

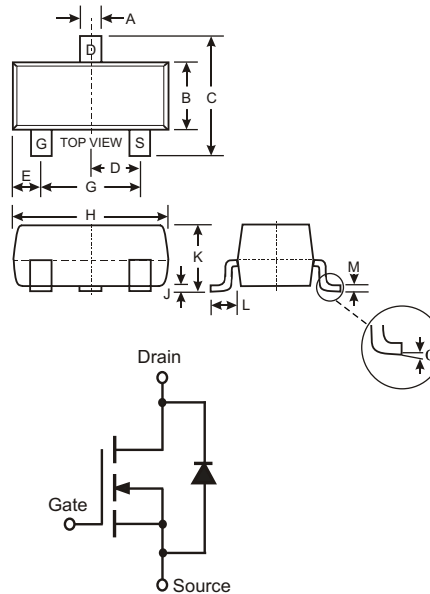
## N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

### Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage

### Mechanical Data

- Case: SOT-23, Molded Plastic
- Case Material - UL Flammability Classification Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking (See Page 2): K70
- Ordering & Date Code Information: See Page 2
- Weight: 0.008 grams (approx.)



| 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          | BS870       | Units            |
|----------------------------------------------------|-----------------|-------------|------------------|
| Drain-Source Voltage                               | $V_{DS}$        | 60          | V                |
| Drain-Gate Voltage $R_{GS} \leq 1.0\text{M}\Omega$ | $V_{DGR}$       | 60          | V                |
| Gate-Source Voltage Continuous                     | $V_{GSS}$       | $\pm 20$    | V                |
| Drain Current (Note 1) Continuous                  | $I_D$           | 250         | mA               |
| Total Power Dissipation (Note 1)                   | $P_d$           | 300         | mW               |
| Thermal Resistance, Junction to Ambient            | $R_{\theta JA}$ | 417         | K/W              |
| Operating and Storage Temperature Range            | $T_j, T_{STG}$  | -55 to +150 | $^\circ\text{C}$ |

Note: 1. Device mounted on FR-5 PCB 1.0 x 0.75 x 0.062 inch pad layout as shown on Diodes, Inc. suggested pad layout AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

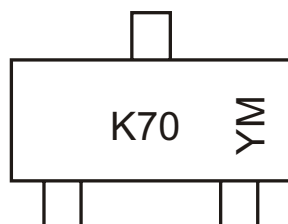
**Electrical Characteristics** @ T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                    | Symbol               | Min | Typ | Max | Unit | Test Condition                                                                                |
|-----------------------------------|----------------------|-----|-----|-----|------|-----------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS (Note 2)      |                      |     |     |     |      |                                                                                               |
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub>    | 60  | 80  | —   | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 100μA                                                  |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>     | —   | —   | 0.5 | μA   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V                                                   |
| Gate-Body Leakage                 | I <sub>GSS</sub>     | —   | —   | ±10 | nA   | V <sub>GS</sub> = ±15V, V <sub>DS</sub> = 0V                                                  |
| ON CHARACTERISTICS (Note 2)       |                      |     |     |     |      |                                                                                               |
| Gate Threshold Voltage            | V <sub>GS(th)</sub>  | 1.0 | 2.0 | 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> | —   | 3.5 | 5.0 | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.2A                                                  |
| On-State Drain Current            | I <sub>D(ON)</sub>   | —   | 1.0 | 0.5 | A    | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 7.5V                                                 |
| Forward Transconductance          | g <sub>FS</sub>      | 80  | —   | —   | mS   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.2A                                                  |
| DYNAMIC CHARACTERISTICS           |                      |     |     |     |      |                                                                                               |
| Input Capacitance                 | C <sub>iss</sub>     | —   | 22  | 50  | pF   | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                     |
| Output Capacitance                | C <sub>oss</sub>     | —   | 11  | 25  | pF   |                                                                                               |
| Reverse Transfer Capacitance      | C <sub>rss</sub>     | —   | 2.0 | 5.0 | pF   |                                                                                               |
| SWITCHING CHARACTERISTICS         |                      |     |     |     |      |                                                                                               |
| Turn-On Delay Time                | t <sub>D(ON)</sub>   | —   | 2.0 | 20  | ns   | V <sub>ES</sub> = 10V, R <sub>L</sub> = 150Ω,<br>V <sub>DS</sub> = 10V, R <sub>D</sub> = 100Ω |
| Turn-Off Delay Time               | t <sub>D(OFF)</sub>  | —   | 5.0 | 20  | ns   |                                                                                               |

**Ordering Information** (Note 3)

| Device  | Packaging | Shipping         |
|---------|-----------|------------------|
| BS870-7 | SOT-23    | 3000/Tape & Reel |

Notes: 2. Short duration test pulse used to minimize self-heating effect.  
 3. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**


K70 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

**Date Code Key**

| Year  | 1998 | 1999 | 2000  | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-------|------|------|-------|------|------|------|------|------|------|------|------|------|
| Code  | J    | K    | L     | M    | N    | P    | R    | 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    |

