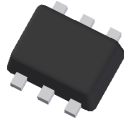
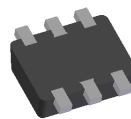
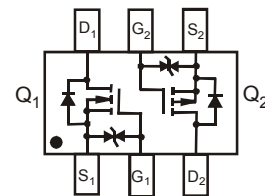


COMPLEMENTARY PAIR ENHANCEMENT MODE FIELD EFFECT TRANSISTOR
Features

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

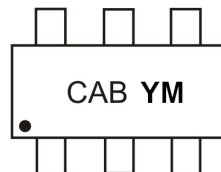
Mechanical Data

- Case: SOT-563
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.006 grams (approximate)


ESD protected

TOP VIEW
SOT-563

BOTTOM VIEW

**TOP VIEW
Internal Schematic**
Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------|---------|------------------|
| DMC2004VK-7 | SOT-563 | 3000/Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 2. See <http://www.diodes.com> 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/datasheets/ap02007.pdf>.

Marking Information


CAB = Product Type Marking Code
 YM = Date Code Marking
 Y = Year ex: U = 2007
 M = Month ex: 9 = September

Date Code Key

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|
| Code | U | V | W | X | Y | Z |

| 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} | ±8 | V |
| Drain Current (Note 5) | I _D | T _A = +25°C | 670 |
| | | T _A = +85°C | 480 |

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} | ±8 | V |
| Drain Current (Note 5) | I _D | T _A = +25°C | -530 |
| | | T _A = +85°C | -380 |

Thermal Characteristics

| Characteristic | Symbol | Value | Units |
|--|-----------------------------------|--------------|-------|
| Total Power Dissipation (Note 5) | P _D | 0.45 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | Steady state | 281 |
| | | t < 10s | 210 |
| Total Power Dissipation (Note 6) | P _D | 1 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | Steady state | 129 |
| | | t < 10s | 97 |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics N-CHANNEL – Q₁ (@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 = 10μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1.0 | μA | V _{DS} = 16V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ± 1.0 | μA | V _{GS} = ±4.5V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| 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)} | — | 0.4 | 0.55 | Ω | V _{GS} = 4.5V, I _D = 540mA |
| | | — | 0.5 | 0.70 | | V _{GS} = 2.5V, I _D = 500mA |
| | | — | 0.7 | 0.90 | | V _{GS} = 1.8V, I _D = 350mA |
| Forward Transfer Admittance (Note 8) | Y _{fs} | 200 | — | — | mS | V _{DS} = 10V, I _D = 0.2A |
| Diode Forward Voltage | V _{SD} | 0.5 | — | 1.2 | V | V _{GS} = 0V, I _S = 115mA |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C _{iss} | — | — | 150 | pF | V _{DS} = 16V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{oss} | — | — | 25 | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | — | 20 | pF | |

- 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 product testing.

Electrical Characteristics P-CHANNEL – Q₂ (@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} | — | — | ± 1.0 | μA | V _{GS} = ±4.5V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| 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)} | — | 0.7 | 0.9 | Ω | V _{GS} = -4.5V, I _D = -430mA |
| | | | 1.1 | 1.4 | | V _{GS} = -2.5V, I _D = -300mA |
| | | | 1.7 | 2.0 | | V _{GS} = -1.8V, I _D = -150mA |
| Forward Transfer Admittance | Y _{fs} | 200 | — | — | mS | V _{DS} = 10V, I _D = 0.2A |
| Diode Forward Voltage | V _{SD} | -0.5 | — | -1.2 | V | V _{GS} = 0V, I _S = -115mA |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iSS} | — | — | 175 | pF | V _{DS} = -16V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{oSS} | — | — | 30 | pF | |
| Reverse Transfer Capacitance | C _{rSS} | — | — | 20 | pF | |

Q₁, N-CHANNEL

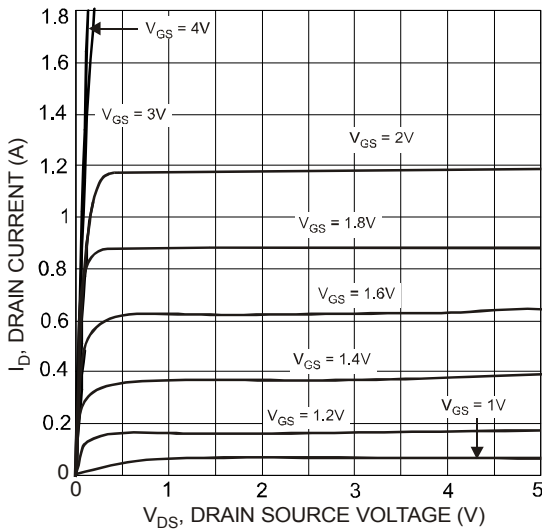


Fig. 1 Typical Output Characteristics

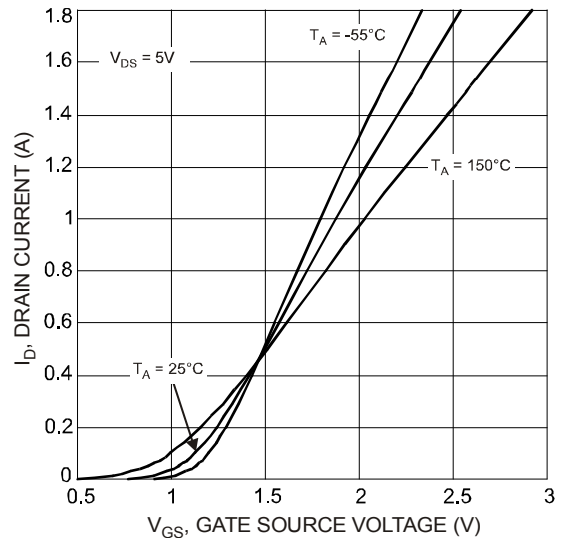


Fig. 2 Typical Transfer Characteristics

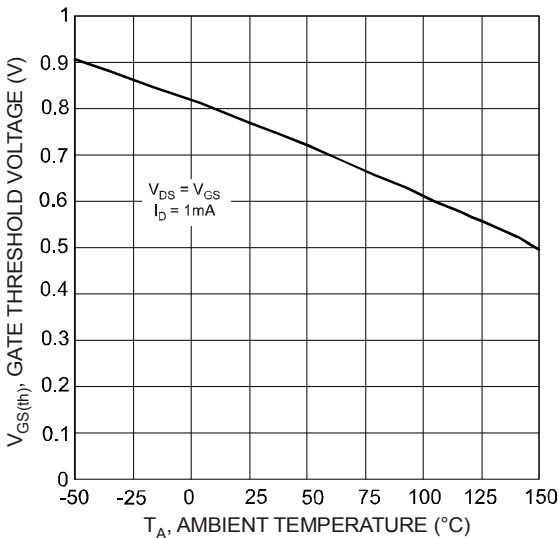


Fig. 3 Gate Threshold Voltage vs. Ambient Temperature

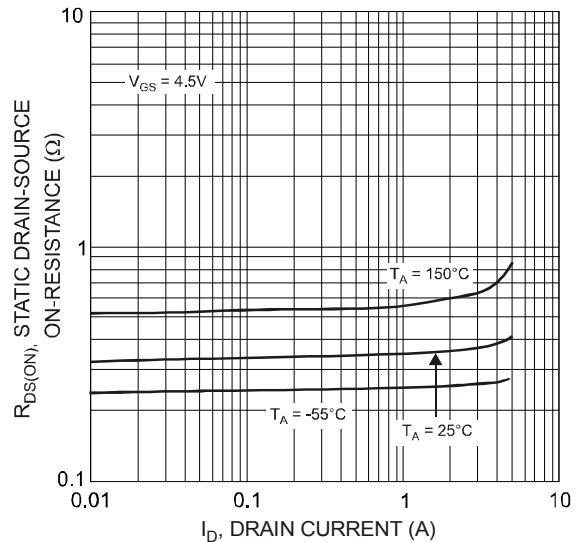


Fig. 4 Static Drain-Source On-Resistance vs. Drain Current

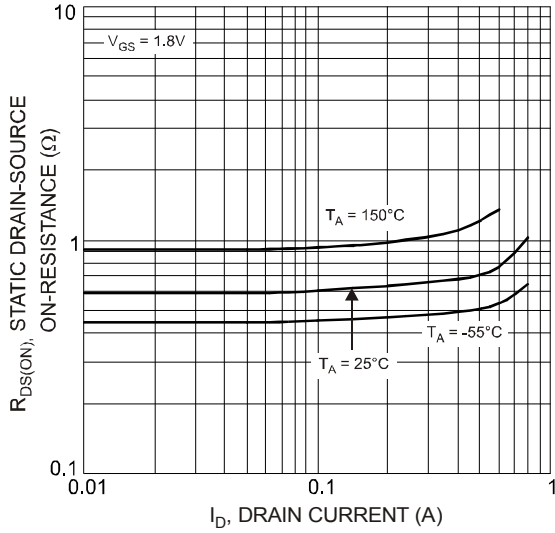


Fig. 5 Static Drain-Source On-Resistance vs. Drain Current

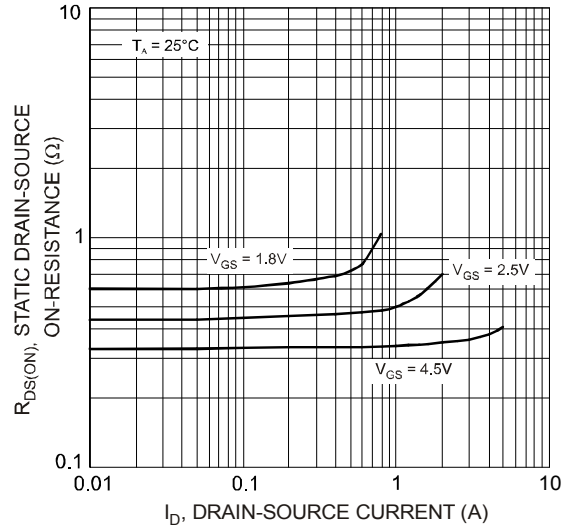


Fig. 6 Static Drain-Source On-Resistance vs. Drain-Source Current vs. Gate Source Voltage

Q₁, N-CHANNEL (cont.)

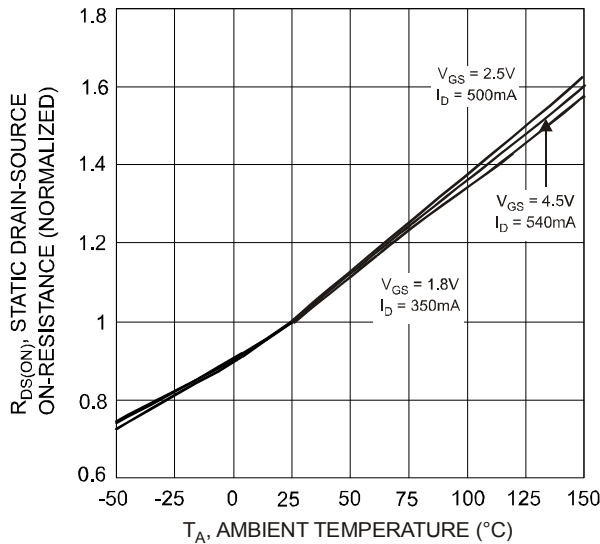


Fig. 7 Static Drain-Source On-State Resistance vs. Ambient Temperature

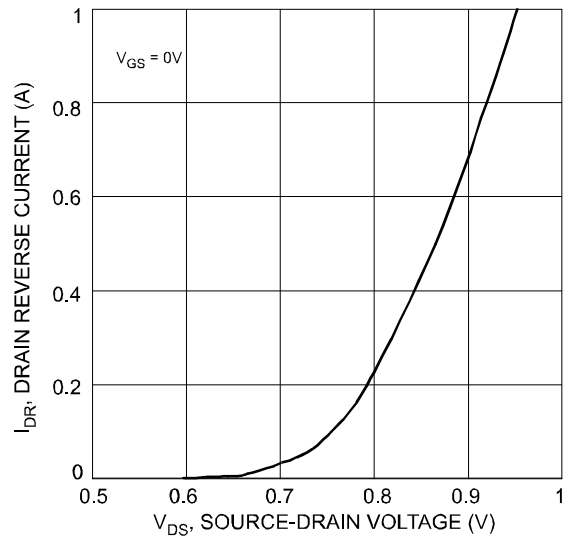


Fig. 8 Drain Reverse Current vs. Source-Drain Voltage

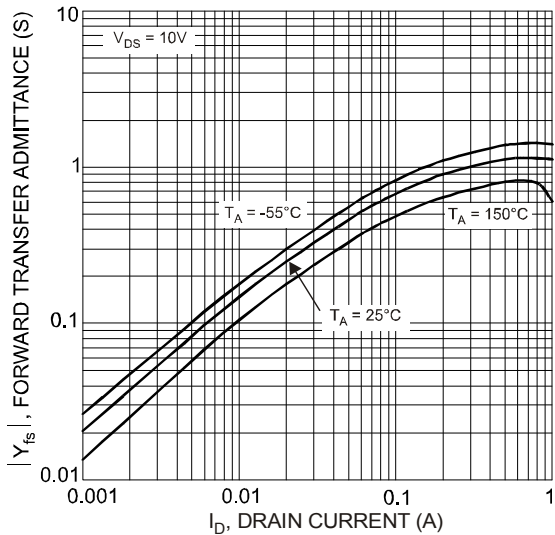


Fig. 9 Forward Transfer Admittance vs. Drain Current

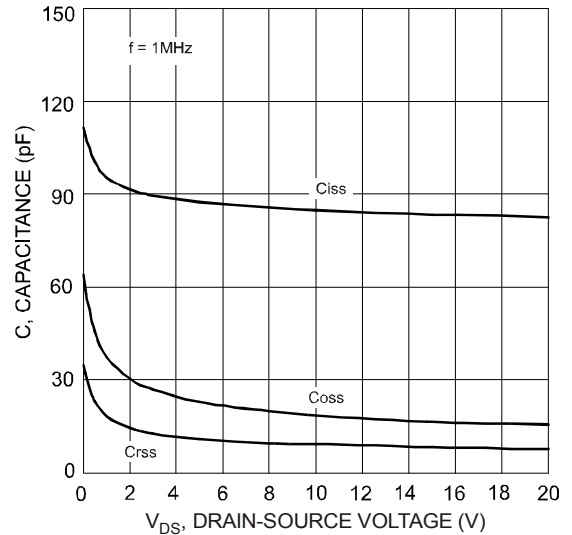


Fig. 10 Typical Capacitance

Q₂, P-CHANNEL

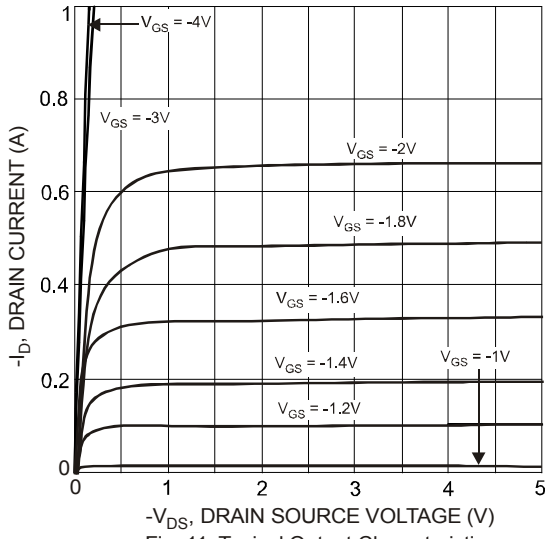


Fig. 11 Typical Output Characteristics

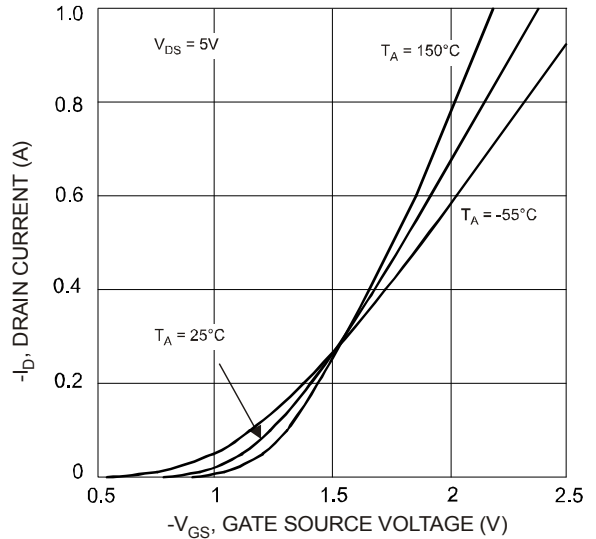


Fig. 12 Typical Transfer Characteristics

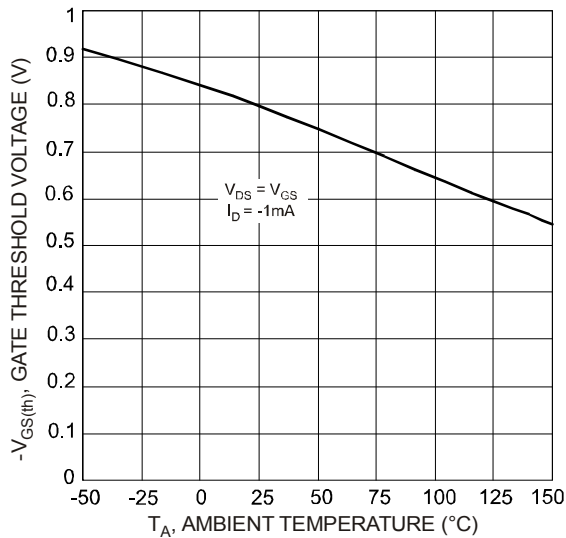


Fig. 13 Gate Threshold Voltage vs. Ambient Temperature

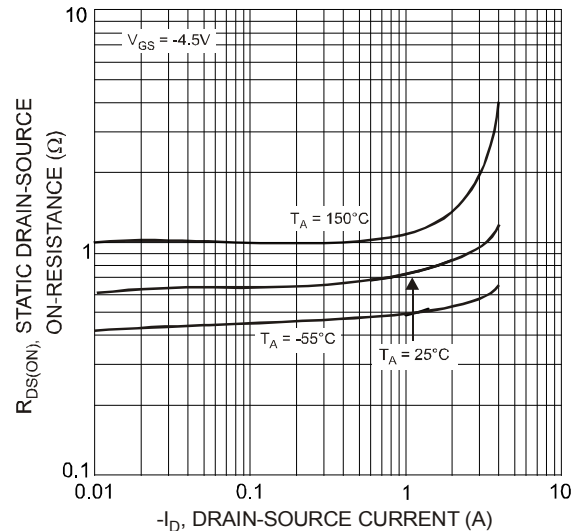


Fig. 14 Static Drain-Source On-Resistance vs. Drain Current

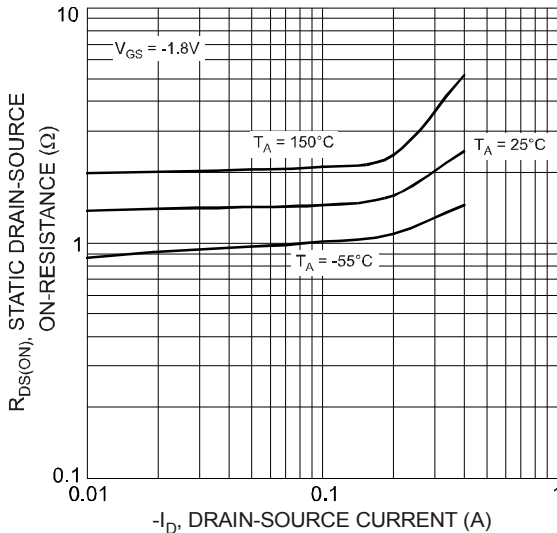


Fig. 15 Static Drain-Source On-Resistance vs. Drain Current

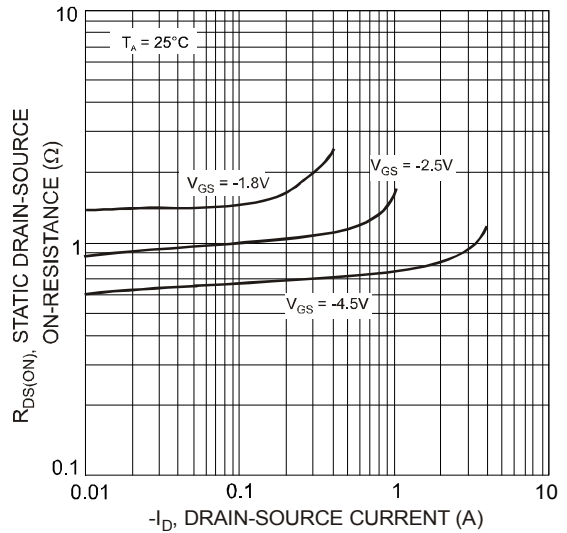


Fig. 16 Static Drain-Source On-Resistance vs. Drain-Source Current vs. Gate Source Voltage

Q₂, P-CHANNEL (cont.)

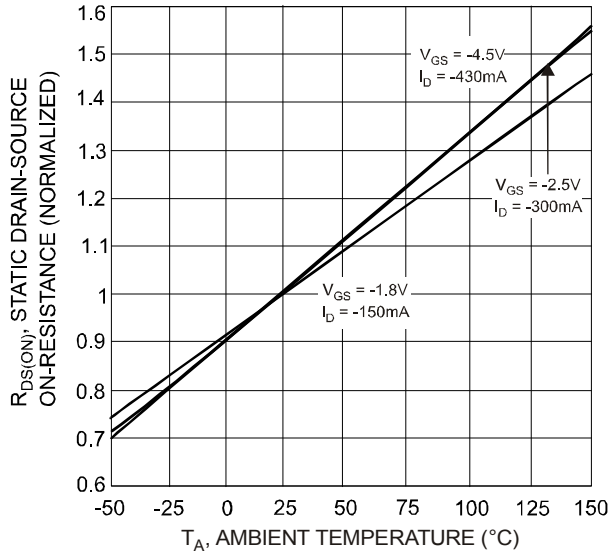


Fig. 17 Static Drain-Source On-State Resistance vs. Ambient Temperature

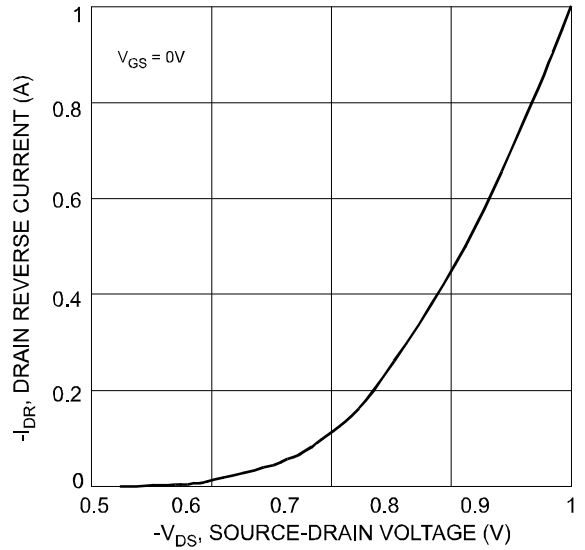


Fig. 18 Drain Reverse Current vs. Source-Drain Voltage

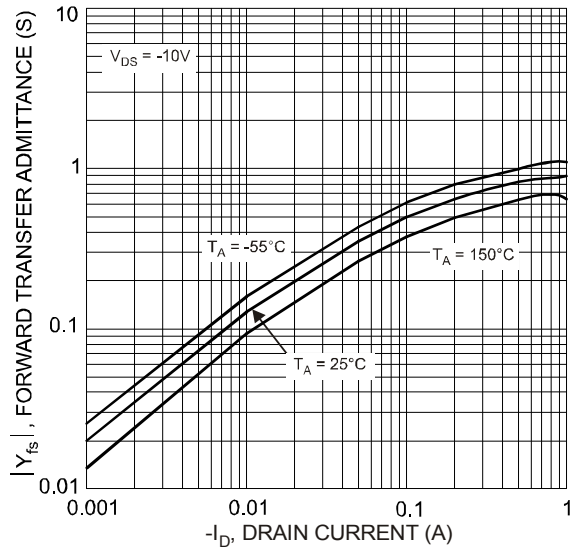


Fig. 19 Forward Transfer Admittance vs. Drain Current

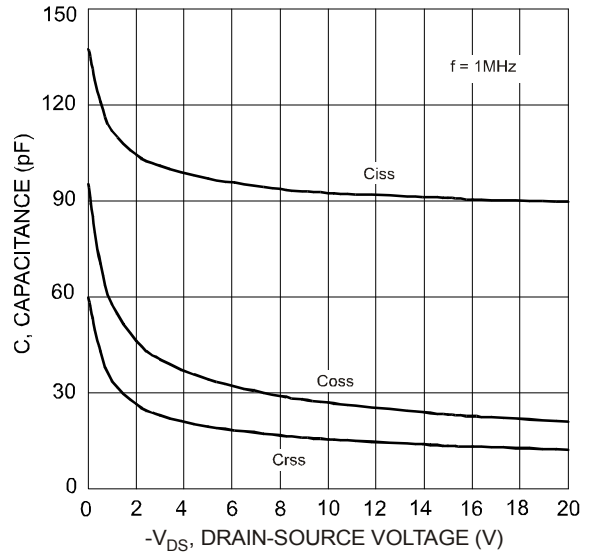
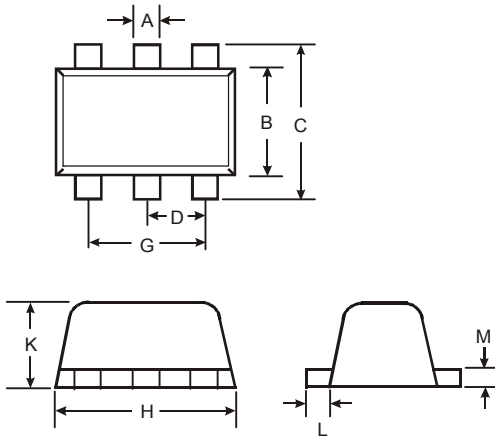


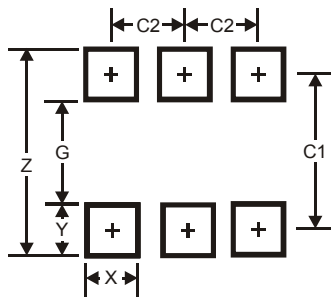
Fig. 20 Typical Capacitance

Package Outline Dimensions



| 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



| 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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