# BS870

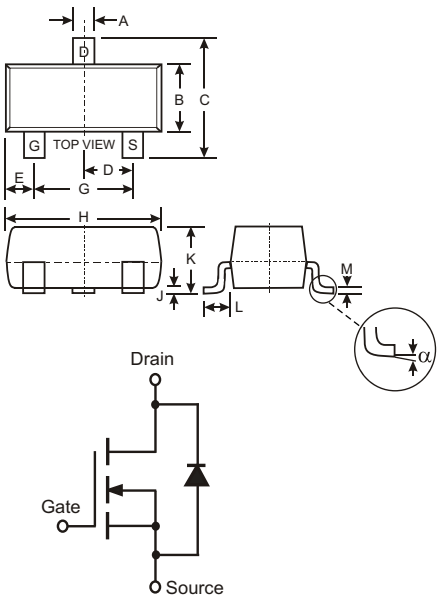
## N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead Free/RoHS Compliant (Note 2)**

## Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking (See Page 2): K70
- Ordering & Date Code Information: See Page 2
- 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 |
| | 0 | 8 |
| **All Dimensions in mm** | | |

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

| Characteristic | | Symbol | BS870 | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 60 | V |
| Drain-Gate Voltage $R_{GS}$ 1.0M | | $V_{DGR}$ | 60 | V |
| Gate-Source Voltage | Continuous | $V_{GSS}$ | 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 | | $R_{JA}$ | 417 | K/W |
| Operating and Storage Temperature Range | | $T_j$, $T_{STG}$ | -55 to +150 | 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.
2. No purposefully added lead.

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

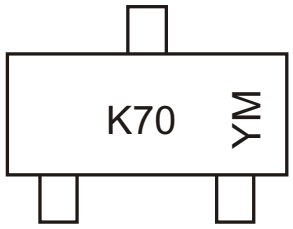
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 3)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 60 | 80 | | V | $V_{GS}$ = 0V, $I_D$ = 100 A |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | 0.5 | µA | $V_{DS}$ = 25V, $V_{GS}$ = 0V |
| Gate-Body Leakage | $I_{GSS}$ | | | 10 | nA | $V_{GS}$ = 15V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 3)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.0 | 2.0 | 3.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 A |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | | 3.5 | 5.0 | | $V_{GS}$ = 10V, $I_D$ = 0.2A |
| On-State Drain Current | $I_{D(ON)}$ | | 1.0 | 0.5 | A | $V_{GS}$ = 10V, $V_{DS}$ = 7.5V |
| Forward Transconductance | $g_{FS}$ | 80 | | | mS | $V_{DS}$ =10V, $I_D$ = 0.2A |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{iss}$ | | 22 | 50 | pF | $V_{DS}$ = 10V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | | 11 | 25 | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 2.0 | 5.0 | pF | |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | | 2.0 | 20 | ns | $V_{ES}$ = 10V, $R_L$ = 150 ,<br>$V_{DS}$ = 10V, $R_D$ = 100 |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | 5.0 | 20 | ns | |

## Ordering Information (Note 4)

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

Notes: 3. Short duration test pulse used to minimize self-heating effect.
4. 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 |

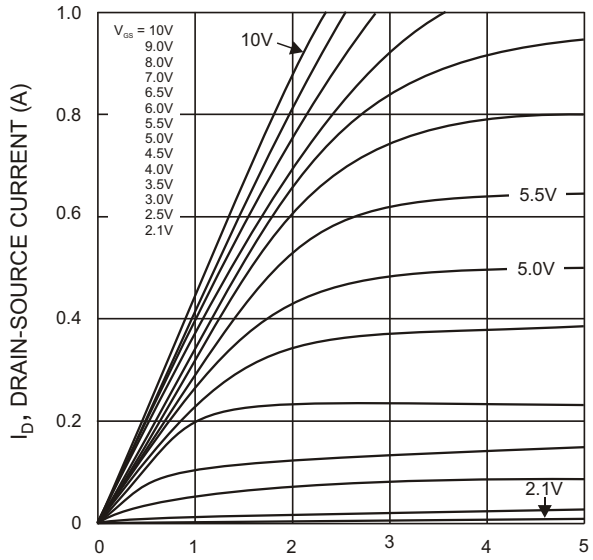



Fig. 1 On-Region Characteristics

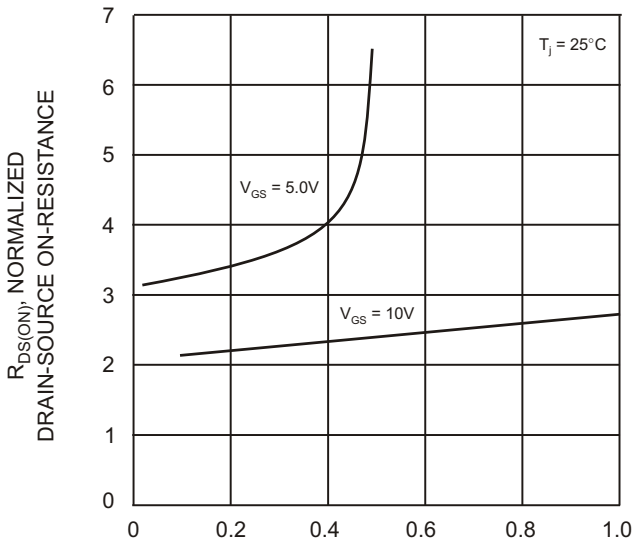



Fig. 2 On-Resistance vs Drain Current

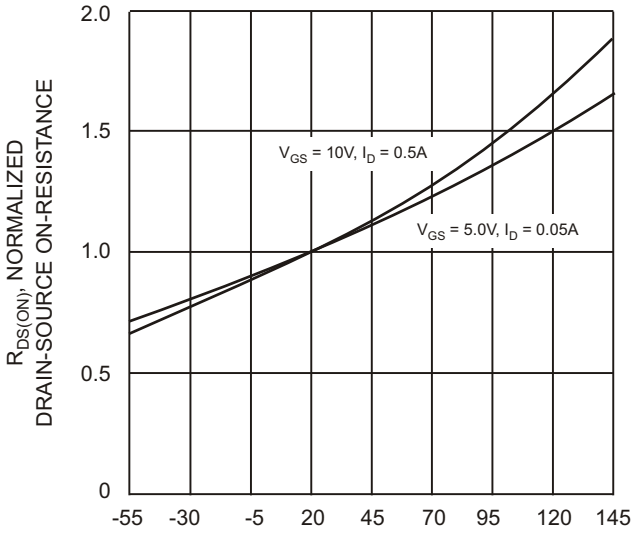



Fig. 3 On-Resistance vs Junction Temperature

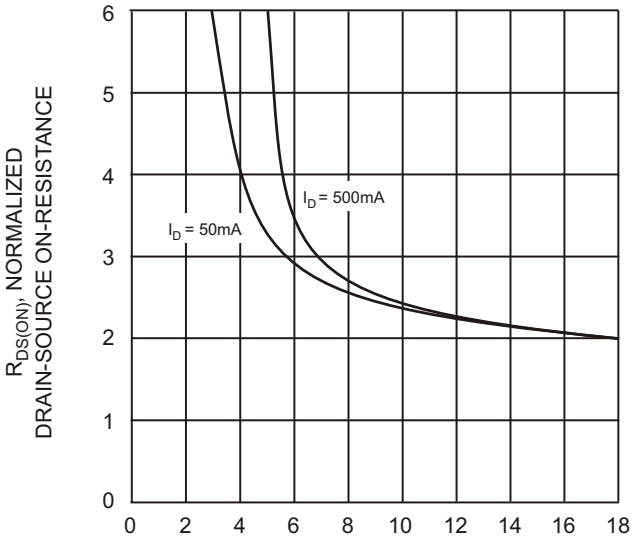



Fig. 4 On-Resistance vs. Gate-Source Voltage

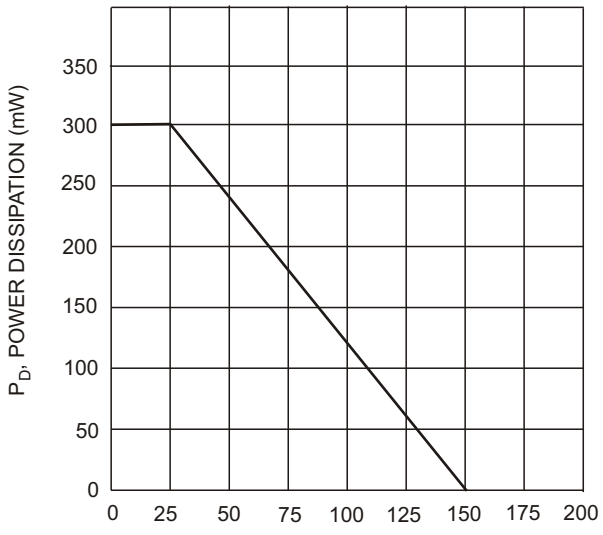



Fig. 5, Max Power Dissipation vs Ambient Temperature

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