# P-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

## Features

- Low On-Resistance
- Very Low Gate Threshold Voltage $V_{GS(TH)}$ <1V
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead Free By Design/RoHS Compliant (Note 2)**
- **ESD Protected Gate**
- **"Green" Device (Note 3)**
- **Qualified to AEC-Q101 standards for High Reliability**

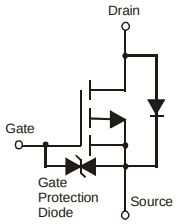
## Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.008 grams (approximate)

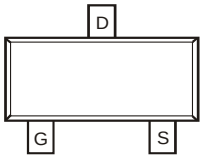
SOT-23

**ESD protected**

TOP VIEW




Equivalent Circuit




TOP VIEW

## Maximum Ratings @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Units |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | -20 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±8 | V |
| Drain Current (Note 1) $V_{GS}$ = -4.5V | $I_D$ | -600 | mA |
| Pulsed Drain Current | $I_{DM}$ | -1.9 | A |

## Thermal Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Units |
|---|---|---|---|
| Total Power Dissipation (Note 1) | $P_D$ | 550 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 227 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 4)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -20 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250mA |
| 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 4)** | | | | | | |
| 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<br>1.1<br>1.7 | 0.9<br>1.4<br>2.0 | Ω | $V_{GS}$ = -4.5V, $I_D$ = -430mA<br>$V_{GS}$ = -2.5V, $I_D$ = -300mA<br>$V_{GS}$ = -1.8V, $I_D$ = -150mA |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | 200 | — | — | mS | $V_{DS}$ = -10V, $I_D$ = -0.2A |
| Diode Forward Voltage (Note 4) | $V_{SD}$ | -0.5 | — | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -115mA |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | — | 175 | pF | $V_{DS}$ = -16V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | — | 30 | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | — | 20 | pF | |

Notes:
1. Device mounted on FR-4 PCB.
2. No purposefully added lead.
3. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
4. Short duration pulse test used to minimize self-heating effect.

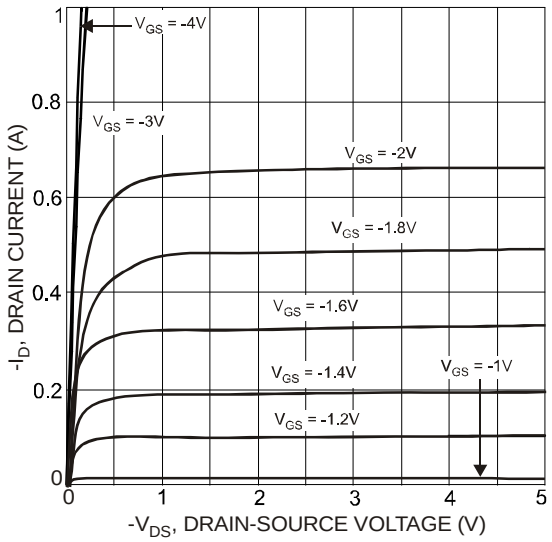



Fig. 1 Typical Output Characteristics

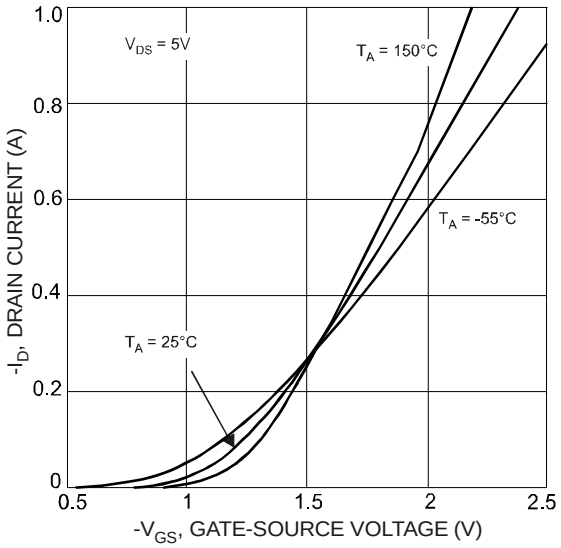



Fig. 2 Typical Transfer Characteristics

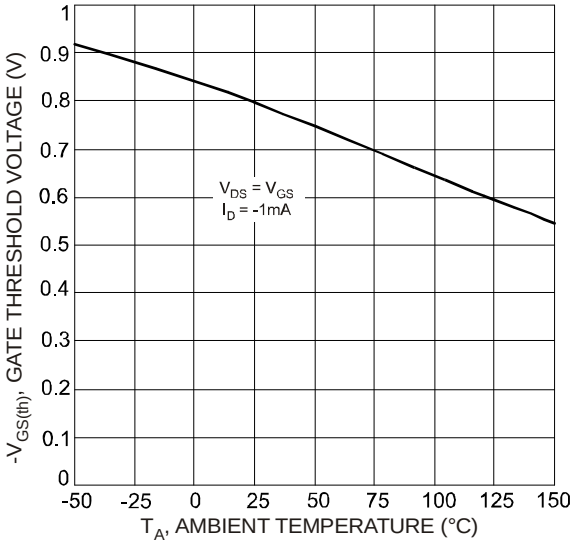



Fig. 3 Gate Threshold Voltage vs. Ambient Temperature

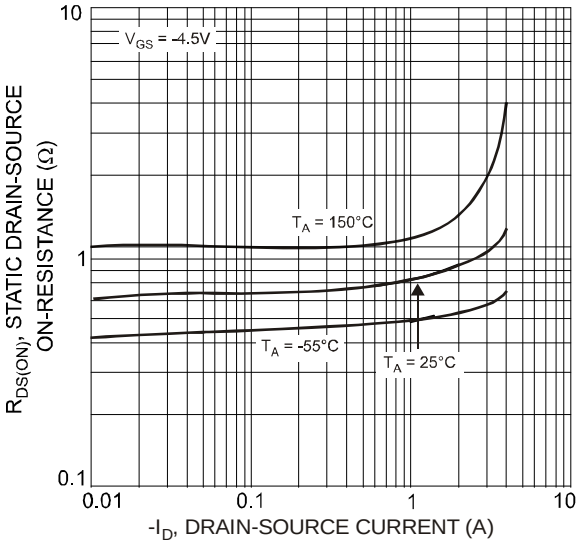



Fig. 4 Static Drain-Source On-Resistance vs. Drain Current

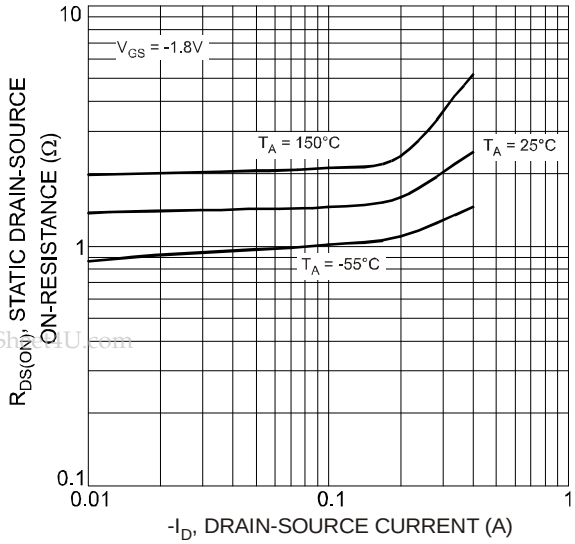





Fig. 5 Static Drain-Source On-Resistance vs. Drain Current

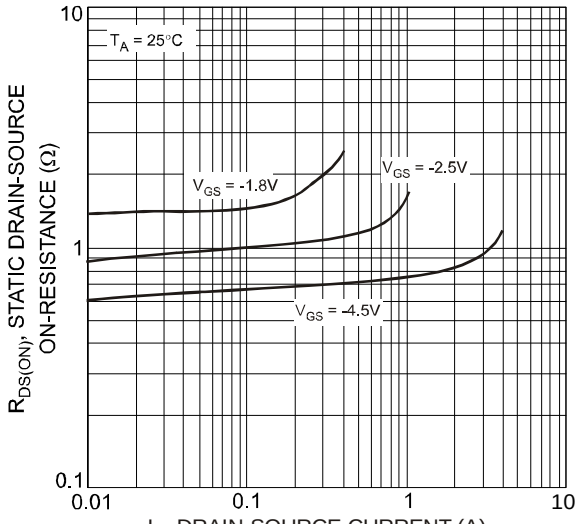



Fig. 6 Static Drain-Source On-Resistance vs. Drain-Source Current

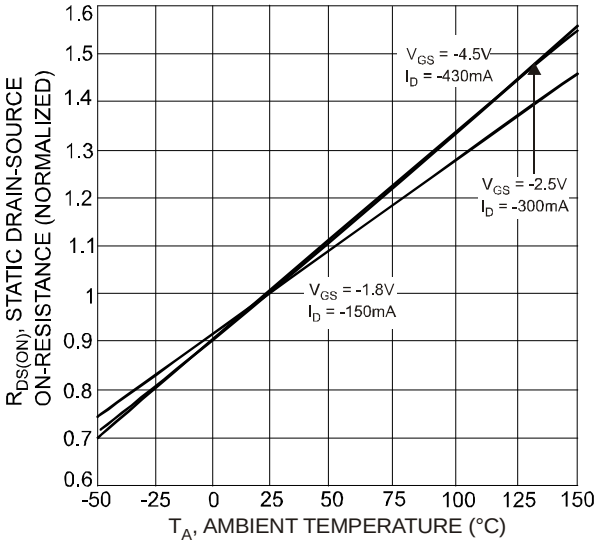



Fig. 7 Static Drain-Source On-State Resistance vs. Ambient Temperature

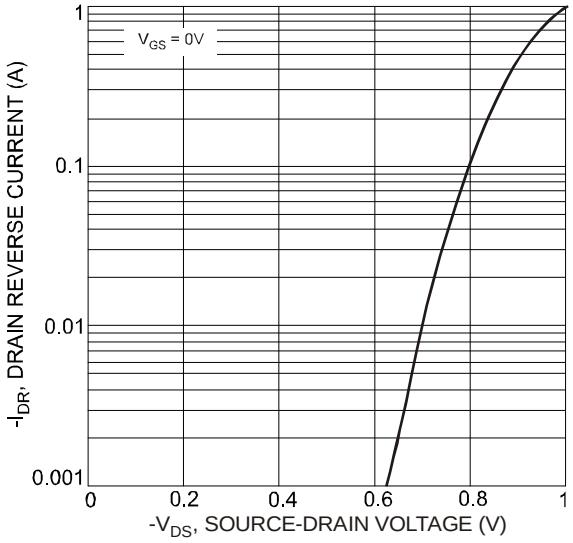



Fig. 8 Reverse Drain Current vs. Source-Drain Voltage

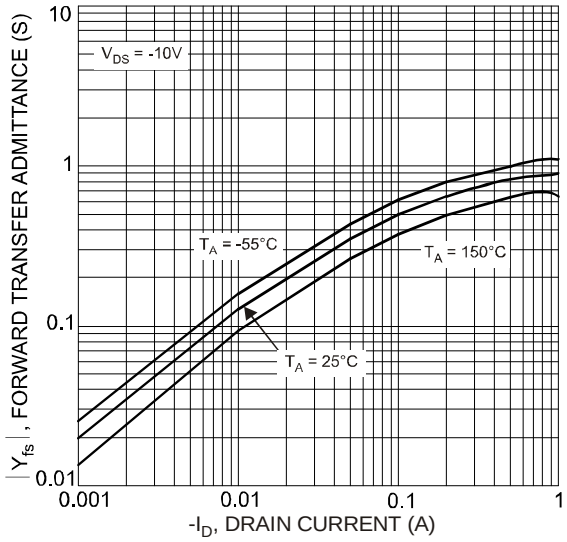



Fig. 9 Forward Transfer Admittance vs. Drain Current

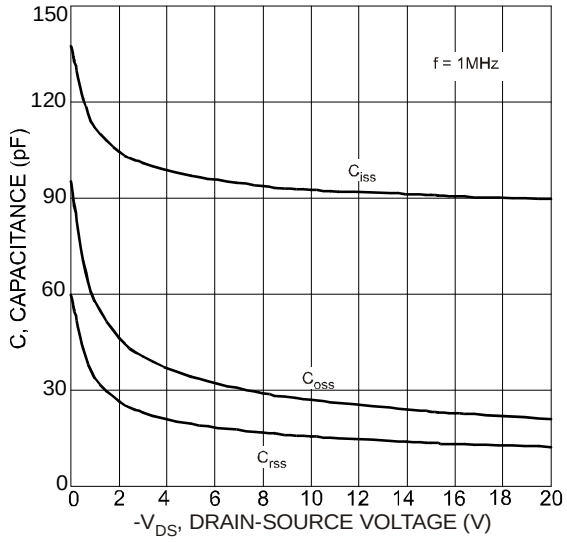



Fig. 10 Typical Capacitance

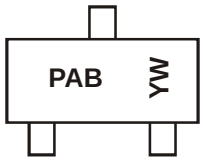
## Ordering Information (Note 5)

| Part Number | Case | Packaging |
|---|---|---|
| DMP2004K-7 | SOT-23 | 3000/Tape & Reel |

Notes: 5. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

## Marking Information





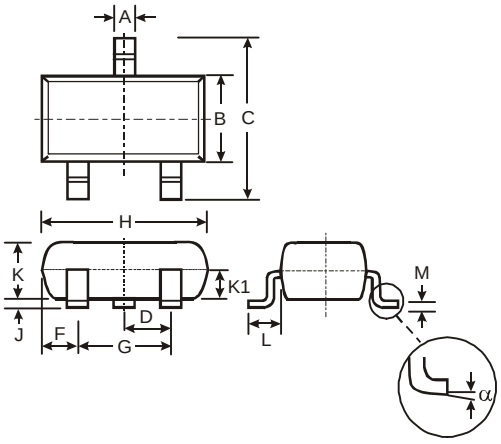

PAB = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: U = 2007)
M = Month (ex: 9 = September)

Date Code Key

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

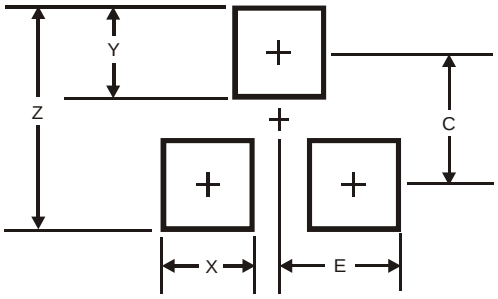
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

## Package Outline Dimensions




| SOT-23 | | | |
|---|---|---|---|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.903 | 1.10 | 1.00 |
| K1 | - | - | 0.400 |
| L | 0.45 | 0.61 | 0.55 |
| M | 0.085 | 0.18 | 0.11 |
| α | 0° | 8° | - |
| All Dimensions in mm | | | |

## Suggested Pad Layout




| Dimensions | Value (in mm) |
|---|---|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |

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