

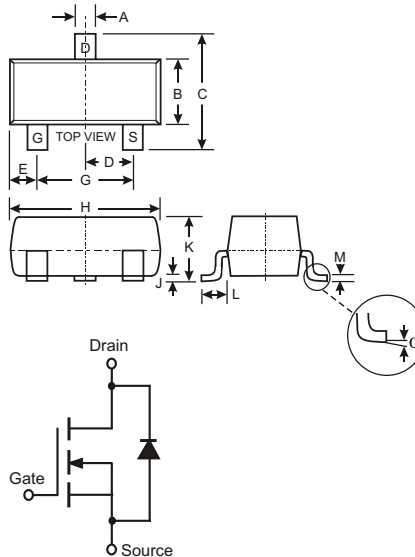
## N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

### 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 Rating Classification 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) K6Z
- 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          | MMBF170     | Units       |
|---|-----------------|-------------|-------------|
| Drain-Source Voltage                        | $V_{DSS}$       | 60          | V           |
| Drain-Gate Voltage $R_{GS} \leq 1.0M\Omega$ | $V_{DGR}$       | 60          | V           |
| Gate-Source Voltage                         | $V_{GSS}$       | $\pm 20$    | V           |
|   |                 | $\pm 40$    |             |
| Drain Current (Note 1)                      | $I_D$           | 500         | mA          |
|   |                 | 800         |             |
| Total Power Dissipation (Note 1)            | $P_d$           | 300         | mW<br>mW/°C |
|   |                 | 1.80        |             |
| Thermal Resistance, Junction to Ambient     | $R_{\theta JA}$ | 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>.

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

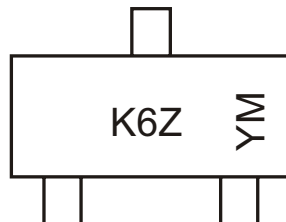
| Characteristic                      | Symbol              | Min | Typ | Max | Unit | Test Condition   |
|-------------------------------------|---------------------|-----|-----|-----|------|--|
| <b>OFF CHARACTERISTICS (Note 2)</b> |                     |     |     |     |      |  |
| Drain-Source Breakdown Voltage      | BV <sub>DSS</sub>   | 60  | 70  | —   | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 100μA   |
| Zero Gate Voltage Drain Current     | I <sub>DSS</sub>    | —   | —   | 1.0 | μA   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V  |
| Gate-Body Leakage                   | I <sub>GSS</sub>    | —   | —   | ±10 | nA   | V <sub>GS</sub> = ±15V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 2)</b>  |                     |     |     |     |      |  |
| Gate Threshold Voltage              | V <sub>GS(th)</sub> | 0.8 | 2.1 | 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> | —   | —   | 5.0 | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 200mA  |
| Forward Transconductance            | g <sub>FS</sub>     | 80  | —   | —   | mS   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.2A   |
| <b>DYNAMIC CHARACTERISTICS</b>      |                     |     |     |     |      |  |
| Input Capacitance                   | C <sub>iSS</sub>    | —   | 22  | 40  | pF   | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                      |
| Output Capacitance                  | C <sub>oss</sub>    | —   | 11  | 30  | pF   |  |
| Reverse Transfer Capacitance        | C <sub>rSS</sub>    | —   | 2.0 | 5.0 | pF   |  |
| <b>SWITCHING CHARACTERISTICS</b>    |                     |     |     |     |      |  |
| Turn-On Delay Time                  | t <sub>D(ON)</sub>  | —   | —   | 10  | ns   | V <sub>DD</sub> = 25V, I <sub>D</sub> = 0.5A,<br>V <sub>GS</sub> = 10V, R <sub>GEN</sub> = 50Ω |
| Turn-Off Delay Time                 | t <sub>D(OFF)</sub> | —   | —   | 10  | ns   |  |

## Ordering Information (Note 3)

| Device    | Packaging | Shipping         |
|-----------|-----------|------------------|
| MMBF170-7 | 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



K6Z = Product Type Marking Code  
YM = Date Code Marking  
Y = Year ex: N = 2002  
M = Month ex: 9 = September

### Date Code Key

|              |      |      |       |      |      |      |      |      |      |      |      |      |
|--------------|------|------|-------|------|------|------|------|------|------|------|------|------|
| <b>Year</b>  | 1998 | 1999 | 2000  | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| <b>Code</b>  | J    | K    | L     | M    | N    | P    | R    | S    | T    | U    | V    | W    |
| <b>Month</b> | Jan  | Feb  | March | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
| <b>Code</b>  | 1    | 2    | 3     | 4    | 5    | 6    | 7    | 8    | 9    | O    | N    | D    |

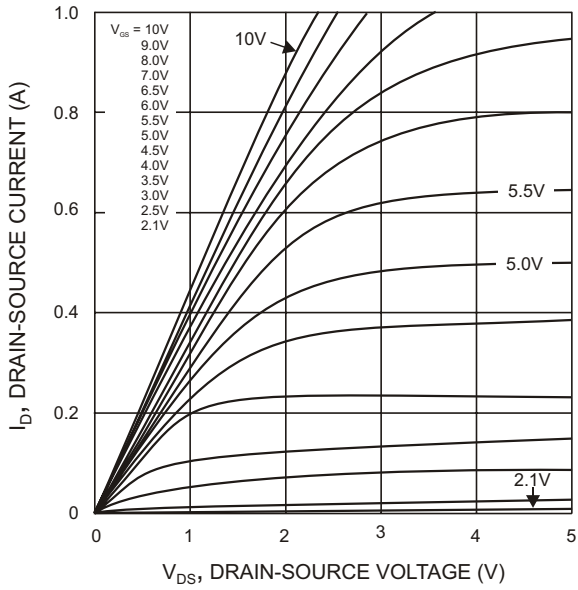


Fig. 1 On-Region Characteristics

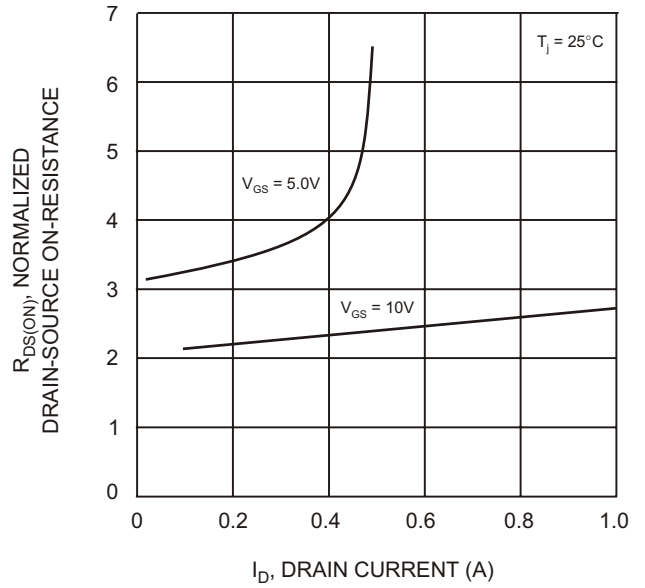


Fig. 2 On-Resistance vs Drain Current

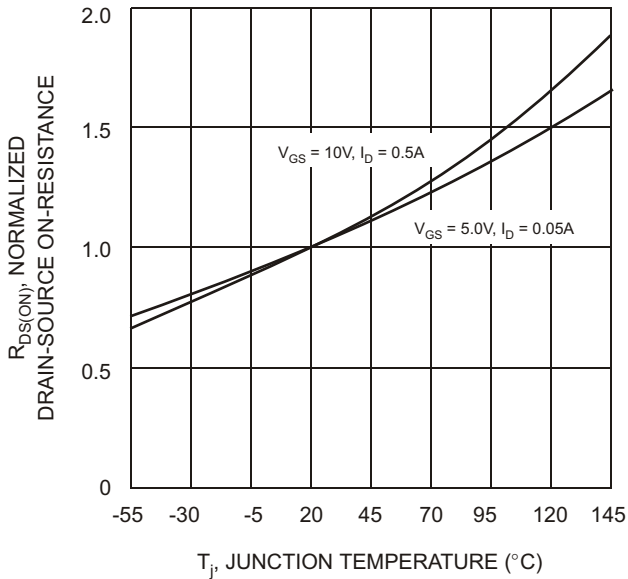


Fig. 3 On-Resistance vs Junction Temperature

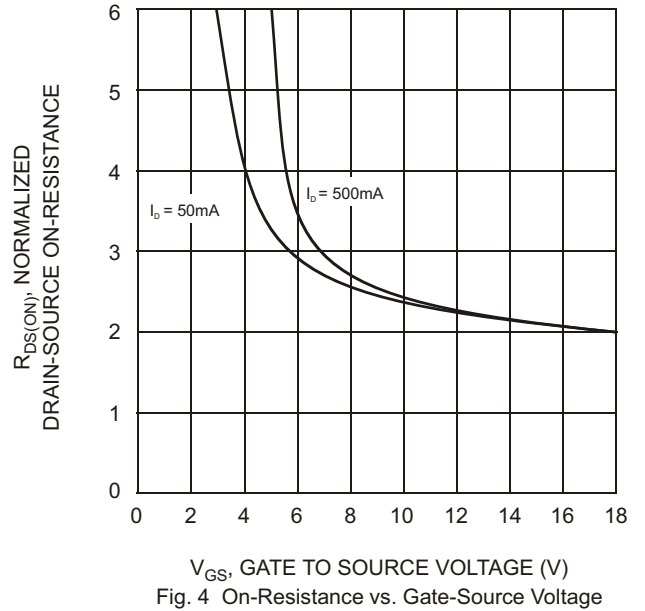


Fig. 4 On-Resistance vs. Gate-Source Voltage

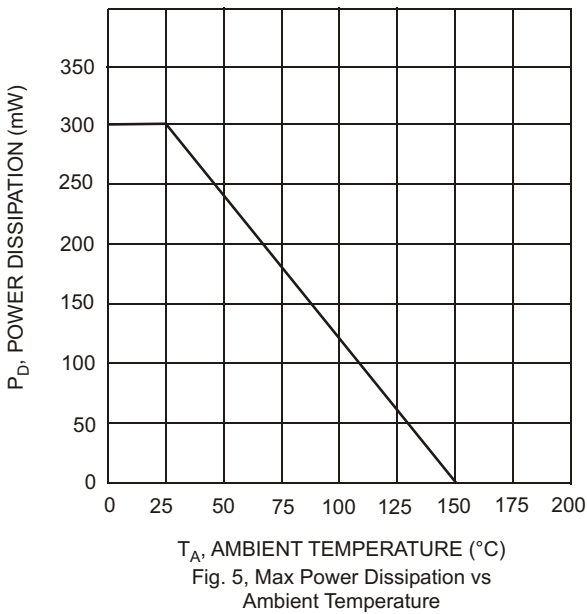


Fig. 5, Max Power Dissipation vs Ambient Temperature