

Product Summary

| Device | BV _{DSS} | R _{DS(ON)} Max | I _D Max T _A = +25°C |
|--------|-------------------|--------------------------------|----------------------------------------------|
| Q1 | 20V | 0.5Ω @ V _{GS} = 4.5V | 1030mA |
| | | 0.9Ω @ V _{GS} = 1.8V | 740mA |
| Q2 | -20V | 1.0Ω @ V _{GS} = -4.5V | -700mA |
| | | 2.0Ω @ V _{GS} = -1.8V | -460mA |

Description

This new generation MOSFET has been 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

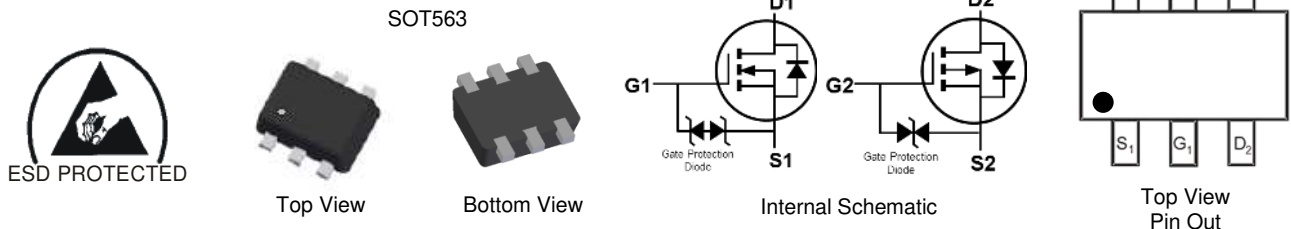
- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Load Switch

Features and Benefits

- Low On-Resistance
 - Low Gate Threshold Voltage V_{GS(TH)} <1V
 - Low Input Capacitance
 - Fast Switching Speed
 - Low Input/Output Leakage
 - Complementary Pair MOSFET
 - Ultra-Small Surface Mount Package
 - **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](mailto:contact@diodes.com) or your local Diodes representative.**
- <https://www.diodes.com/quality/product-definitions/>

Mechanical Data

- Case: SOT563
- 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: 0.003 grams (Approximate)

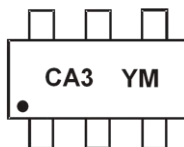


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|--------------|--------|---------------------------|
| DMC2400UV-7 | SOT563 | 3000/Tape & Reel |
| DMC2400UV-7B | SOT563 | 8000/Tape & Reel (Note 5) |
| DMC2400UV-13 | SOT563 | 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/>.
 5. Change the pitch from 4mm to 2mm in T&R.

Marking Information



CA3 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: H = 2020)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2011 | ... | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|------|------|-----|------|------|------|------|------|------|------|------|------|------|
| Code | Y | ... | H | I | J | K | L | M | N | O | P | R |

| 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 N-CHANNEL (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|----------------------------------------------------------|--------------|--------------------------------------------------|------------------|-------------|------|
| Drain-Source Voltage | | | V _{DSS} | 20 | V |
| Gate-Source Voltage | | | V _{GSS} | ±12 | V |
| Continuous Drain Current (Note 7) V _{GS} = 4.5V | Steady State | T _A = +25°C T _A = +70°C | I _D | 1030 800 | mA |
| | t < 10s | T _A = +25°C T _A = +70°C | I _D | 1150 900 | mA |
| Continuous Drain Current (Note 7) V _{GS} = 1.8V | Steady State | T _A = +25°C T _A = +70°C | I _D | 740 570 | mA |
| | t < 10s | T _A = +25°C T _A = +70°C | I _D | 870 700 | mA |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | I _{DM} | 3 | A |
| Maximum Body Diode Continuous Current | | | I _S | 800 | mA |

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

| Characteristic | | | Symbol | Value | Unit |
|-----------------------------------------------------------|--------------|--------------------------------------------------|------------------|--------------|------|
| Drain-Source Voltage | | | V _{DSS} | -20 | V |
| Gate-Source Voltage | | | V _{GSS} | ±8 | V |
| Continuous Drain Current (Note 7) V _{GS} = -4.5V | Steady State | T _A = +25°C T _A = +70°C | I _D | -700 -550 | mA |
| | t < 10s | T _A = +25°C T _A = +70°C | I _D | -820 -640 | mA |
| Continuous Drain Current (Note 7) V _{GS} = -1.8V | Steady State | T _A = +25°C T _A = +70°C | I _D | -460 -350 | mA |
| | t < 10s | T _A = +25°C T _A = +70°C | I _D | -550 -420 | mA |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | I _{DM} | -2 | A |
| Maximum Body Diode Continuous Current | | | I _S | -800 | mA |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|--------------------------------------------------|--------------|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 6) | | | P _D | 0.45 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | | R _{θJA} | 281 | °C/W |
| | t < 10s | | R _{θJA} | 210 | °C/W |
| Total Power Dissipation (Note 7) | | | P _D | 1 | W |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady State | | R _{θJA} | 129 | °C/W |
| | t < 10s | | R _{θJA} | 97 | °C/W |
| Operating and Storage Temperature Range | | | T _J , T _{STG} | -55 to +150 | °C |

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

Electrical Characteristics - Q1 N-CHANNEL (@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} | 20 | — | — | V | V _{GS} = 0V, I _D = 1mA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | 100 | nA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±1 | µA | V _{GS} = ±5V, V _{DS} = 0V |
| | | — | — | ±4.0 | | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 0.5 | — | 0.9 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 0.3 | 0.48 | Ω | V _{GS} = 5.0V, I _D = 200mA |
| | | — | 0.35 | 0.5 | | V _{GS} = 4.5V, I _D = 200mA |
| | | — | 0.45 | 0.7 | | V _{GS} = 2.5V, I _D = 200mA |
| | | — | 0.55 | 0.9 | | V _{GS} = 1.8V, I _D = 100mA |
| | | — | 0.65 | 1.5 | | V _{GS} = 1.5V, I _D = 50mA |
| | | — | 2 | — | | V _{GS} = 1.2V, I _D = 1mA |
| | | Forward Transfer Admittance | Y _{fs} | — | | 1.4 |
| Diode Forward Voltage | V _{SD} | — | 0.7 | 1.2 | V | V _{GS} = 0V, I _S = 500mA |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iSS} | — | 37.1 | — | pF | V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oSS} | — | 6.5 | — | | |
| Reverse Transfer Capacitance | C _{rSS} | — | 4.8 | — | | |
| Gate Resistance | R _g | — | 68 | — | Ω | V _{DS} = 0V, V _{GS} = 0V |
| Total Gate Charge | Q _g | — | 0.5 | — | nC | V _{GS} = 4.5V, V _{DS} = 10V, I _D = 250mA |
| Gate-Source Charge | Q _{gs} | — | 0.07 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 0.1 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 4.06 | — | ns | V _{DD} = 10V, V _{GS} = 4.5V, R _L = 47Ω, R _G = 10Ω, I _D = 200mA |
| Turn-On Rise Time | t _r | — | 7.28 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 13.74 | — | | |
| Turn-Off Fall Time | t _f | — | 10.54 | — | | |

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

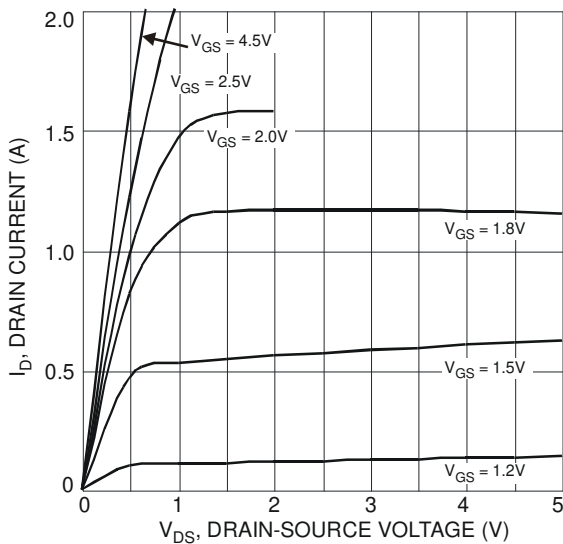


Fig. 1 Typical Output Characteristics

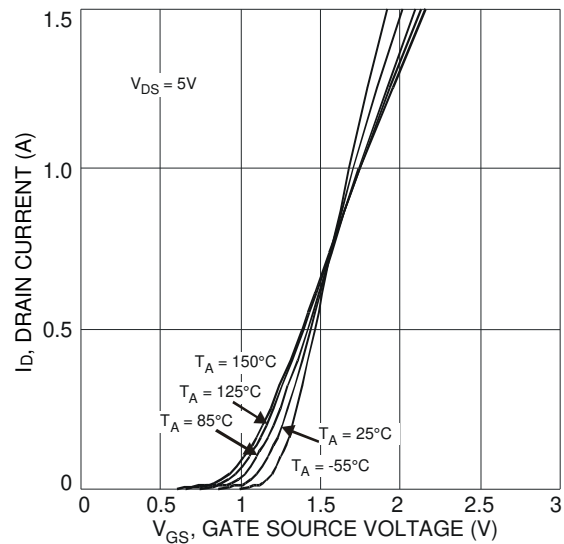


Fig. 2 Typical Transfer Characteristics

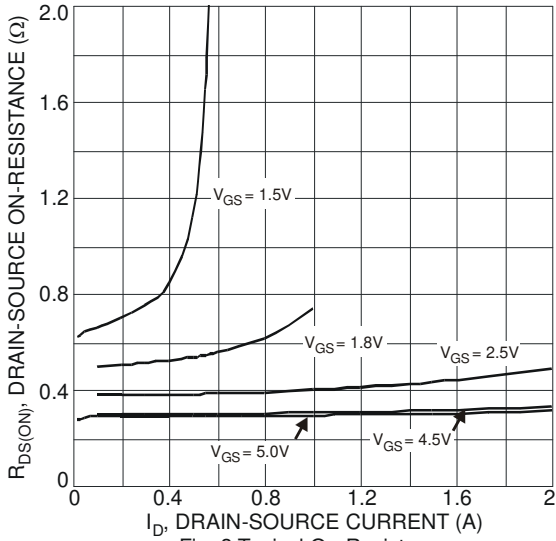


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

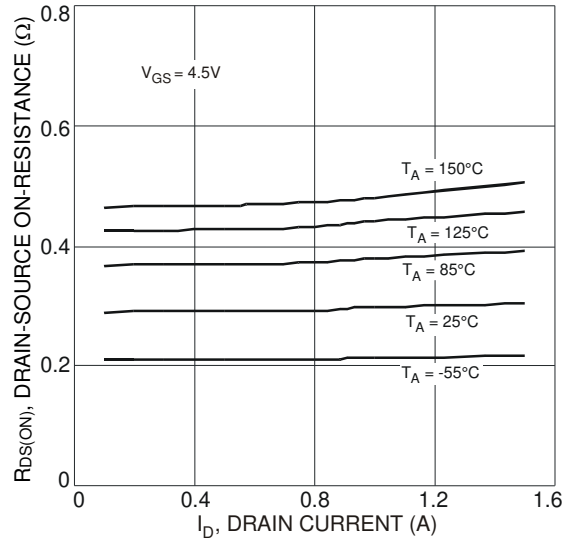


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

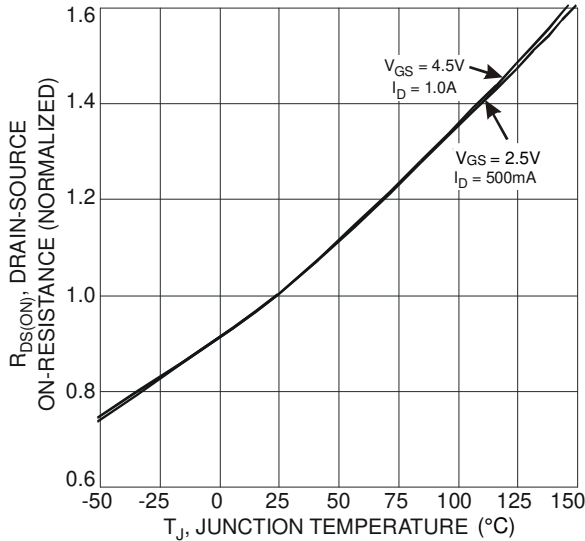


Fig. 5 On-Resistance Variation with Temperature

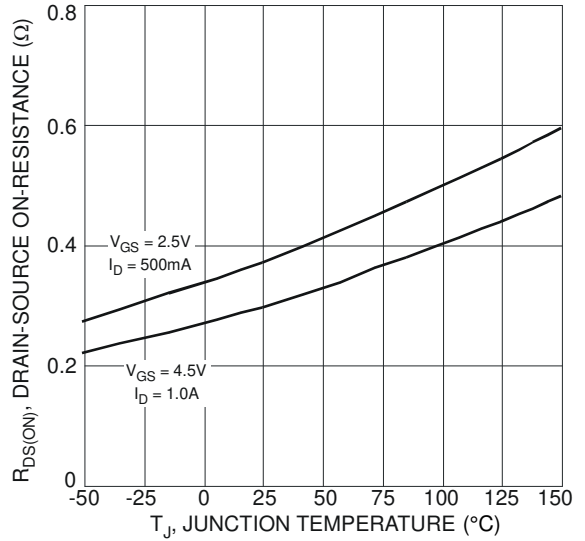


Fig. 6 On-Resistance Variation with Temperature

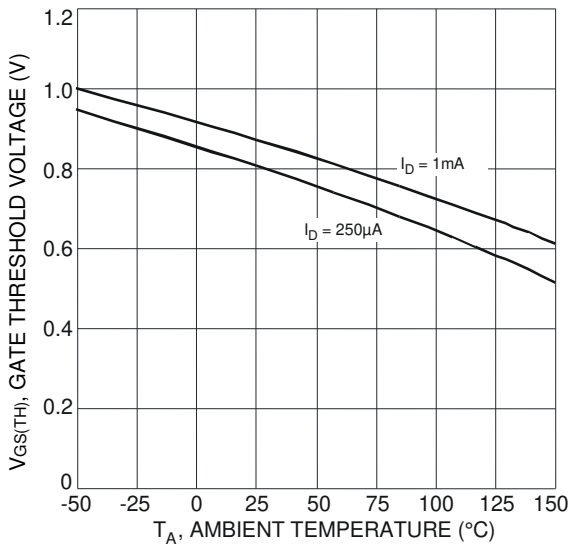


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

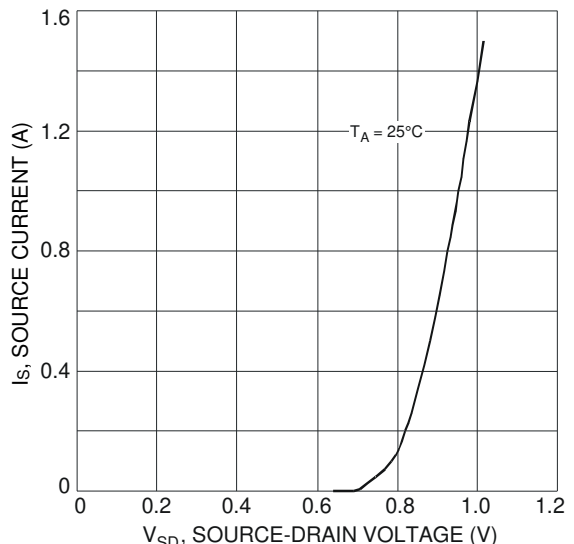
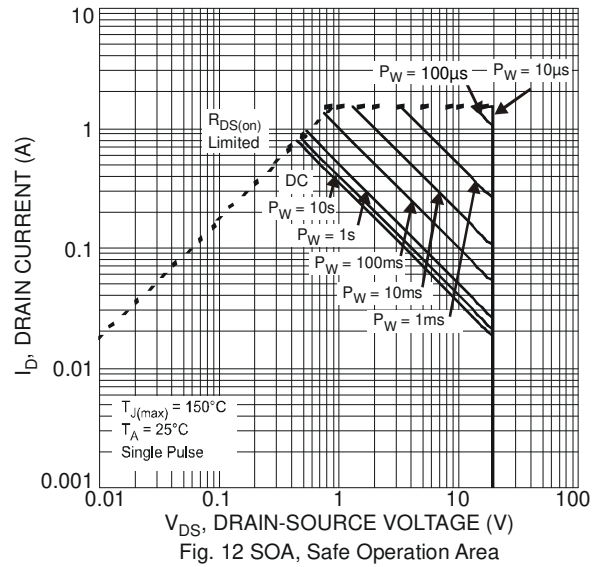
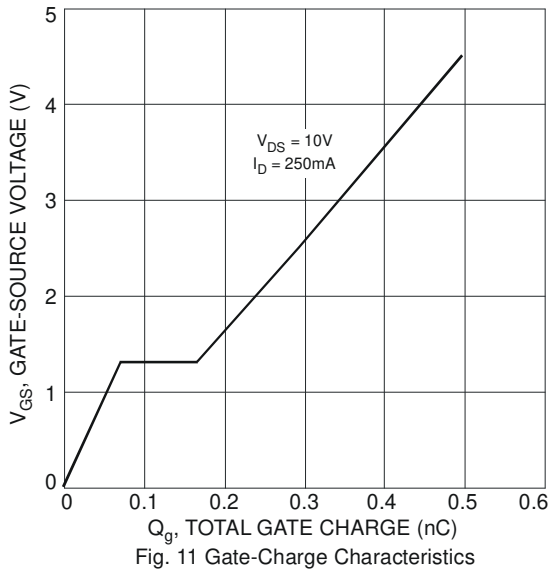
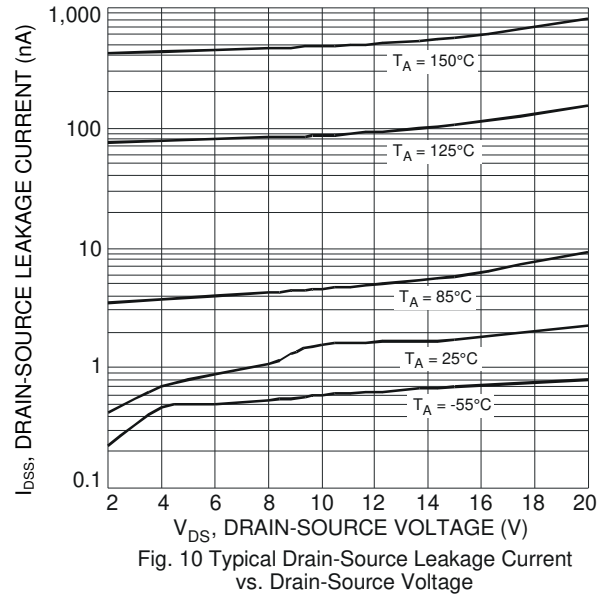
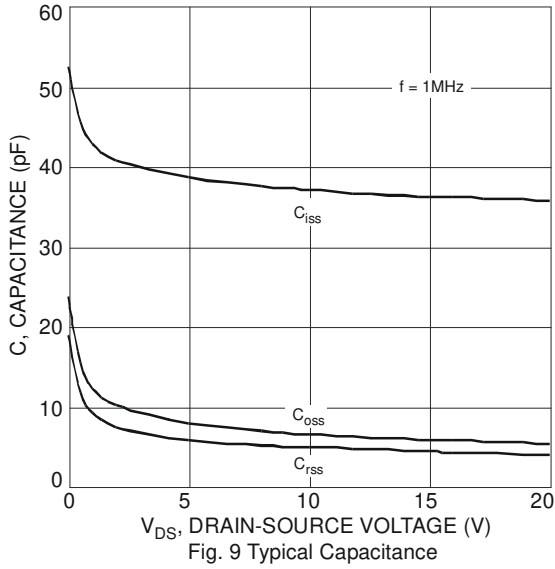


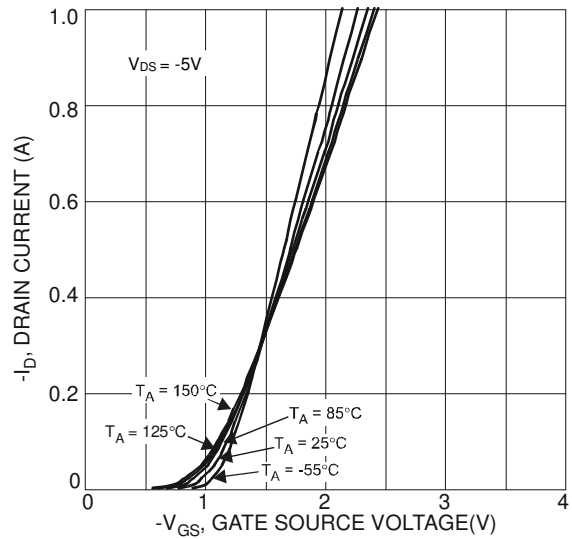
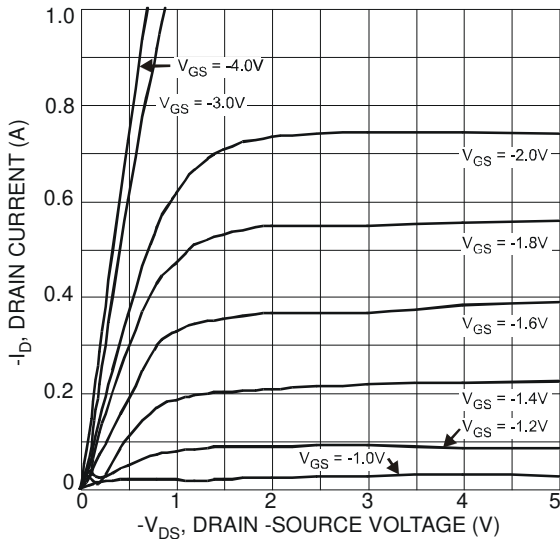
Fig. 8 Diode Forward Voltage vs. Current



Electrical Characteristics - Q2 P-CHANNEL (@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} | -20 | — | — | V | V _{GS} = 0V, I _D = -1mA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | -100 | nA | V _{DS} = -20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±1.0 | µA | V _{GS} = ±5V, V _{DS} = 0V |
| | | — | — | ±5.0 | | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -0.5 | — | -1.0 | V | V _{DS} = V _{GS} , I _D = -250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 0.67 | 0.97 | Ω | V _{GS} = -5V, I _D = -100mA |
| | | — | 0.7 | 1.0 | | V _{GS} = -4.5V, I _D = -100mA |
| | | — | 0.9 | 1.5 | | V _{GS} = -2.5V, I _D = -80mA |
| | | — | 1.2 | 2.0 | | V _{GS} = -1.8V, I _D = -40mA |
| | | — | 1.5 | 3.0 | | V _{GS} = -1.5V, I _D = -30mA |
| | | — | 5 | — | | V _{GS} = -1.2V, I _D = -1mA |
| | | — | — | — | | — |
| Forward Transfer Admittance | Y _{fs} | — | 0.7 | — | S | V _{DS} = -3V, I _D = -100mA |
| Diode Forward Voltage | V _{SD} | — | -0.75 | -1.2 | V | V _{GS} = 0V, I _S = -330mA |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | — | 46.1 | — | pF | V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 7.2 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 4.9 | — | | |
| Gate Resistance | R _g | — | 14.3 | — | Ω | V _{DS} = 0V, V _{GS} = 0V |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 0.5 | — | nC | V _{DS} = -10V, I _D = -250mA |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 0.85 | — | | |
| Gate-Source Charge | Q _{gs} | — | 0.09 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 0.09 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 8.5 | — | ns | V _{DD} = -3V, V _{GS} = -2.5V, R _L = 300Ω, R _G = 25Ω, I _D = -100mA |
| Turn-On Rise Time | t _R | — | 4.3 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 20.2 | — | | |
| Turn-Off Fall Time | t _F | — | 19.2 | — | | |

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



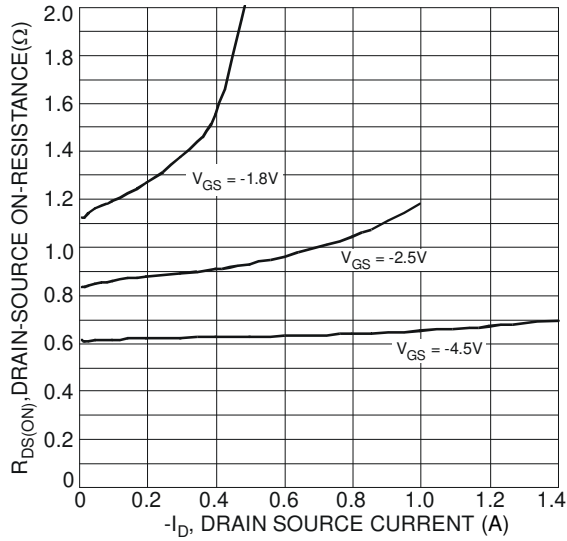


Fig. 15 Typical On-Resistance vs. Drain Current and Gate Voltage

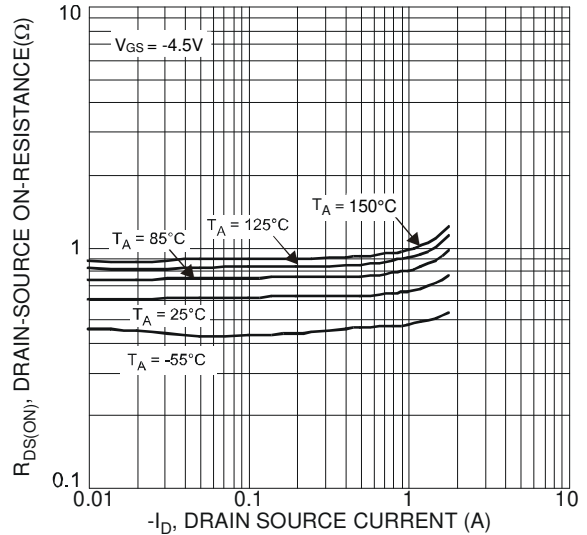


Fig. 16 Typical On-Resistance vs. Drain Current and Temperature

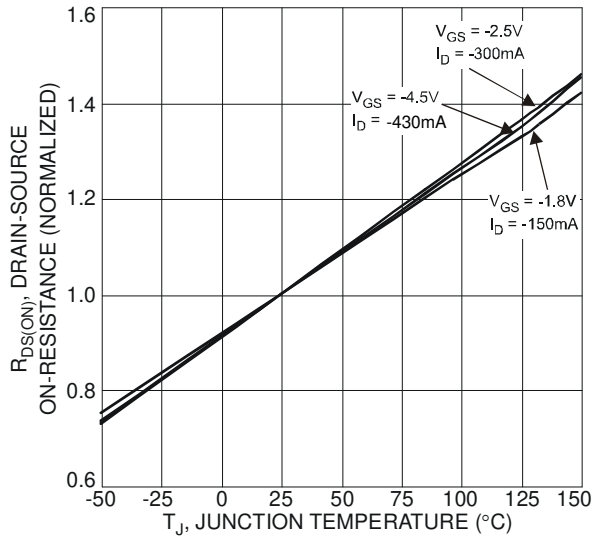


Fig. 17 On-Resistance Variation with Temperature

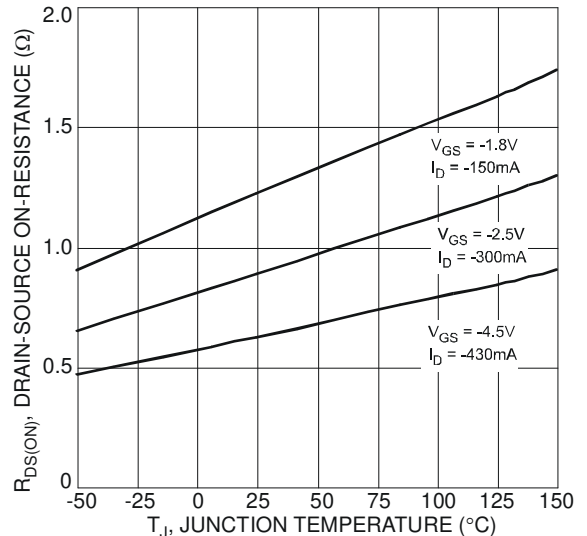


Fig. 18 On-Resistance vs. Temperature

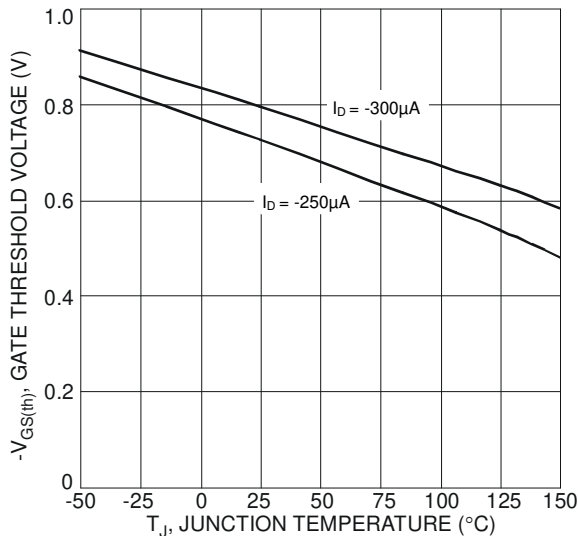


Fig. 19 Gate Threshold Voltage vs. Junction Temperature

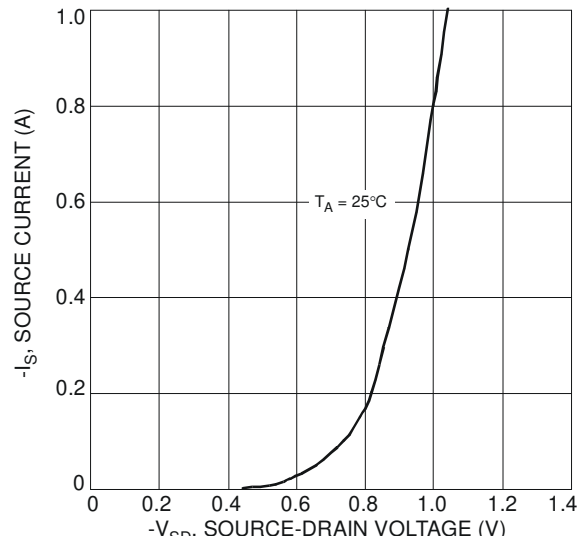


Fig. 20 Diode Forward Voltage vs. Current

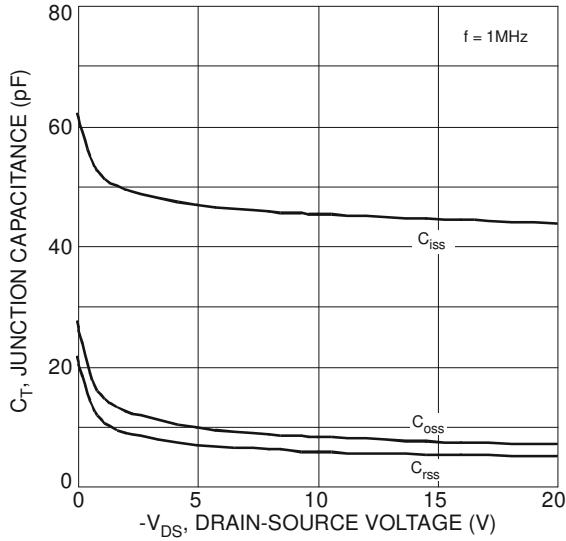


Fig. 21 Typical Junction Capacitance

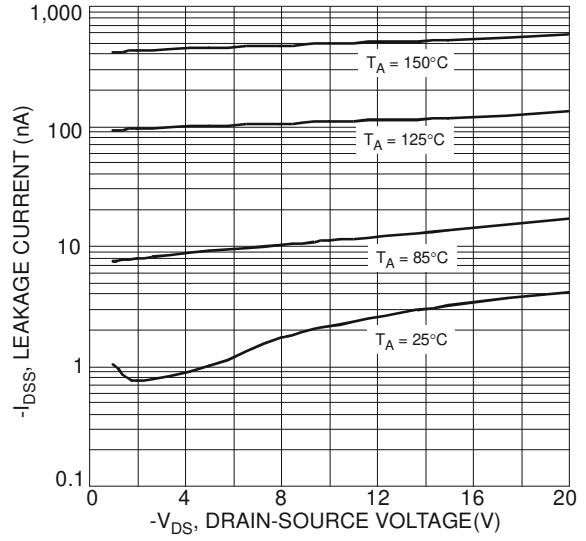


Fig. 22 Typical Drain-Source Leakage Current vs. Voltage

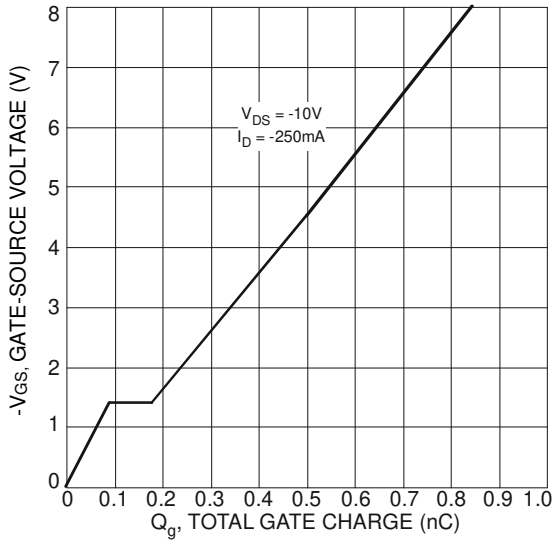


Fig. 23 Gate-Charge Characteristics

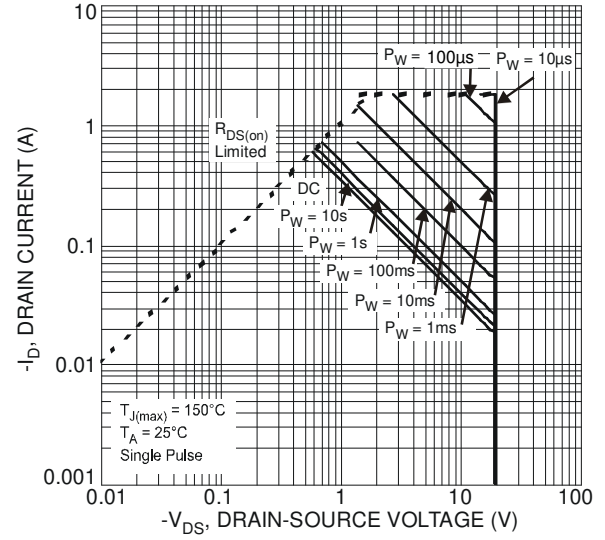


Fig. 24 SOA, Safe Operation Area

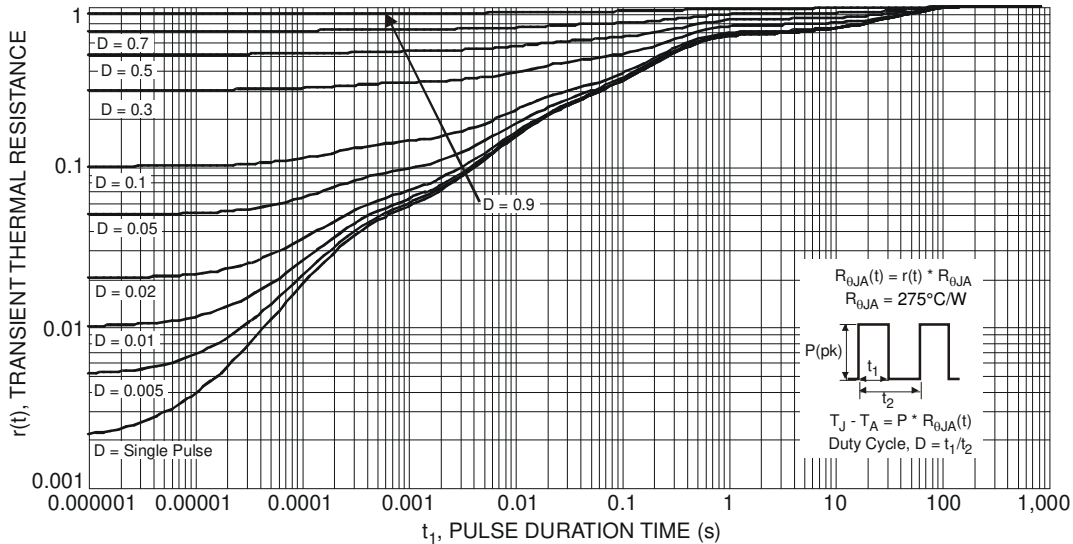
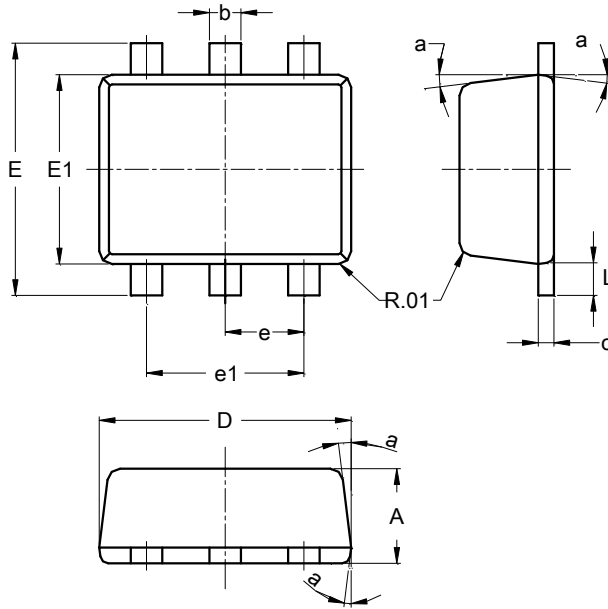


Fig. 25 Transient Thermal Response

Package Outline Dimensions

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

SOT563

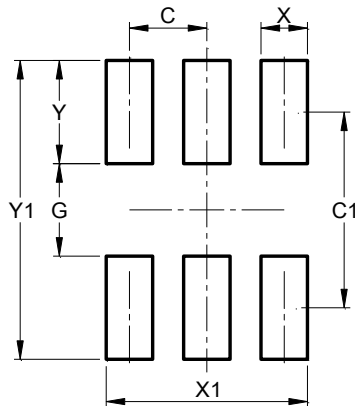


| SOT563 | | | |
|-----------------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.55 | 0.60 | 0.60 |
| b | 0.15 | 0.30 | 0.20 |
| c | 0.10 | 0.18 | 0.11 |
| D | 1.50 | 1.70 | 1.60 |
| E | 1.55 | 1.70 | 1.60 |
| E1 | 1.10 | 1.25 | 1.20 |
| e | -- | -- | 0.50 |
| e1 | 0.90 | 1.10 | 1.00 |
| L | 0.10 | 0.30 | 0.20 |
| a | 8° | 9° | 7° |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

SOT563



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.500 |
| C1 | 1.270 |
| G | 0.600 |
| X | 0.300 |
| X1 | 1.300 |
| Y | 0.670 |
| Y1 | 1.940 |

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