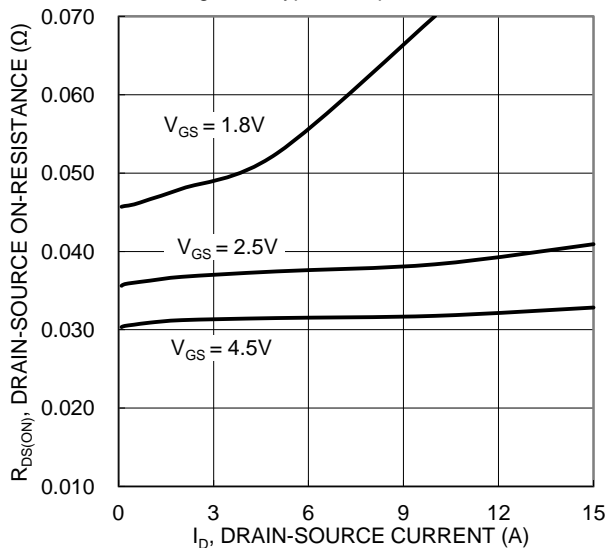


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

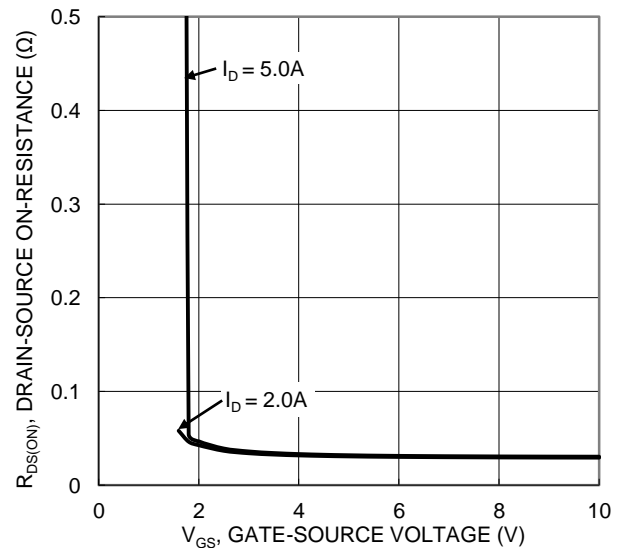


Figure 4. Typical Transfer Characteristic

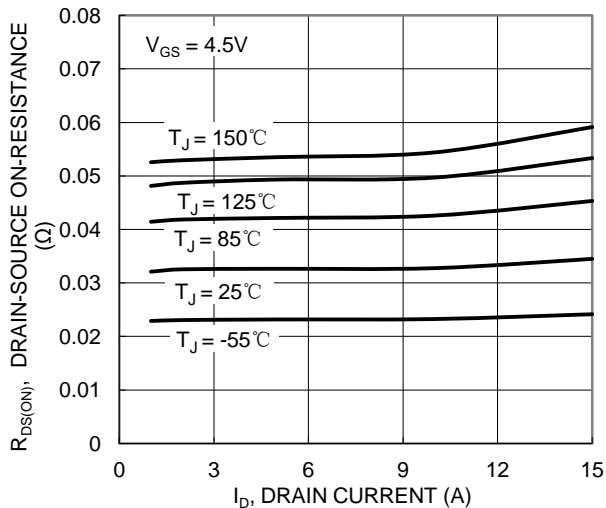


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

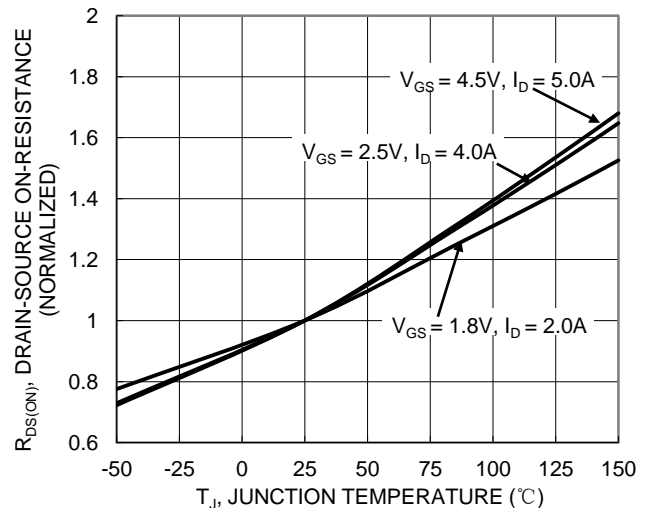


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics - N-CHANNEL (continued)

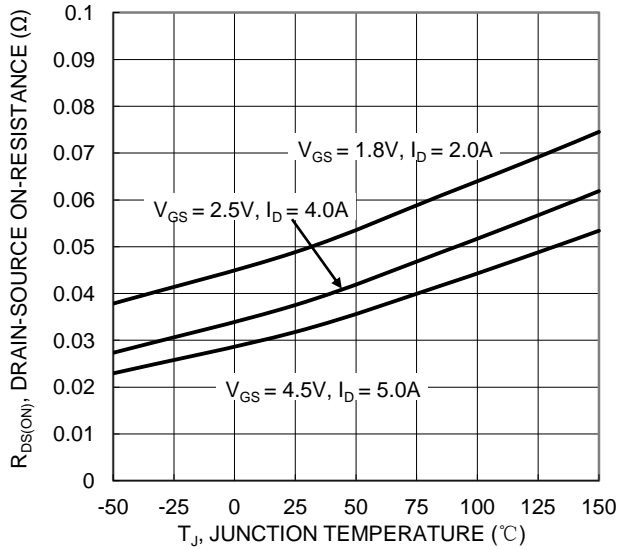


Figure 7. On-Resistance Variation with Temperature

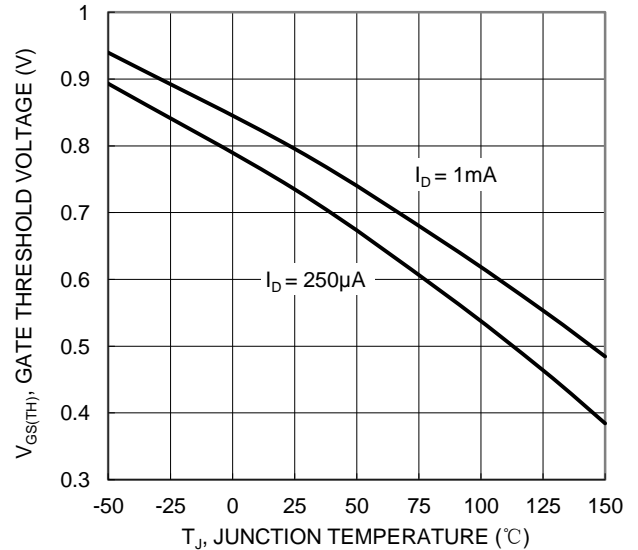


Figure 8. Gate Threshold Variation vs. Junction Temperature

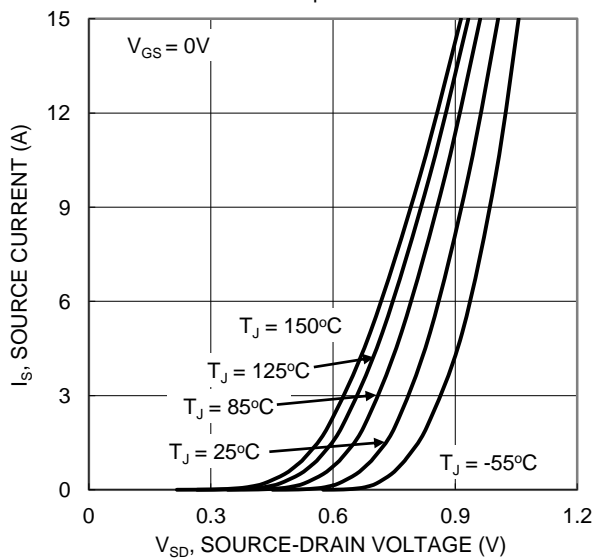


Figure 9. Diode Forward Voltage vs. Current

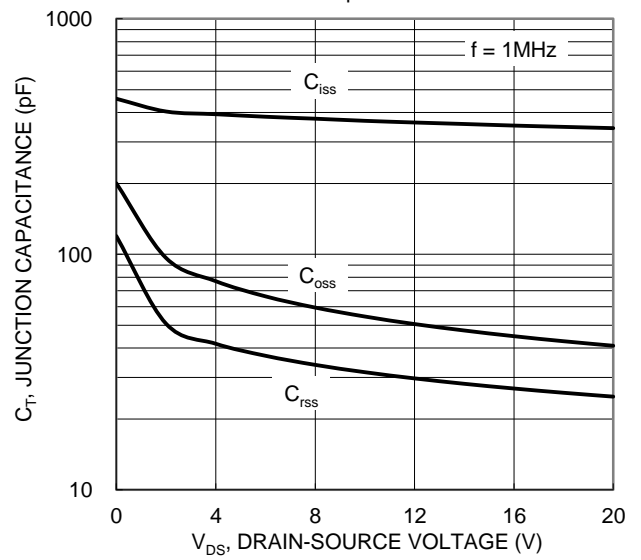


Figure 10. Typical Junction Capacitance

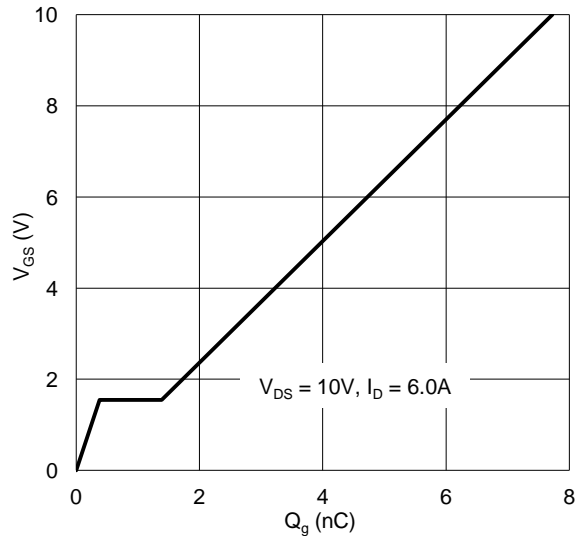


Figure 11. Gate Charge

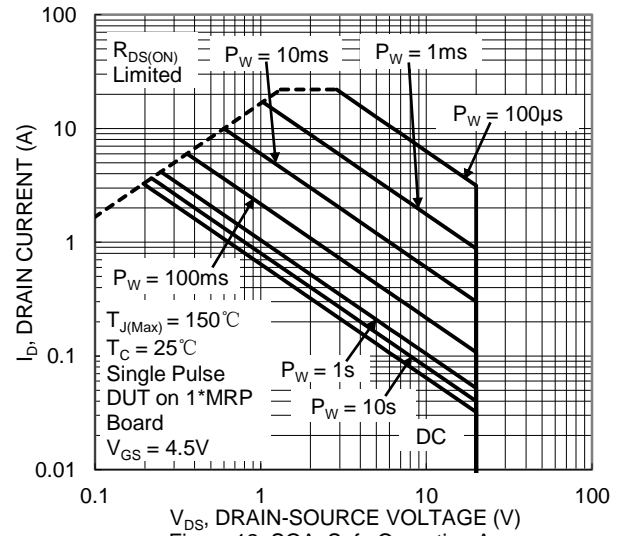


Figure 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

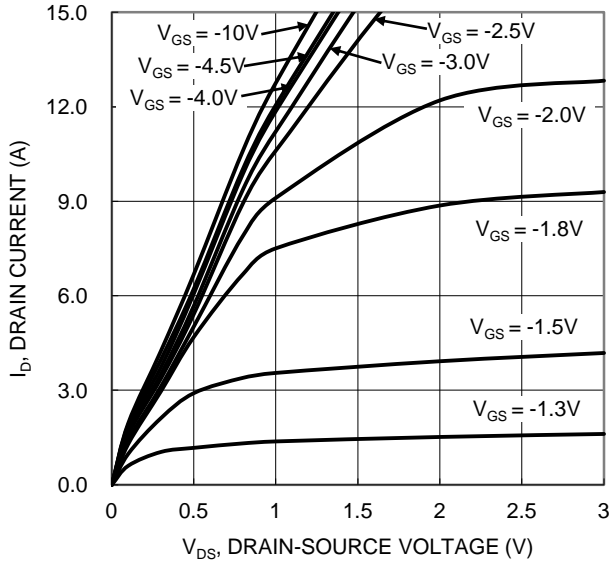


Figure 13. Typical Output Characteristic

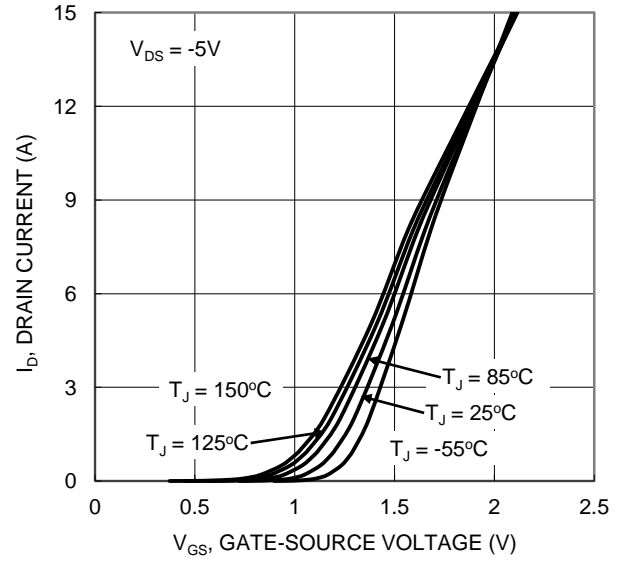


Figure 14. Typical Transfer Characteristic

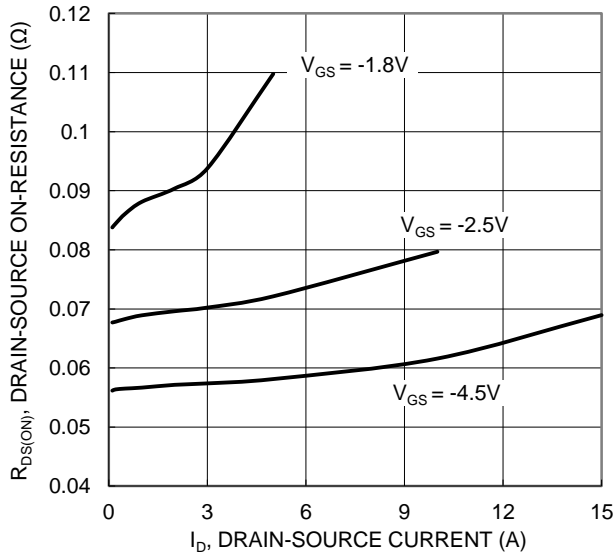


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

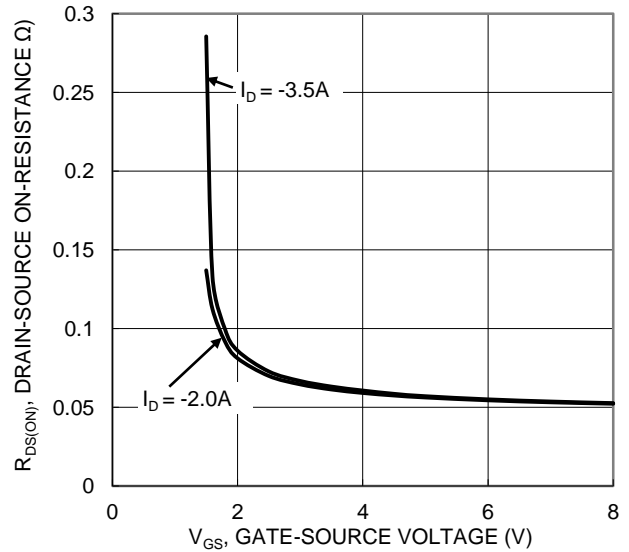


Figure 16. Typical Transfer Characteristic

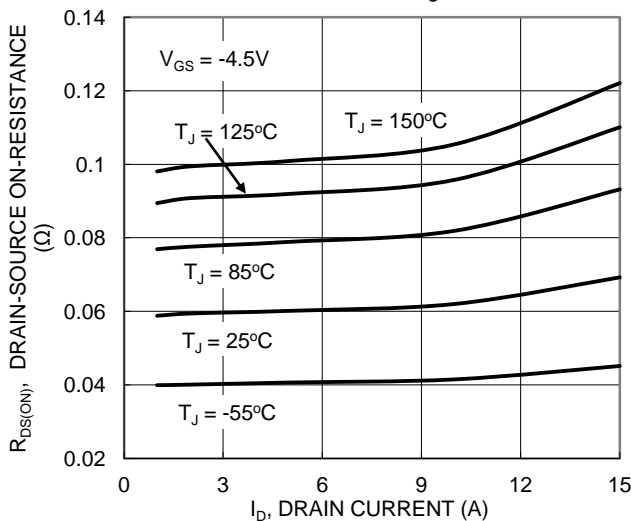


Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

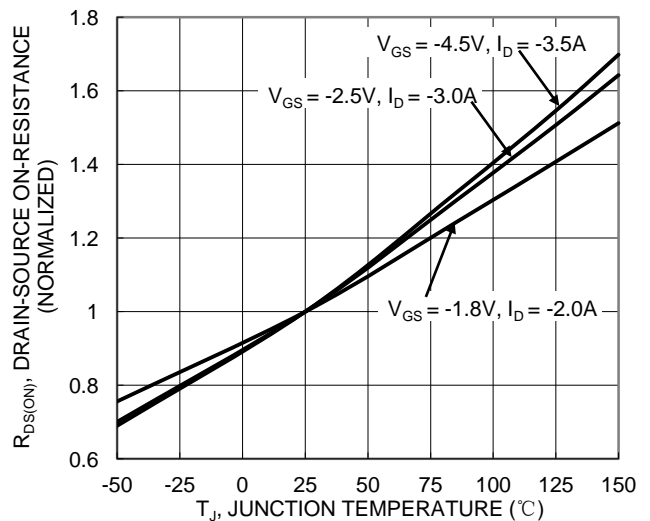


Figure 18. On-Resistance Variation with Junction Temperature

Typical Characteristics - P-CHANNEL (continued)

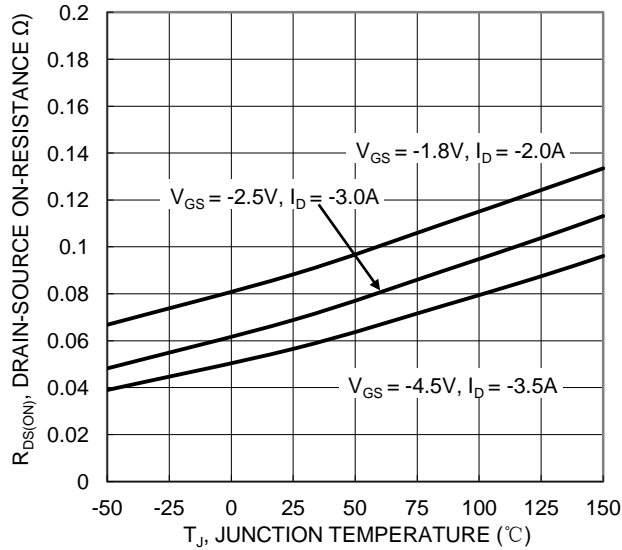


Figure 19. On-Resistance Variation with Junction Temperature

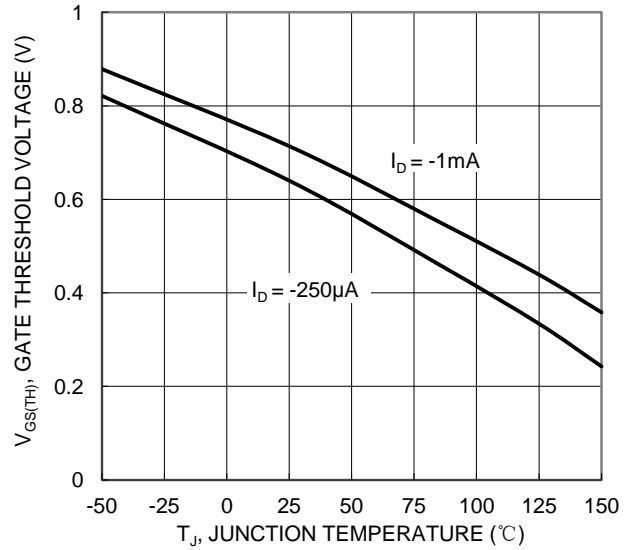


Figure 20. Gate Threshold Variation vs. Junction Temperature

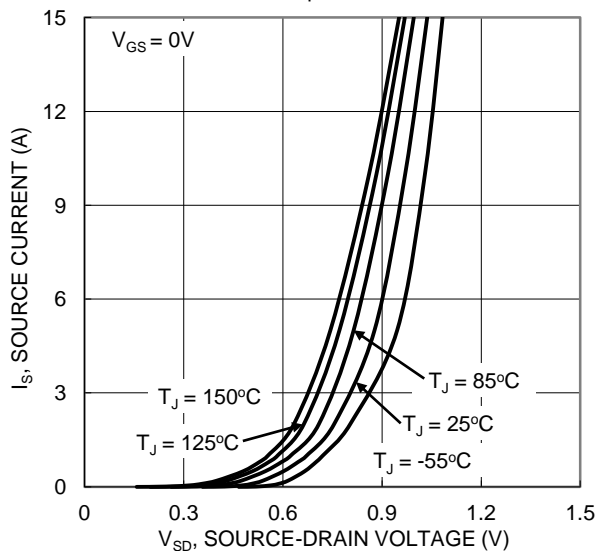


Figure 21. Diode Forward Voltage vs. Current

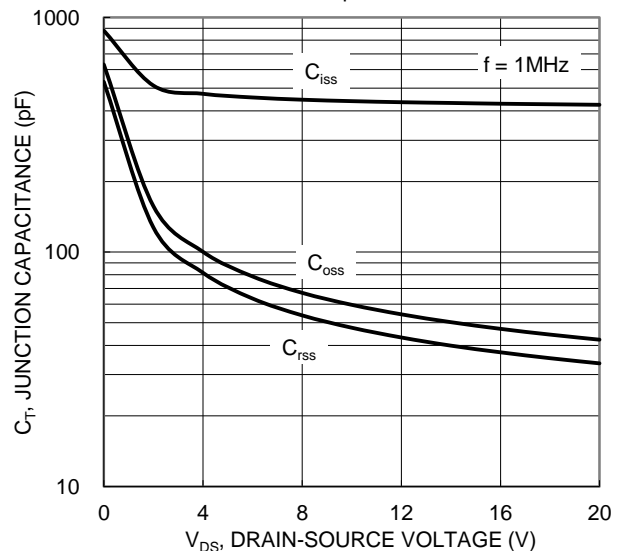


Figure 22. Typical Junction Capacitance

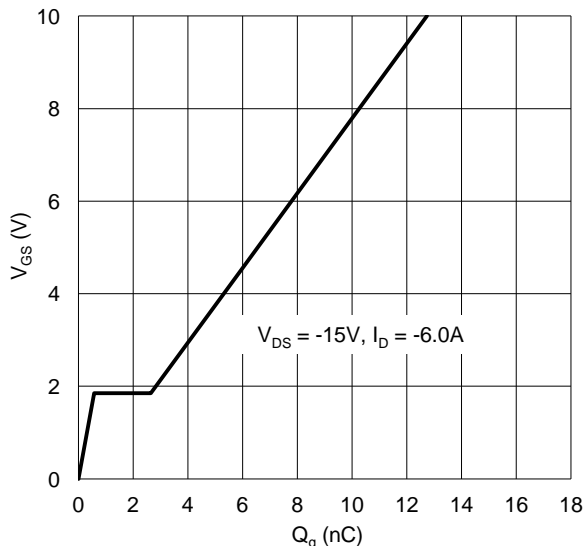


Figure 23. Gate Charge

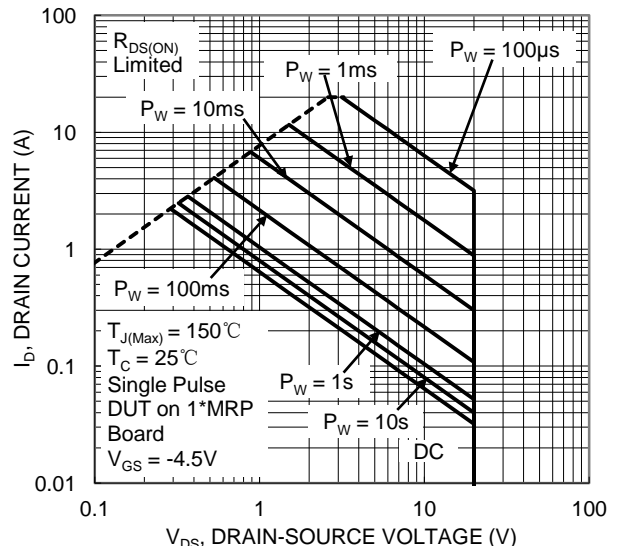


Figure 24. SOA, Safe Operation Area

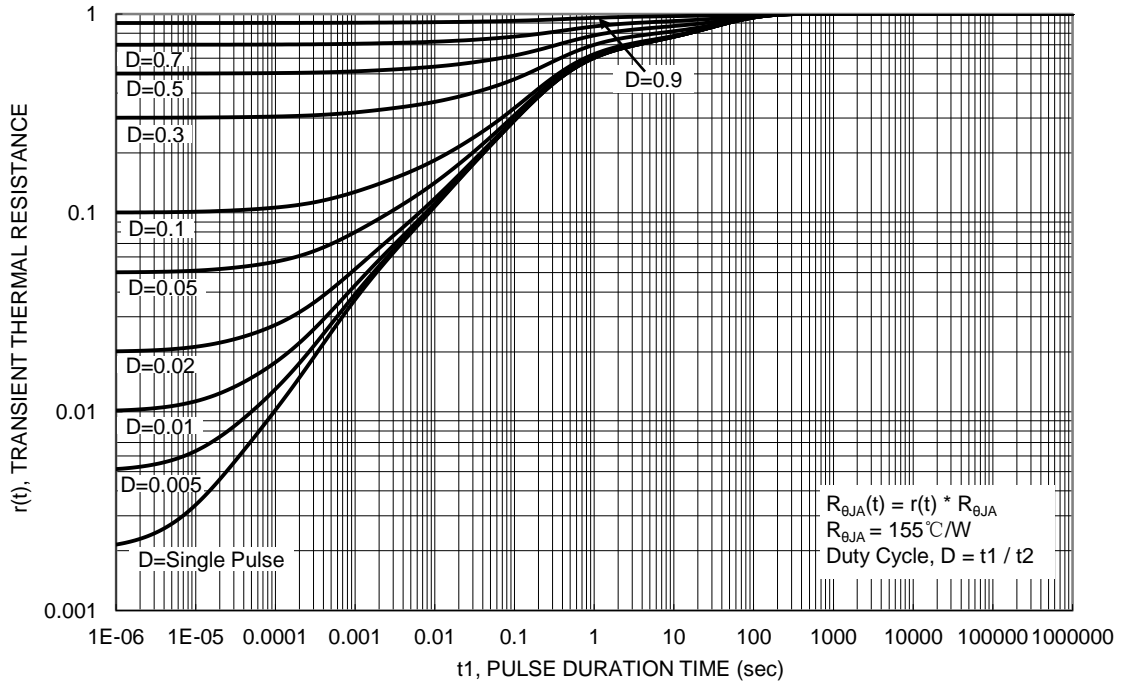
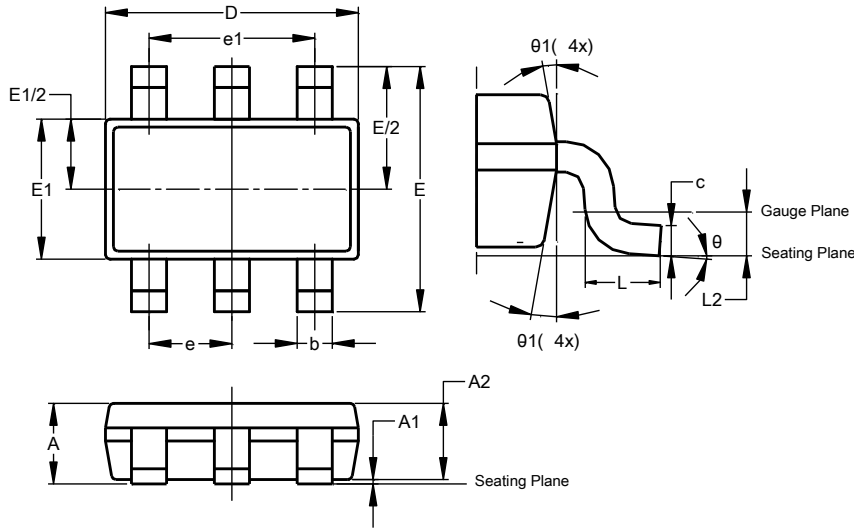


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

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

TSOT26

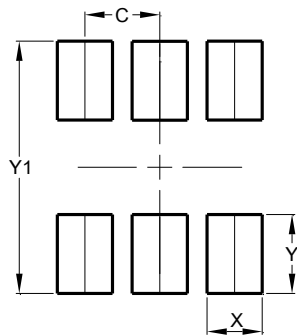


| TSOT26 | | | |
|----------------------|-----------|-------|-------|
| Dim | Min | Max | Typ |
| A | - | 1.00 | - |
| A1 | 0.010 | 0.100 | - |
| A2 | 0.840 | 0.900 | - |
| D | 2.800 | 3.000 | 2.900 |
| E | 2.800 BSC | | |
| E1 | 1.500 | 1.700 | 1.600 |
| b | 0.300 | 0.450 | - |
| c | 0.120 | 0.200 | - |
| e | 0.950 BSC | | |
| e1 | 1.900 BSC | | |
| L | 0.30 | 0.50 | - |
| L2 | 0.250 BSC | | |
| θ | 0° | 8° | 4° |
| θ_1 | 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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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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