

**N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR**

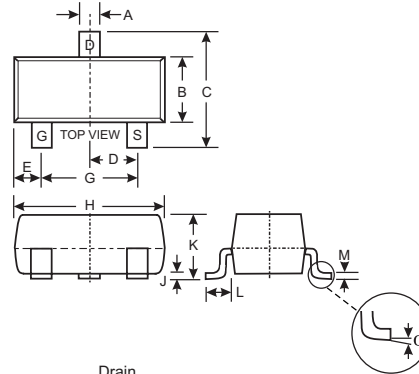
NEW PRODUCT

**Features**

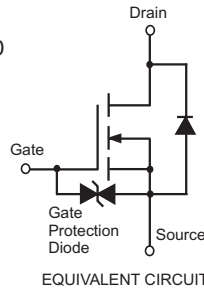
- Low On-Resistance:  $R_{DS(ON)}$
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead Free By Design/RoHS Compliant (Note 2)**
- **ESD Protected Up To 2kV**
- "Green" Device (Note 4)
- **Qualified to AEC-Q101 Standards for High Reliability**

**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-020C
- Terminals: Finish — Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking: See Last Page
- Ordering & Date Code Information: See Last Page
- Weight: 0.008 grams (approximate)



| SOT-23               |       |       |
|----------------------|-------|-------|
| Dim                  | Min   | Max   |
| A                    | 0.37  | 0.51  |
| B                    | 1.20  | 1.40  |
| C                    | 2.30  | 2.50  |
| D                    | 0.89  | 1.03  |
| E                    | 0.45  | 0.60  |
| G                    | 1.78  | 2.05  |
| H                    | 2.80  | 3.00  |
| J                    | 0.013 | 0.10  |
| K                    | 0.903 | 1.10  |
| L                    | 0.45  | 0.61  |
| M                    | 0.085 | 0.180 |
| $\alpha$             | 0°    | 8°    |
| All Dimensions in mm |       |       |



**Maximum Ratings** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

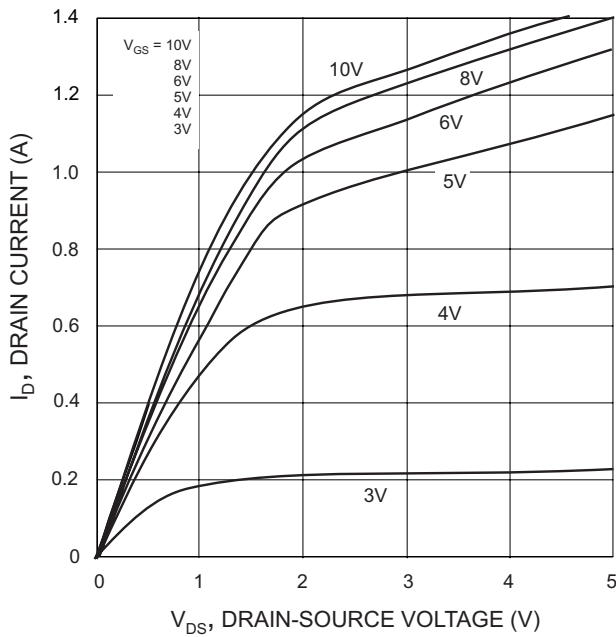
| Characteristic                          | Symbol          | Value       | Units              |
|---|-----------------|-------------|--------------------|
| Drain-Source Voltage                    | $V_{DSS}$       | 60          | V                  |
| Gate-Source Voltage                     | $V_{GSS}$       | $\pm 20$    | V                  |
| Drain Current (Note 1)                  | $I_D$           | 300         | mA                 |
| Continuous Pulsed (Note 3)              |                 | 800         |                    |
| Total Power Dissipation (Note 1)        | $P_d$           | 350         | mW                 |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 357         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | $T_j, T_{STG}$  | -65 to +150 | $^\circ\text{C}$   |

- Note:
1. Device mounted on FR-4 PCB.
  2. No purposefully added lead.
  3. Pulse width  $\leq 10\mu\text{s}$ , Duty Cycle  $\leq 1\%$ .
  4. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).

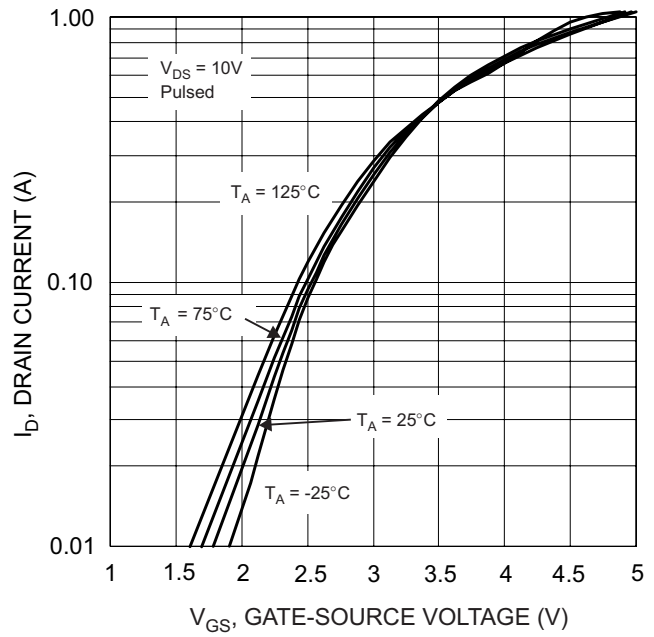
**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                      | Symbol       | Min | Typ | Max      | Unit     | Test Condition                              |
|-------------------------------------|--------------|-----|-----|----------|----------|---|
| <b>OFF CHARACTERISTICS (Note 5)</b> |              |     |     |          |          |   |
| Drain-Source Breakdown Voltage      | $BV_{DSS}$   | 60  | —   | —        | V        | $V_{GS} = 0V, I_D = 10\mu A$                |
| Zero Gate Voltage Drain Current     | $I_{DSS}$    | —   | —   | 1.0      | $\mu A$  | $V_{DS} = 60V, V_{GS} = 0V$                 |
| Gate-Source Leakage                 | $I_{GSS}$    | —   | —   | $\pm 10$ | $\mu A$  | $V_{GS} = \pm 20V, V_{DS} = 0V$             |
| <b>ON CHARACTERISTICS (Note 5)</b>  |              |     |     |          |          |   |
| Gate Threshold Voltage              | $V_{GS(th)}$ | 1.0 | 1.6 | 2.5      | V        | $V_{DS} = 10V, I_D = 1mA$                   |
| Static Drain-Source On-Resistance   | $R_{DS(on)}$ | —   | —   | 2.0      | $\Omega$ | $V_{GS} = 10V, I_D = 0.5A$                  |
|                                     |              |     |     | 3.0      |          | $V_{GS} = 5V, I_D = 0.05A$                  |
| Forward Transfer Admittance         | $ Y_{fs} $   | 80  | —   | —        | ms       | $V_{DS} = 10V, I_D = 0.2A$                  |
| <b>DYNAMIC CHARACTERISTICS</b>      |              |     |     |          |          |   |
| Input Capacitance                   | $C_{iss}$    | —   | —   | 50       | pF       | $V_{DS} = 25V, V_{GS} = 0V$<br>$f = 1.0MHz$ |
| Output Capacitance                  | $C_{oss}$    | —   | —   | 25       | pF       |   |
| Reverse Transfer Capacitance        | $C_{rss}$    | —   | —   | 5.0      | pF       |   |

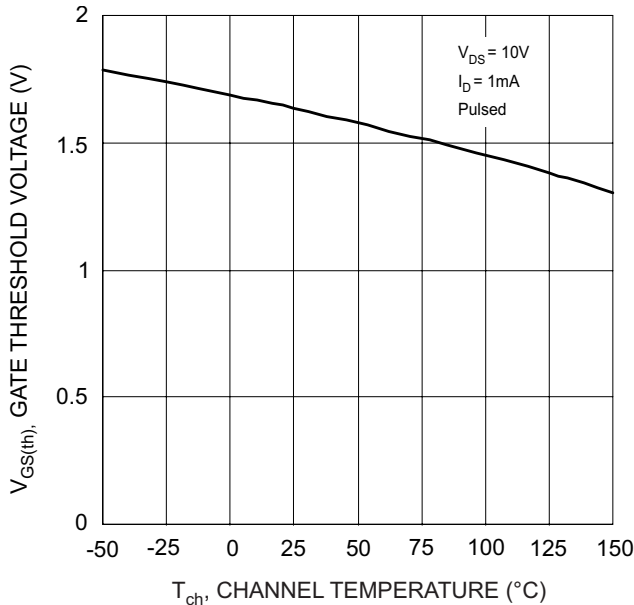
Notes: 5. Short duration test pulse used to minimize self-heating effect.



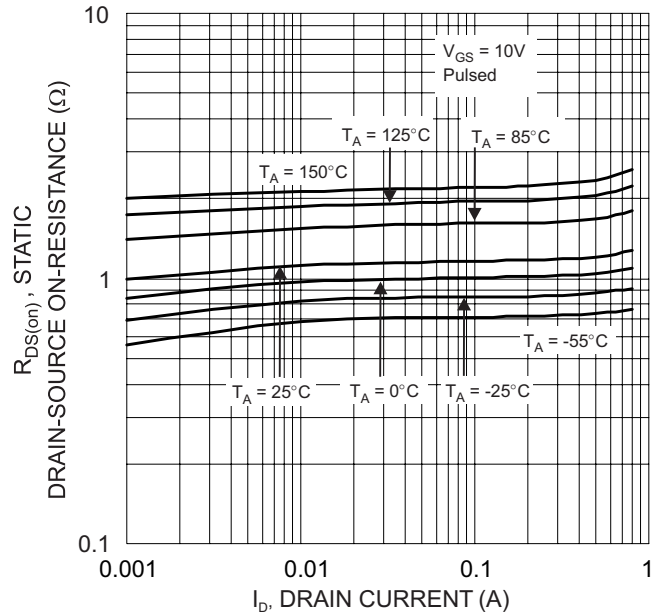
$V_{DS}$ , DRAIN-SOURCE VOLTAGE (V)  
Fig. 1 Typical Output Characteristics



$V_{GS}$ , GATE-SOURCE VOLTAGE (V)  
Fig. 2 Typical Transfer Characteristics



$T_{ch}$ , CHANNEL TEMPERATURE ( $^\circ\text{C}$ )  
Fig. 3 Gate Threshold Voltage vs. Channel Temperature



$I_D$ , DRAIN CURRENT (A)  
Fig. 4 Static Drain-Source On-Resistance vs. Drain Current

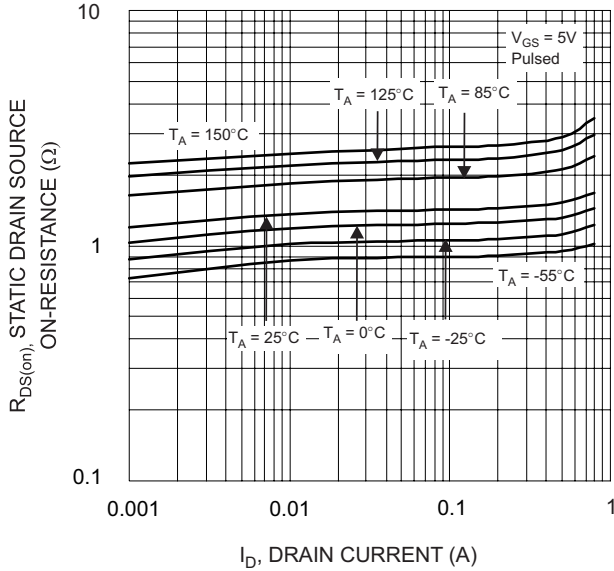


Fig. 5 Static Drain-Source On-Resistance vs. Drain Current

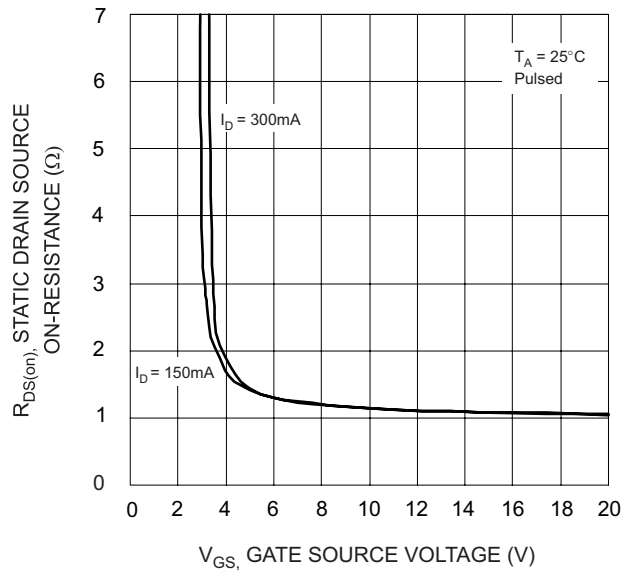


Fig. 6 Static Drain-Source On-Resistance vs. Gate-Source Voltage

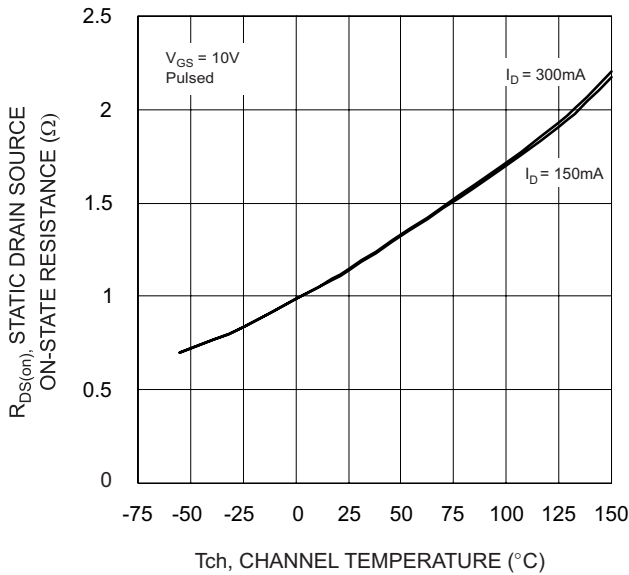


Fig. 7 Static Drain-Source On-State Resistance vs. Channel Temperature

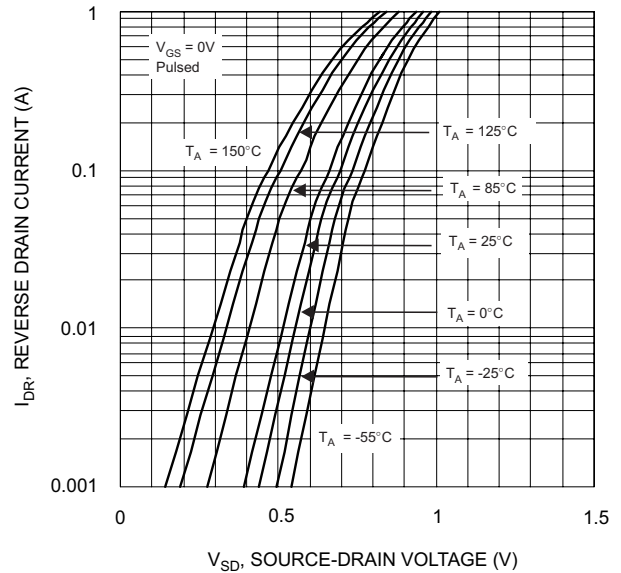


Fig. 8 Reverse Drain Current vs. Source-Drain Voltage

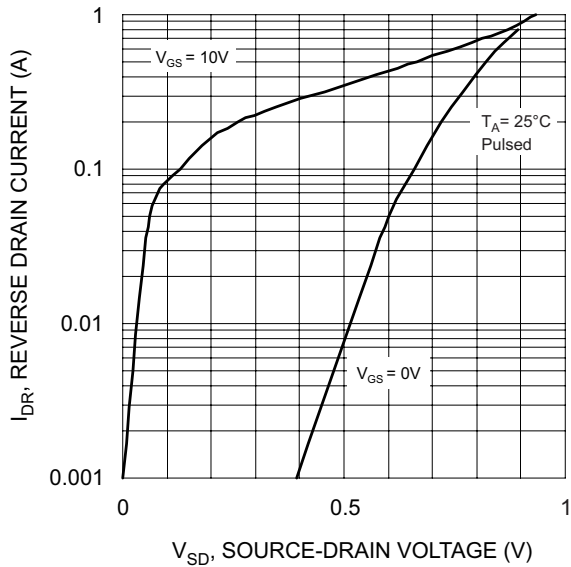


Fig. 9 Reverse Drain Current vs. Source-Drain Voltage

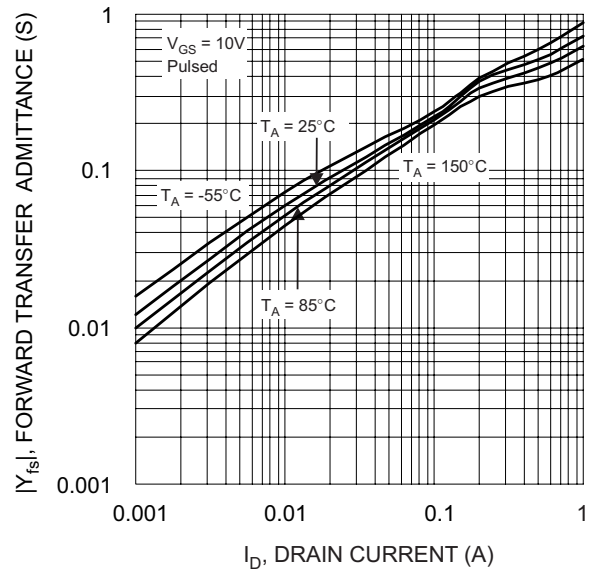


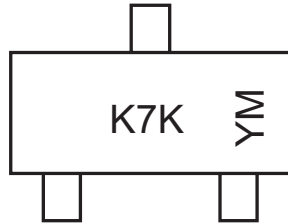
Fig. 10 Forward Transfer Admittance vs. Drain Current

**Ordering Information** (Note 6)

| Device    | Packaging | Shipping         |
|-----------|-----------|------------------|
| 2N7002K-7 | SOT-23    | 3000/Tape & Reel |

Notes: 6. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**



K7K = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: S = 2005  
 M = Month ex: 9 = September

Date Code Key

| Year | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|
| Code | S    | T    | U    | V    | W    |

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

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