

**COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET**
**Product Summary**

| Device | V <sub>(BR)DSS</sub> | R <sub>DS(ON)</sub> max      | I <sub>D</sub> max<br>T <sub>A</sub> = +25°C |
|--------|----------------------|------------------------------|--|
| Q1     | 60V                  | 1.7Ω @ V <sub>GS</sub> = 10V | 500mA  |
|        |                      | 3Ω @ V <sub>GS</sub> = 4.5V  | 400mA  |
| Q2     | -60V                 | 4Ω @ V <sub>GS</sub> = -10V  | -360mA                                       |
|        |                      | 6Ω @ V <sub>GS</sub> = -4.5V | -310mA                                       |

**Description**

This MOSFET has been designed to minimize the on-state resistance (R<sub>DS(on)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

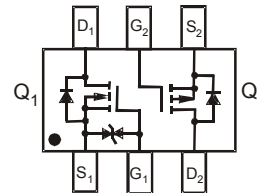
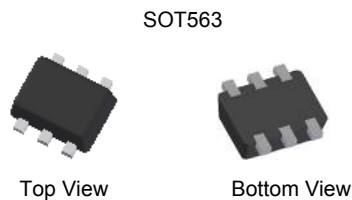
- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

**Features and Benefits**

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package
- **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**

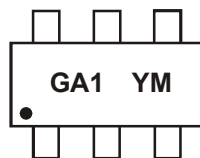
**Mechanical Data**

- Case: SOT563
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 **Ⓜ3**
- Weight: 0.027 grams (approximate)


**Ordering Information** (Note 4 & 5)

| Part Number  | Compliance | Case   | Packaging        |
|--------------|------------|--------|------------------|
| DMG1029SV-7  | Standard   | SOT563 | 3000/Tape & Reel |
| DMG1029SVQ-7 | Automotive | SOT563 | 3000/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](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>.
  5. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_grade\\_definitions/](http://www.diodes.com/quality/product_grade_definitions/).

**Marking Information**


GA1 = 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 |
|------|------|------|------|------|------|------|------|
| Code | W    | X    | Y    | Z    | A    | B    | C    |

| 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** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic  |                  |  | Symbol    | Value      | Units |
|---|------------------|--|-----------|------------|-------|
| Drain-Source Voltage                                    |                  |  | $V_{DSS}$ | 60         | V     |
| Gate-Source Voltage                                     |                  |  | $V_{GSS}$ | $\pm 20$   | V     |
| Continuous Drain Current (Note 7) $V_{GS} = 10\text{V}$ | Steady State     | $T_A = +25^\circ\text{C}$<br>$T_A = +70^\circ\text{C}$ | $I_D$     | 500<br>400 | mA    |
|   | $t < 10\text{s}$ | $T_A = +25^\circ\text{C}$<br>$T_A = +70^\circ\text{C}$ | $I_D$     | 620<br>480 | mA    |
| Pulsed Drain Current (Note 7)                           |                  |  | $I_{DM}$  | 1000       | mA    |

**Maximum Ratings P-CHANNEL – Q2** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic   |                  |  | Symbol    | Value        | Units |
|--|------------------|--|-----------|--------------|-------|
| Drain-Source Voltage                                     |                  |  | $V_{DSS}$ | -60          | V     |
| Gate-Source Voltage                                      |                  |  | $V_{GSS}$ | $\pm 20$     | V     |
| Continuous Drain Current (Note 7) $V_{GS} = -10\text{V}$ | Steady State     | $T_A = +25^\circ\text{C}$<br>$T_A = +70^\circ\text{C}$ | $I_D$     | -360<br>-280 | mA    |
|  | $t < 10\text{s}$ | $T_A = +25^\circ\text{C}$<br>$T_A = +70^\circ\text{C}$ | $I_D$     | -410<br>-320 | mA    |
| Pulsed Drain Current (Note 7)                            |                  |  | $I_{DM}$  | -650         | mA    |

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                   |                           | Symbol          | Value       | Units              |
|--|---------------------------|-----------------|-------------|--------------------|
| Total Power Dissipation (Note 6)                 | $T_A = +25^\circ\text{C}$ | $P_D$           | 0.45        | W                  |
|  | $T_A = +70^\circ\text{C}$ |                 | 0.28        |                    |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state              | $R_{\theta JA}$ | 281         | $^\circ\text{C/W}$ |
|  | $t < 10\text{s}$          |                 | 210         |                    |
| Total Power Dissipation (Note 7)                 | $T_A = +25^\circ\text{C}$ | $P_D$           | 1           | W                  |
|  | $T_A = +70^\circ\text{C}$ |                 | 0.62        |                    |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady state              | $R_{\theta JA}$ | 129         | $^\circ\text{C/W}$ |
|  | $t < 10\text{s}$          |                 | 97          |                    |
| Operating and Storage Temperature Range          |                           | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$   |

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 N-CHANNEL – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          | Symbol              | Min | Typ  | Max | Unit | Test Condition  |
|---|---------------------|-----|------|-----|------|---|
| <b>OFF CHARACTERISTICS (Note 8)</b>     |                     |     |      |     |      |   |
| Drain-Source Breakdown Voltage          | BV <sub>DSS</sub>   | 60  | —    | —   | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA  |
| Zero Gate Voltage Drain Current         | I <sub>DSS</sub>    | —   | —    | 10  | nA   | @T <sub>C</sub> = +25°C<br>V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V                        |
| Gate-Source Leakage                     | I <sub>GSS</sub>    | —   | —    | ±50 | nA   | V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 8)</b>      |                     |     |      |     |      |   |
| Gate Threshold Voltage                  | V <sub>GS(th)</sub> | 1.0 | —    | 2.5 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                    |
| Static Drain-Source On-Resistance       | R <sub>DS(on)</sub> | —   | 1.3  | 1.7 | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 500mA   |
|   |                     | —   | 1.5  | 3   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 200mA  |
| Forward Transfer Admittance             | Y <sub>fs</sub>     | 80  | —    | —   | mS   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 200mA   |
| Diode Forward Voltage                   | V <sub>SD</sub>     | —   | —    | 1.4 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 115mA  |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b> |                     |     |      |     |      |   |
| Input Capacitance                       | C <sub>iss</sub>    | —   | 30   | —   | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                    |
| Output Capacitance                      | C <sub>oss</sub>    | —   | 4.2  | —   | pF   |   |
| Reverse Transfer Capacitance            | C <sub>rss</sub>    | —   | 2.9  | —   | pF   |   |
| Total Gate Charge                       | Q <sub>g</sub>      | —   | 0.3  | —   | nC   | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V,<br>I <sub>D</sub> = 250mA                      |
| Gate-Source Charge                      | Q <sub>gs</sub>     | —   | 0.2  | —   | nC   |   |
| Gate-Drain Charge                       | Q <sub>gd</sub>     | —   | 0.08 | —   | nC   |   |
| Turn-On Delay Time                      | t <sub>D(on)</sub>  | —   | 3.9  | —   | ns   | V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V,<br>R <sub>G</sub> = 25Ω, I <sub>D</sub> = 200mA |
| Turn-On Rise Time                       | t <sub>r</sub>      | —   | 3.4  | —   | ns   |   |
| Turn-Off Delay Time                     | t <sub>D(off)</sub> | —   | 15.7 | —   | ns   |   |
| Turn-Off Fall Time                      | t <sub>f</sub>      | —   | 9.9  | —   | ns   |   |

**Electrical Characteristics P-CHANNEL – Q2** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          | Symbol              | Min | Typ  | Max  | Unit | Test Condition   |
|---|---------------------|-----|------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 8)</b>     |                     |     |      |      |      |  |
| Drain-Source Breakdown Voltage          | BV <sub>DSS</sub>   | -60 | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA  |
| Zero Gate Voltage Drain Current         | I <sub>DSS</sub>    | —   | —    | -25  | nA   | @T <sub>C</sub> = +25°C<br>V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V                          |
| Gate-Source Leakage                     | I <sub>GSS</sub>    | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 8)</b>      |                     |     |      |      |      |  |
| Gate Threshold Voltage                  | V <sub>GS(th)</sub> | -1  | —    | -3.0 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                      |
| Static Drain-Source On-Resistance       | R <sub>DS(on)</sub> | —   | 2.7  | 4    | Ω    | V <sub>GS</sub> = -10V, I <sub>D</sub> = -500mA  |
|   |                     | —   | 3.2  | 6    |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -200mA   |
| Forward Transfer Admittance             | Y <sub>fs</sub>     | 50  | —    | —    | mS   | V <sub>DS</sub> = -25V, I <sub>D</sub> = -100mA  |
| Diode Forward Voltage                   | V <sub>SD</sub>     | —   | —    | -1.4 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -115mA  |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b> |                     |     |      |      |      |  |
| Input Capacitance                       | C <sub>iss</sub>    | —   | 25   | —    | pF   | V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                      |
| Output Capacitance                      | C <sub>oss</sub>    | —   | 4.7  | —    | pF   |  |
| Reverse Transfer Capacitance            | C <sub>rss</sub>    | —   | 2.7  | —    | pF   |  |
| Total Gate Charge                       | Q <sub>g</sub>      | —   | 0.28 | —    | nC   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V,<br>I <sub>D</sub> = -500mA                      |
| Gate-Source Charge                      | Q <sub>gs</sub>     | —   | 0.14 | —    | nC   |  |
| Gate-Drain Charge                       | Q <sub>gd</sub>     | —   | 0.08 | —    | nC   |  |
| Turn-On Delay Time                      | t <sub>D(on)</sub>  | —   | 5.5  | —    | ns   | V <sub>DD</sub> = -30V, V <sub>GS</sub> = -10V,<br>R <sub>G</sub> = 50Ω, I <sub>D</sub> = -270mA |
| Turn-On Rise Time                       | t <sub>r</sub>      | —   | 7.9  | —    | ns   |  |
| Turn-Off Delay Time                     | t <sub>D(off)</sub> | —   | 10.6 | —    | ns   |  |
| Turn-Off Fall Time                      | t <sub>f</sub>      | —   | 11.6 | —    | ns   |  |

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

**N-CHANNEL - Q1**

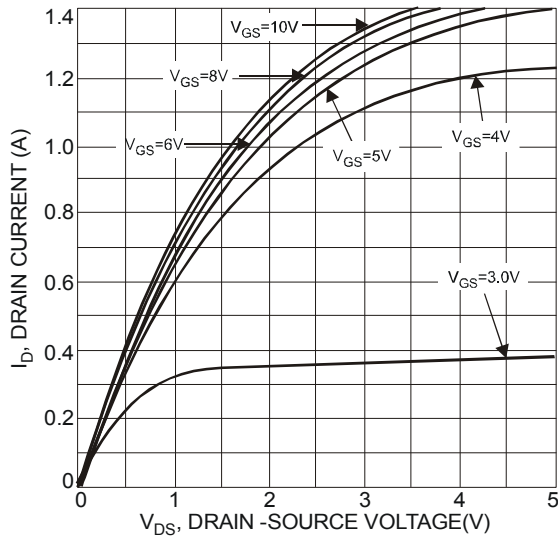


Fig. 1 Typical Output Characteristics

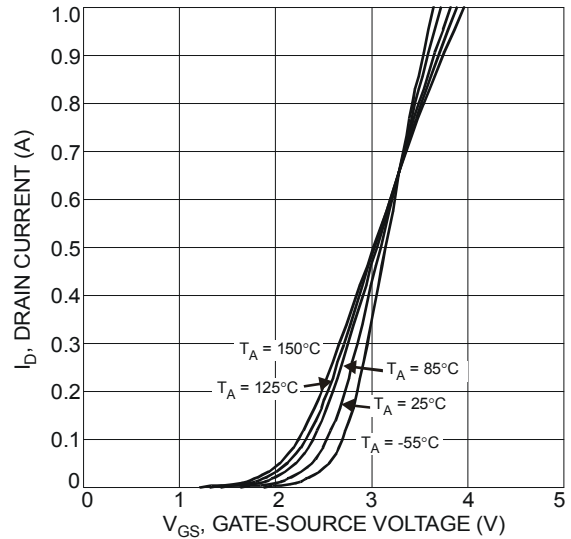


Fig. 2 Typical Transfer Characteristics

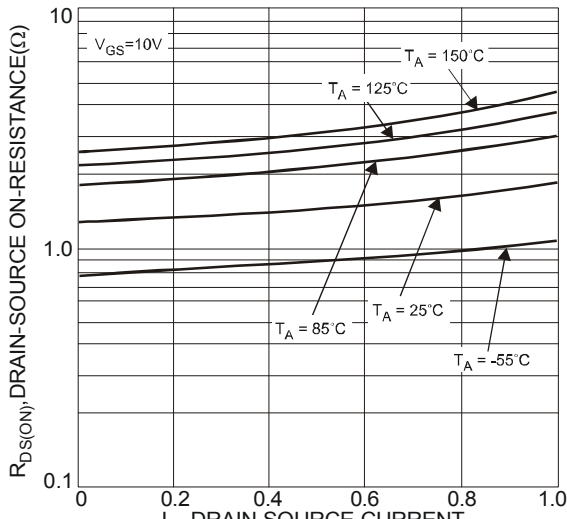


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

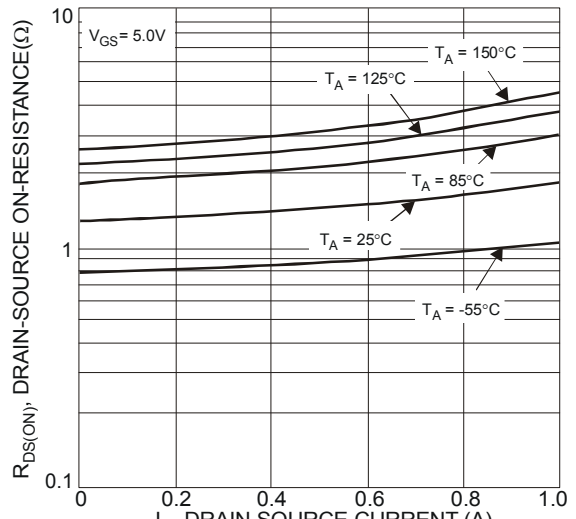


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

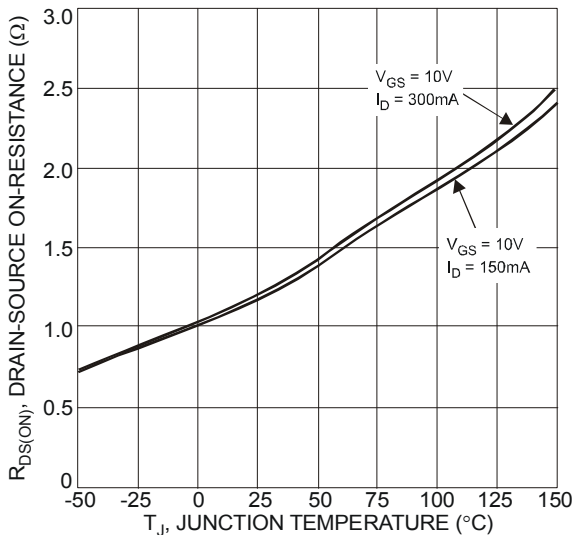


Fig. 5 On-Resistance Variation with Temperature

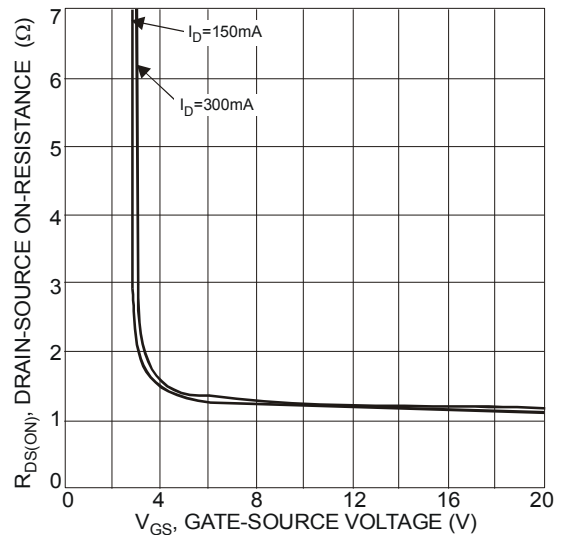
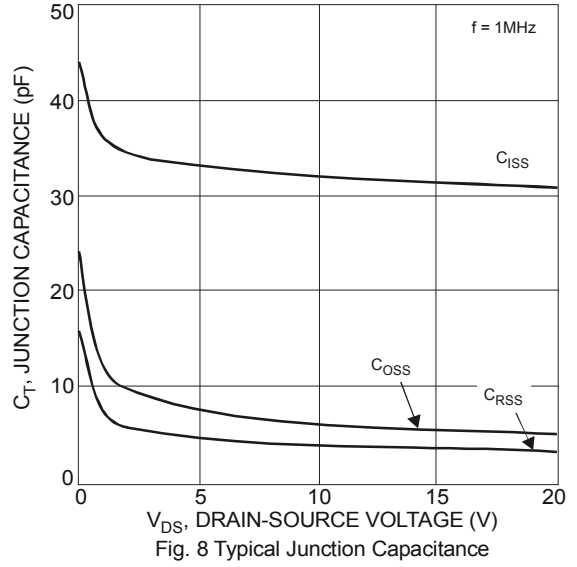
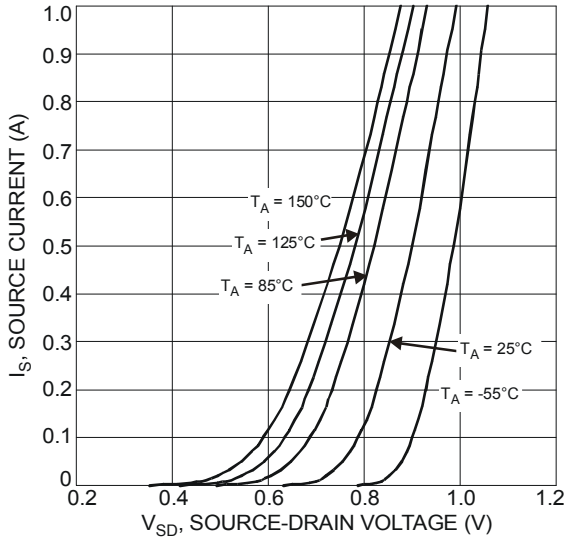


Fig. 6 Static Drain-Source On-Resistance vs. Gate-Source Voltage



**P-CHANNEL – Q2**

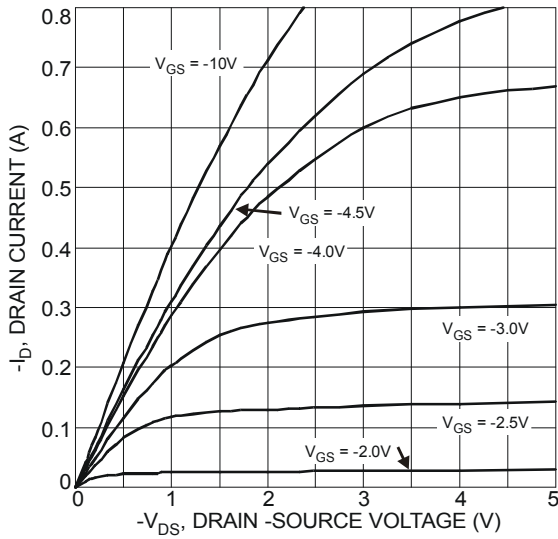


Fig. 9 Typical Output Characteristics

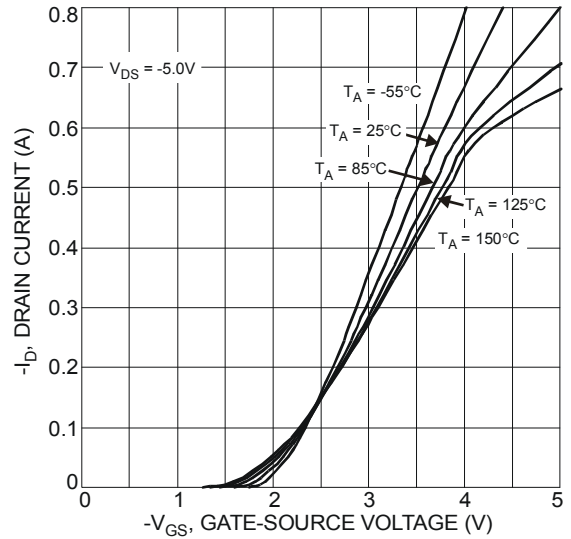


Fig. 10 Typical Transfer Characteristics

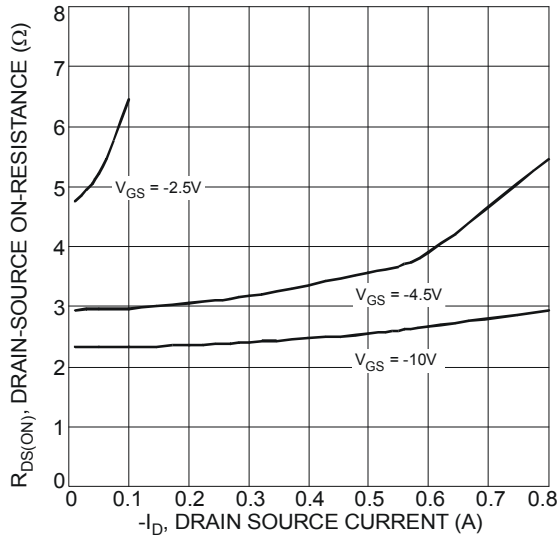


Fig. 11 Typical On-Resistance vs. Drain Current and Gate Voltage

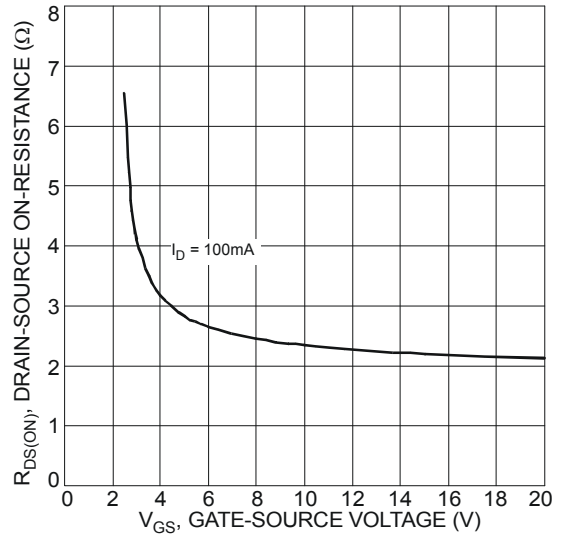


Fig. 12 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

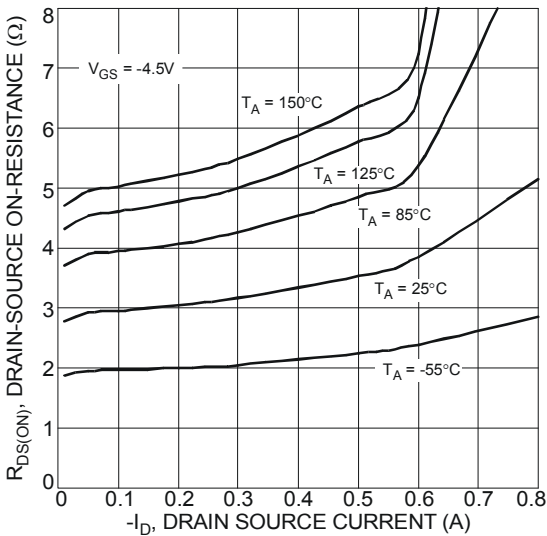


Fig. 13 Typical On-Resistance vs. Drain Current and Temperature

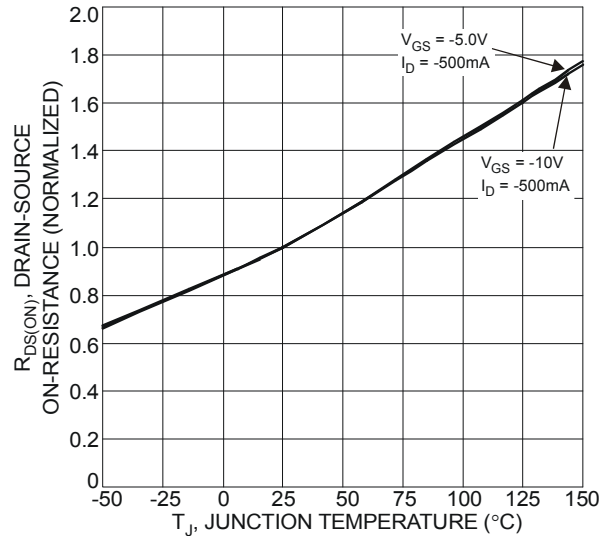


Fig. 14 On-Resistance Variation with Temperature

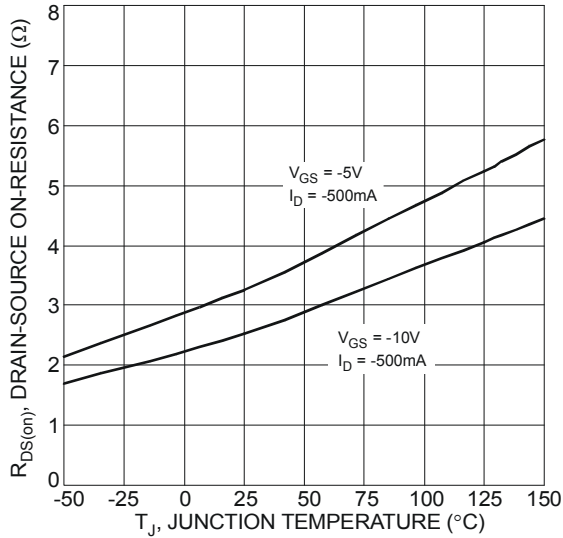


Fig. 15 On-Resistance Variation with Temperature

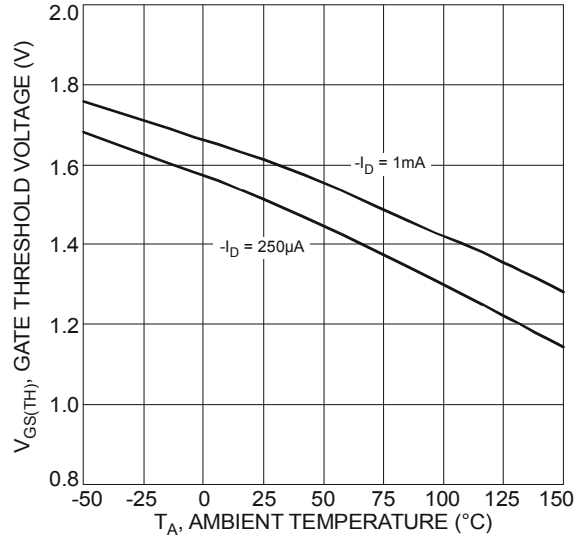


Fig. 16 Gate Threshold Variation vs. Ambient Temperature

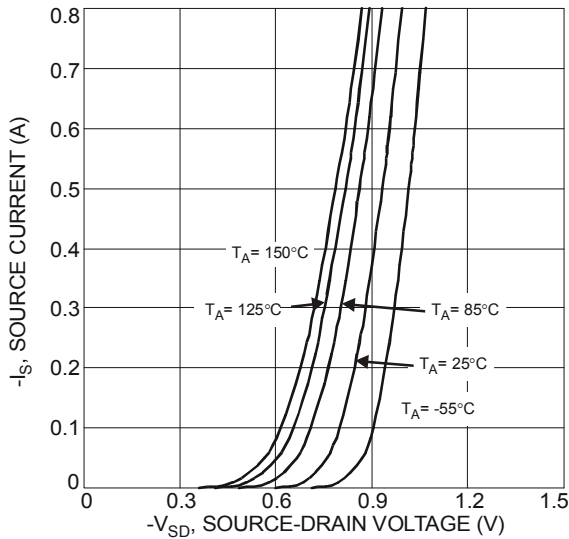


Fig. 17 Diode Forward Voltage vs. Current

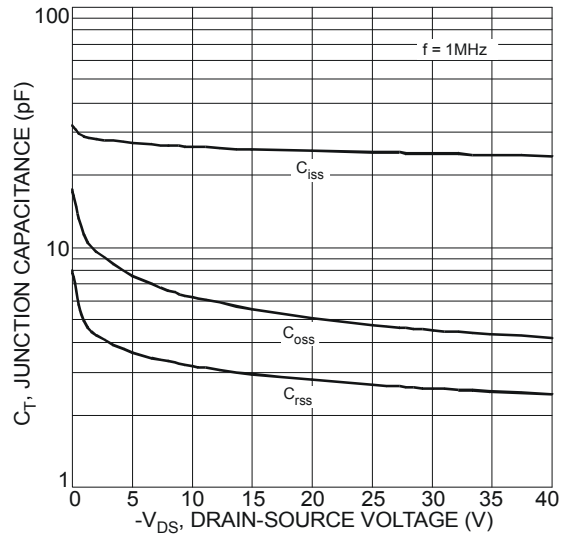


Fig. 18 Typical Junction Capacitance

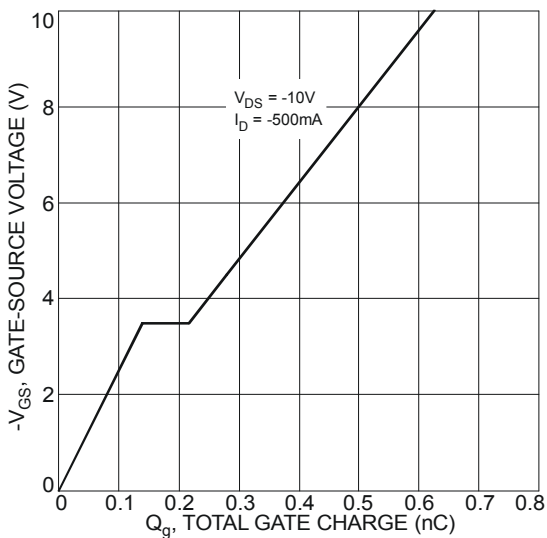
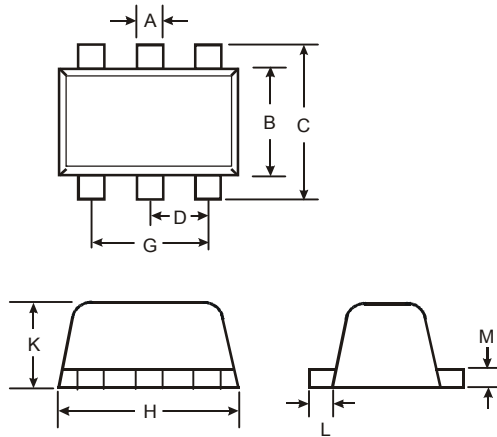


Fig. 19 Gate-Charge Characteristics

**Package Outline Dimensions**

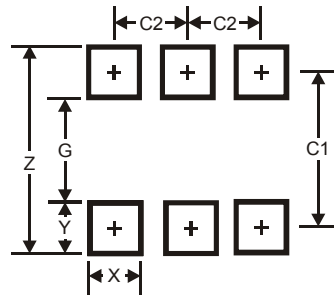
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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 latest version.



| 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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