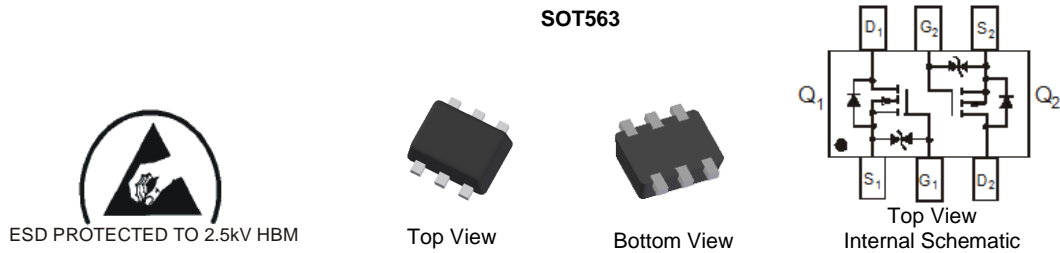


Features

- 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
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **ESD Protected Gate to 2.5kV HBM**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT563
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe.
Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.006 grams (Approximate)

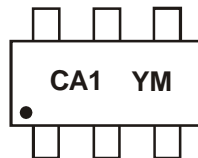


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------|--------|-------------------|
| DMG1016V-7 | SOT563 | 3,000/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



CA1 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: W = 2009)
 M = Month (ex: 9 = September)

Date Code Key

| | | | | | | | | | | | | |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| Code | W | X | Y | Z | A | B | C | D | E | F | G | H |
| 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 N-Channel – Q1 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|------------------------|------------------|------------------------|------|
| Drain Source Voltage | V _{DSS} | 20 | V |
| Gate-Source Voltage | V _{GSS} | ±6 | V |
| Drain Current (Note 5) | I _D | T _A = +25°C | 870 |
| | | T _A = +85°C | 630 |

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

| Characteristic | Symbol | Value | Unit |
|------------------------|------------------|------------------------|------|
| Drain Source Voltage | V _{DSS} | -20 | V |
| Gate-Source Voltage | V _{GSS} | ±6 | V |
| Drain Current (Note 5) | I _D | T _A = +25°C | -640 |
| | | T _A = +85°C | -460 |

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

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | P _D | 530 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 235 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Note: 5. Device mounted on FR-4 PCB.

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------------------|---------------------|-----|-------|-------|------|--|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 20 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 100 | nA | V _{DS} = 20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ± 1.0 | μA | V _{GS} = ±4.5V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| 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)} | — | 0.3 | 0.4 | Ω | V _{GS} = 4.5V, I _D = 600mA V _{GS} = 2.5V, I _D = 500mA V _{GS} = 1.8V, I _D = 350mA |
| | | — | 0.4 | 0.5 | | |
| | | — | 0.5 | 0.7 | | |
| Forward Transfer Admittance | Y _{FS} | — | 1.4 | — | S | V _{DS} = 10V, I _D = 400mA |
| Diode Forward Voltage (Note 6) | V _{SD} | — | 0.7 | 1.2 | V | V _{GS} = 0V, I _S = 150mA |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C _{ISS} | — | 60.67 | — | pF | V _{DS} = 16V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 9.68 | — | pF | |
| Reverse Transfer Capacitance | C _{RSS} | — | 5.37 | — | pF | |
| Total Gate Charge | Q _G | — | 736.6 | — | pC | V _{GS} = 4.5V, V _{DS} = 10V, I _D = 250mA |
| Gate-Source Charge | Q _{GS} | — | 93.6 | — | | |
| Gate-Drain Charge | Q _{GD} | — | 116.6 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.1 | — | ns | V _{DD} = 10V, V _{GS} = 4.5V, R _L = 47Ω, R _G = 10Ω, I _D = 200mA |
| Turn-On Rise Time | t _R | — | 7.4 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 26.7 | — | | |
| Turn-Off Fall Time | t _F | — | 12.3 | — | | |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------------------|---------------------|------|-------|-------|------|--|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -20 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -100 | nA | V _{DS} = -20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ± 2.0 | μA | V _{GS} = ±4.5V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| 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)} | — | 0.5 | 0.7 | Ω | V _{GS} = -4.5V, I _D = -430mA V _{GS} = -2.5V, I _D = -300mA V _{GS} = -1.8V, I _D = -150mA |
| | | — | 0.7 | 0.9 | | |
| | | — | 1.0 | 1.3 | | |
| Forward Transfer Admittance | Y _{FS} | — | -0.9 | — | S | V _{DS} = 10V, I _D = -250mA |
| Diode Forward Voltage (Note 6) | V _{SD} | — | -0.8 | -1.2 | V | V _{GS} = 0V, I _S = -150mA |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C _{ISS} | — | 59.76 | — | pF | V _{DS} = -16V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 12.07 | — | pF | |
| Reverse Transfer Capacitance | C _{RSS} | — | 6.36 | — | pF | |
| Total Gate Charge | Q _G | — | 622.4 | — | pC | V _{GS} = -4.5V, V _{DS} = -10V, I _D = -250mA |
| Gate-Source Charge | Q _{GS} | — | 100.3 | — | | |
| Gate-Drain Charge | Q _{GD} | — | 132.2 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.1 | — | ns | V _{DD} = -10V, V _{GS} = -4.5V, R _L = 47Ω, R _G = 10Ω, I _D = -200mA |
| Turn-On Rise Time | t _R | — | 8.1 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 28.4 | — | | |
| Turn-Off Fall Time | t _F | — | 20.7 | — | | |

Note: 6. Short duration pulse test used to minimize self-heating effect.

N-CHANNEL – Q1

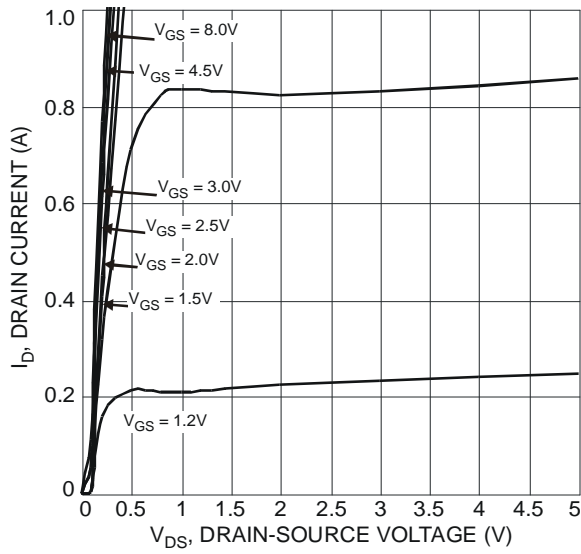


Fig. 1 Typical Output Characteristic

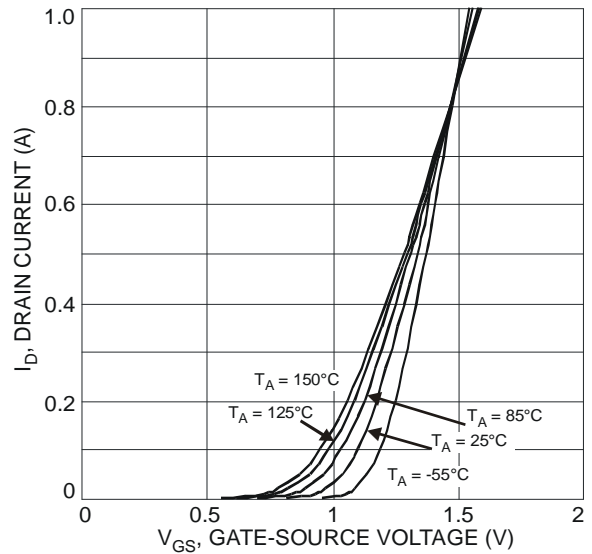


Fig. 2 Typical Transfer Characteristic

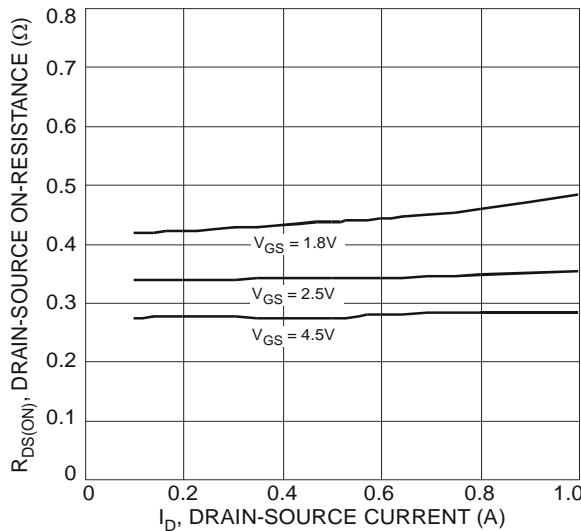


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

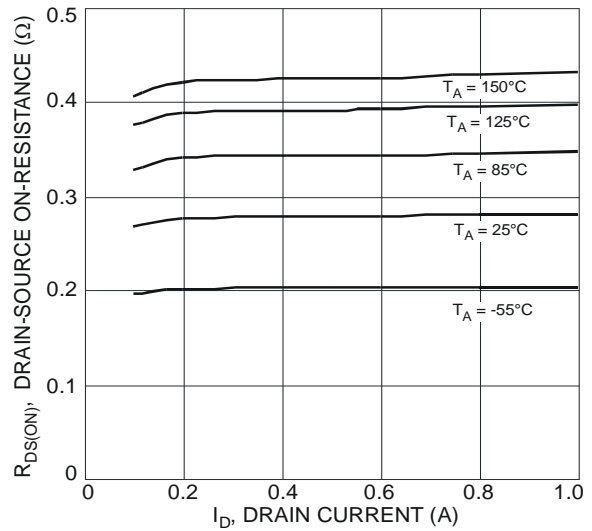


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

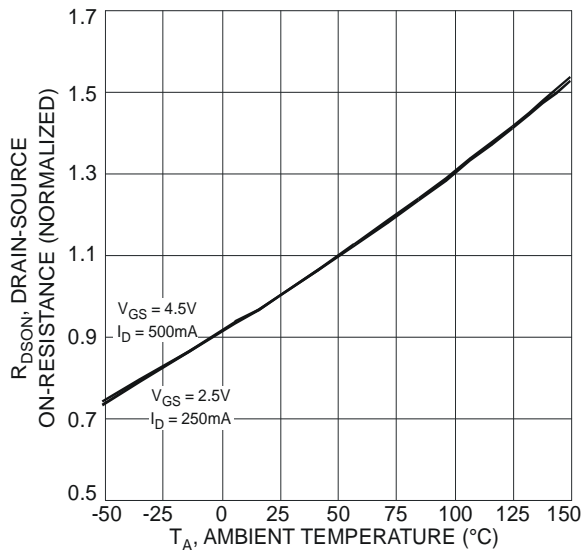


Fig. 5 On-Resistance Variation with Temperature

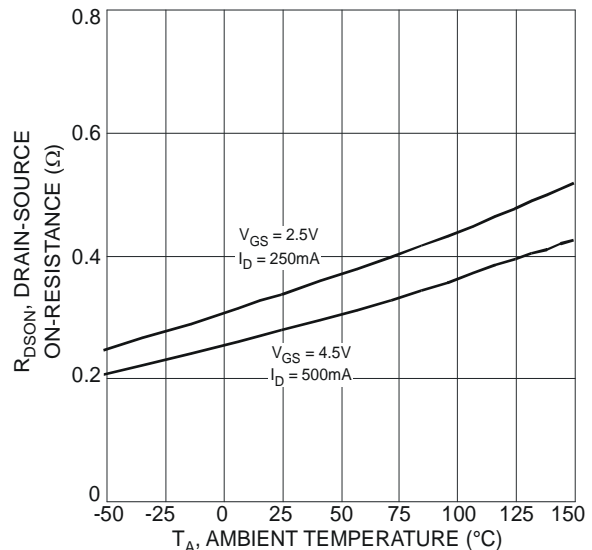


Fig. 6 On-Resistance Variation with Temperature

N-CHANNEL – Q1 (Continued)

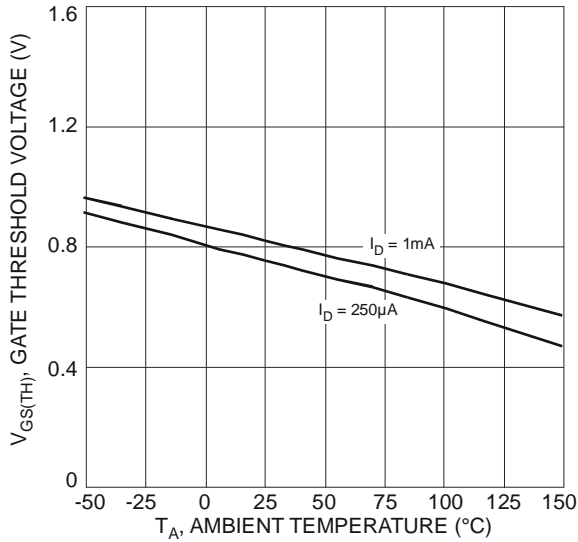


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

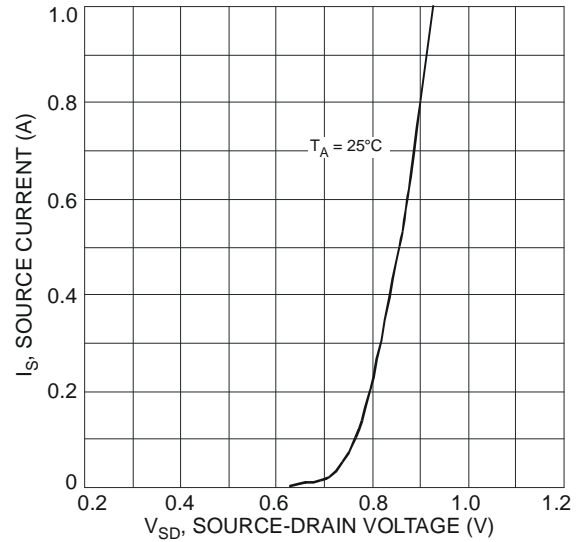


Fig. 8 Diode Forward Voltage vs. Current

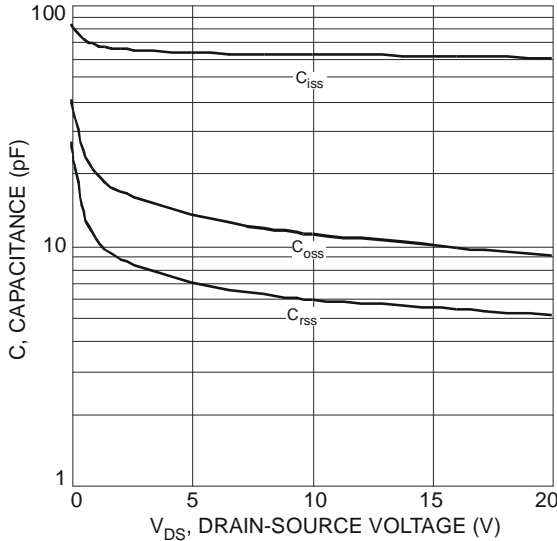


Fig. 9 Typical Total Capacitance

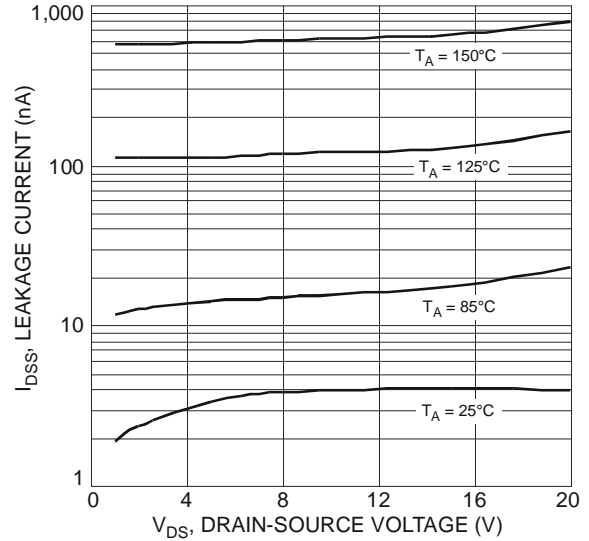


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

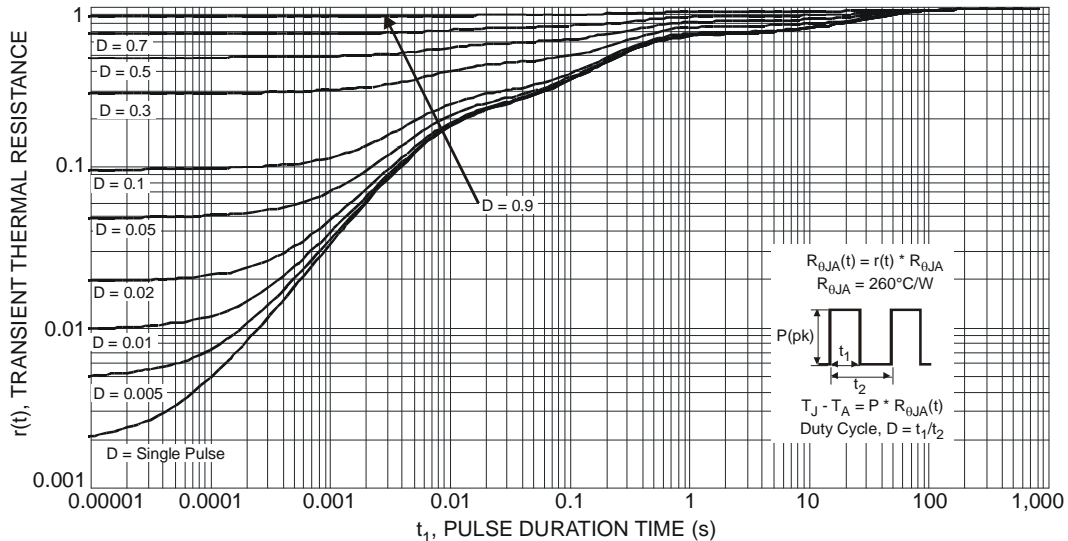


Fig. 11 Transient Thermal Response

P-CHANNEL – Q2

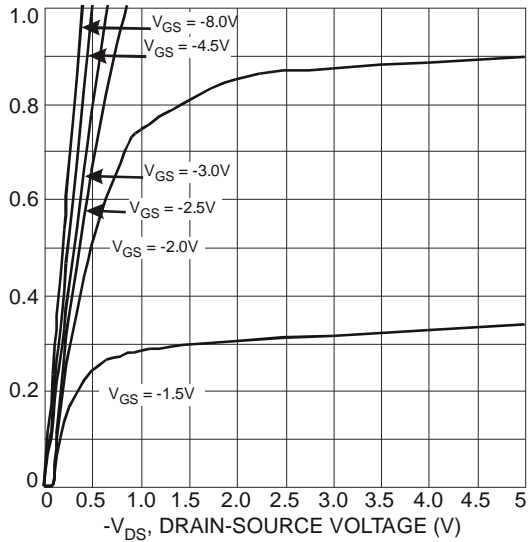


Fig. 12 Typical Output Characteristic

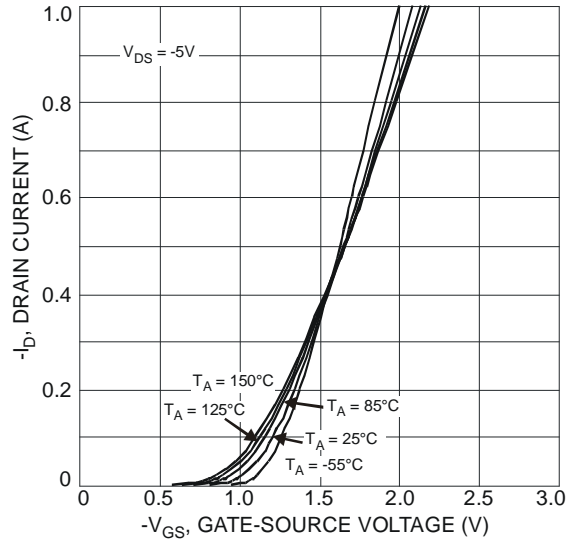


Fig. 13 Typical Transfer Characteristic

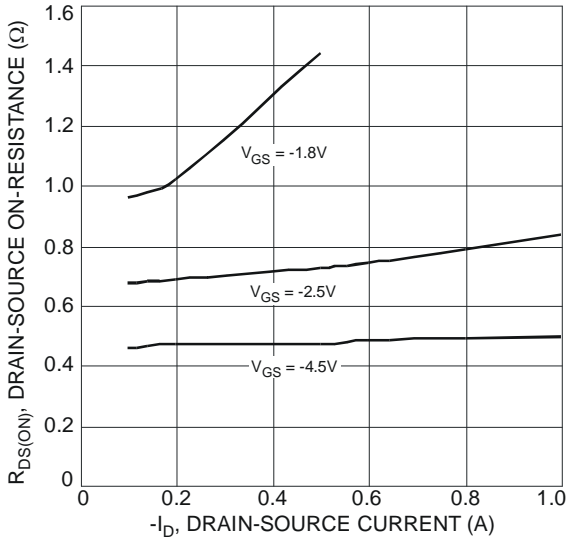


Fig. 14 Typical On-Resistance vs. Drain Current and Gate Voltage

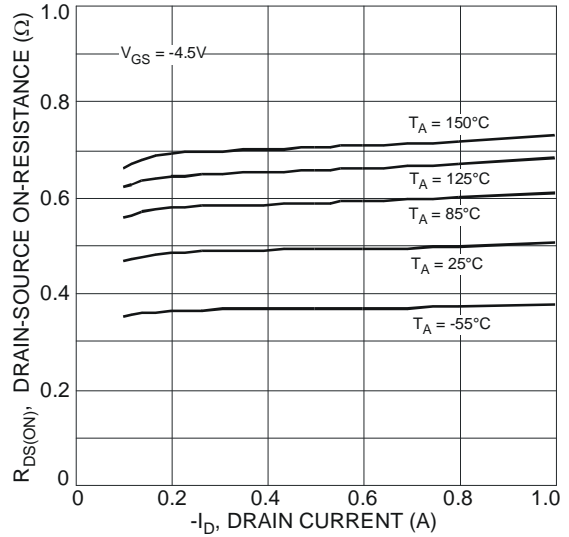


Fig. 15 Typical On-Resistance vs. Drain Current and Temperature

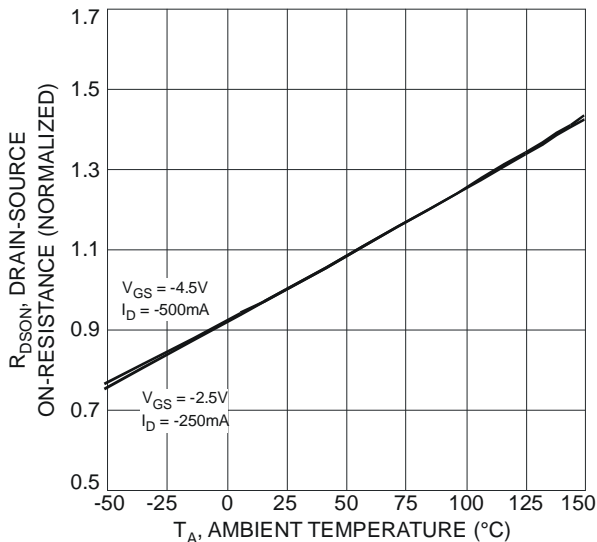


Fig. 16 On-Resistance Variation with Temperature

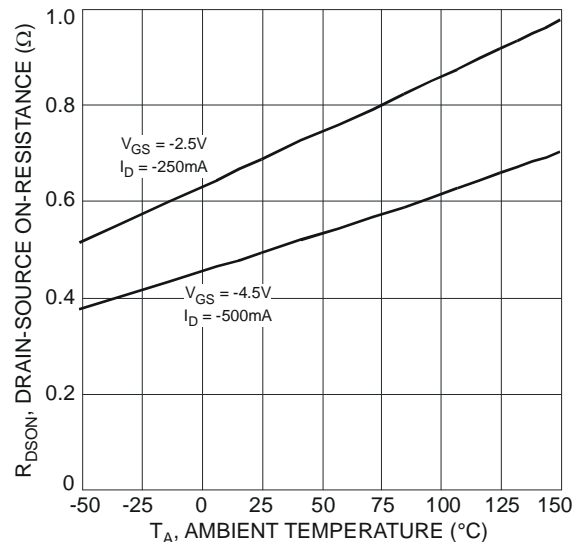


Fig. 17 On-Resistance Variation with Temperature

P-CHANNEL – Q2 (Continued)

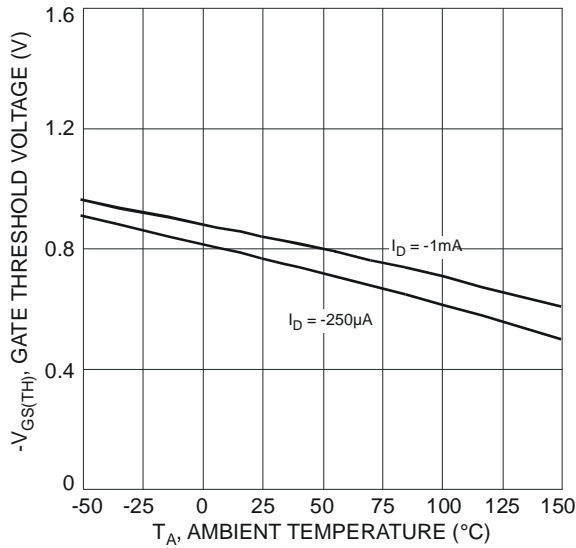


Fig. 18 Gate Threshold Variation vs. Ambient Temperature

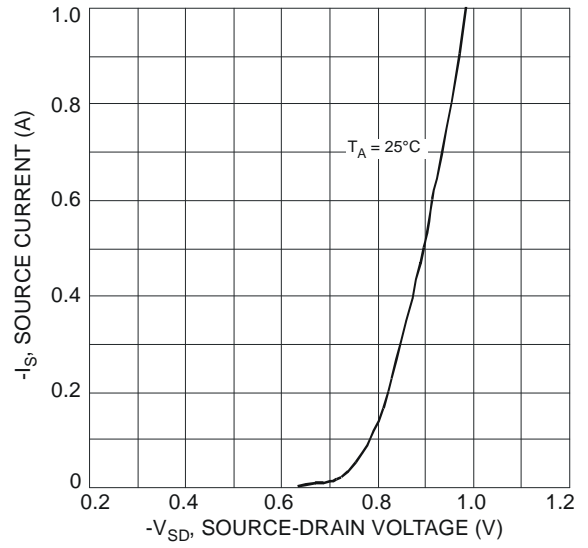


Fig. 19 Diode Forward Voltage vs. Current

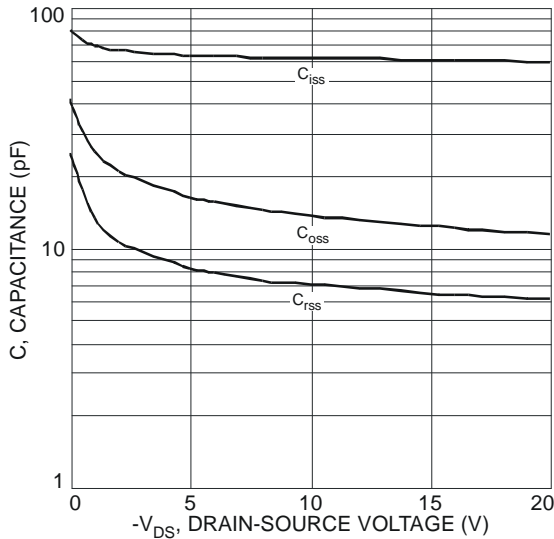


Fig. 20 Typical Total Capacitance

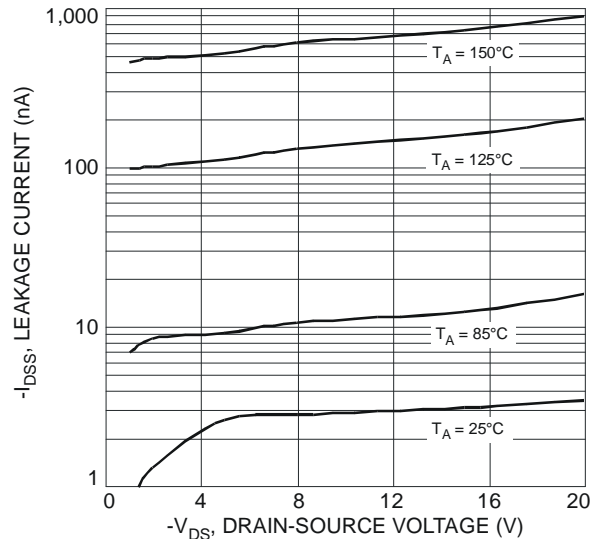


Fig. 21 Typical Leakage Current vs. Drain-Source Voltage

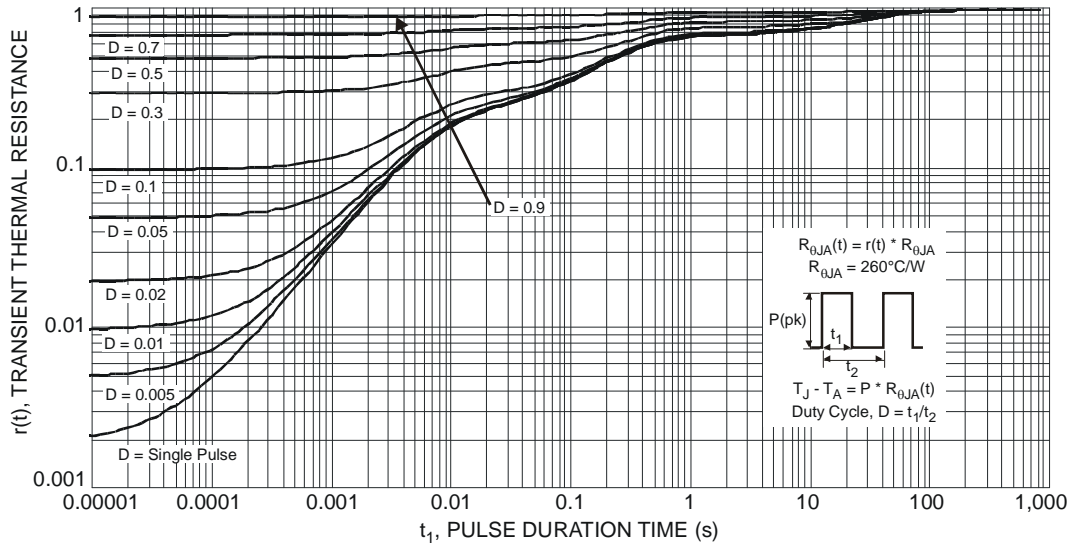
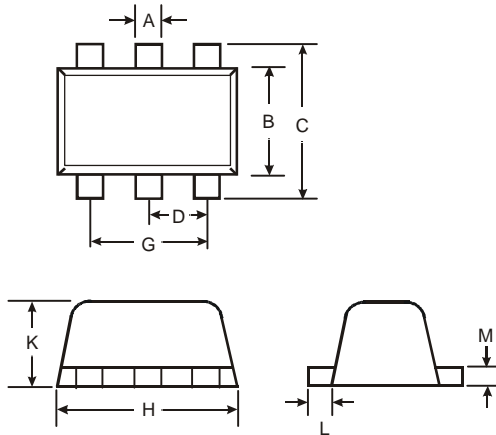


Fig. 22 Transient Thermal Response

Package Outline Dimensions

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

SOT563

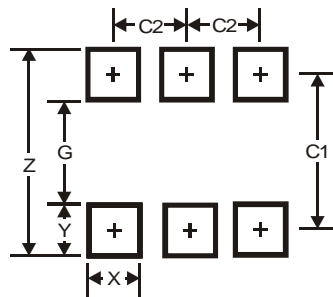


| SOT563 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.15 | 0.30 | 0.20 |
| B | 1.10 | 1.25 | 1.20 |
| C | 1.55 | 1.70 | 1.60 |
| D | - | - | 0.50 |
| G | 0.90 | 1.10 | 1.00 |
| H | 1.50 | 1.70 | 1.60 |
| K | 0.55 | 0.60 | 0.60 |
| L | 0.10 | 0.30 | 0.20 |
| M | 0.10 | 0.18 | 0.11 |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

SOT563



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.2 |
| G | 1.2 |
| X | 0.375 |
| Y | 0.5 |
| C1 | 1.7 |
| C2 | 0.5 |

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