

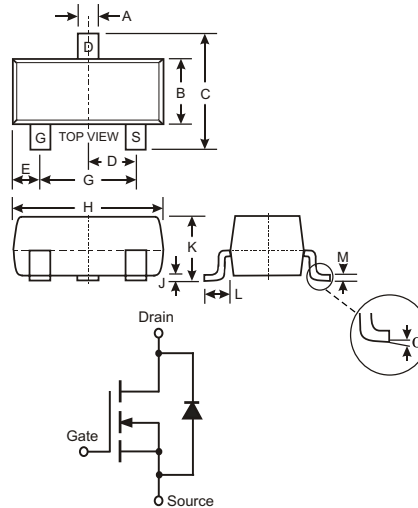
N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Also Available in Lead Free Version

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
- Also Available in Lead Free Plating (Matte Tin Finish). Please see Ordering Information, Note 4, on Page 2
- Terminal Connections: See Diagram
- Marking (See Page 2): K38
- 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 |
| α | 0° | 8° |
| All Dimensions in mm | | |

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

| Characteristic | Symbol | BSS138 | Units |
|--|-----------------|-------------|---------------------------|
| Drain-Source Voltage | V_{DSS} | 50 | V |
| Drain-Gate Voltage $R_{GS} \leq 20K\Omega$ | V_{DGR} | 50 | V |
| Gate-Source Voltage | V_{GSS} | ± 20 | V |
| Drain Current | I_D | 200 | mA |
| Power Dissipation (Note 1) | P_d | 300 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_j, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------------------|--------------|-----|-----|-----------|---------------|---|
| OFF CHARACTERISTICS (Note 2) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 50 | 75 | — | V | $V_{GS} = 0V, I_D = 250\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 0.5 | μA | $V_{DS} = 50V, V_{GS} = 0V$ |
| Gate-Body Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 20V, V_{DS} = 0V$ |
| ON CHARACTERISTICS (Note 2) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.5 | 1.2 | 1.5 | V | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | 1.4 | 3.5 | Ω | $V_{GS} = 10V, I_D = 0.22A$ |
| Forward Transconductance | g_{FS} | 100 | — | — | mS | $V_{DS} = 25V, I_D = 0.2A, f = 1.0\text{KHz}$ |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C_{iss} | — | — | 50 | pF | $V_{DS} = 10V, V_{GS} = 0V$ $f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | — | — | 25 | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | — | 8.0 | pF | |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | $t_{D(on)}$ | — | — | 20 | ns | $V_{DD} = 30V, I_D = 0.2A,$ $R_{GEN} = 50\Omega$ |
| Turn-Off Delay Time | $t_{D(off)}$ | — | — | 20 | ns | |

Notes: 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>.

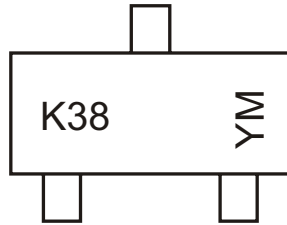
2. Short duration test pulse used to minimize self-heating effect.
DS30144 Rev. 7 - 2 1 of 5

Ordering Information (Note 3)

| Device | Packaging | Shipping |
|----------|-----------|------------------|
| BSS138-7 | SOT-23 | 3000/Tape & Reel |

- Notes:
- For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.
 - For Lead Free version (with Lead Free terminal finish) part number, please add "-F" suffix to part number above.
Example: BSS138-7-F.

Marking Information



K38 = 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 |

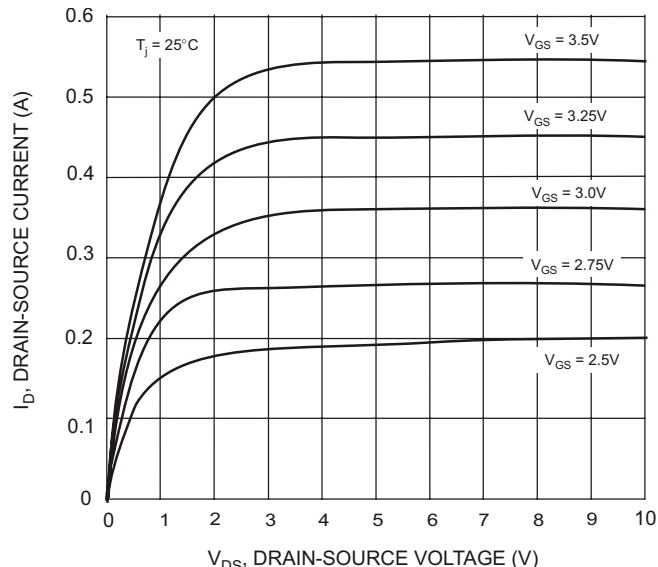


Fig. 1 Drain-Source Current vs. Drain-Source Voltage

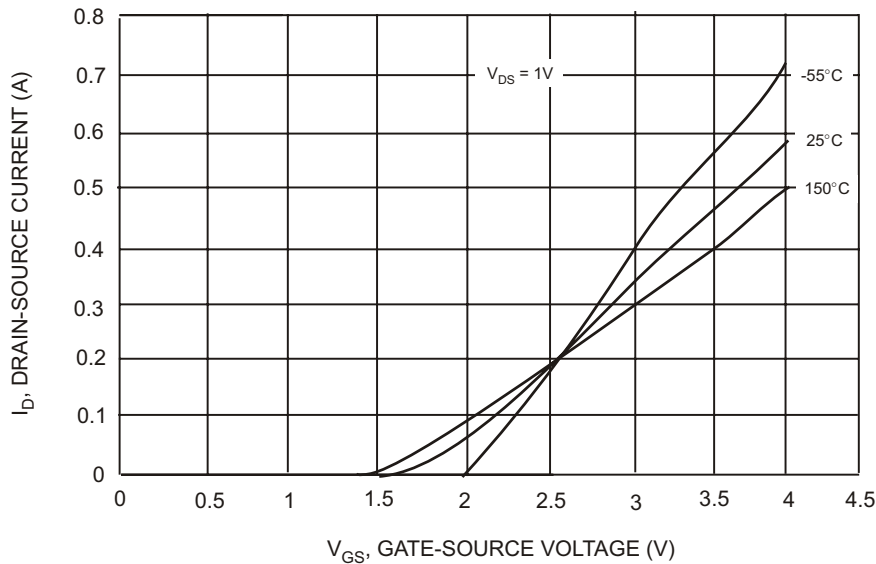


Fig. 2 Transfer Characteristics

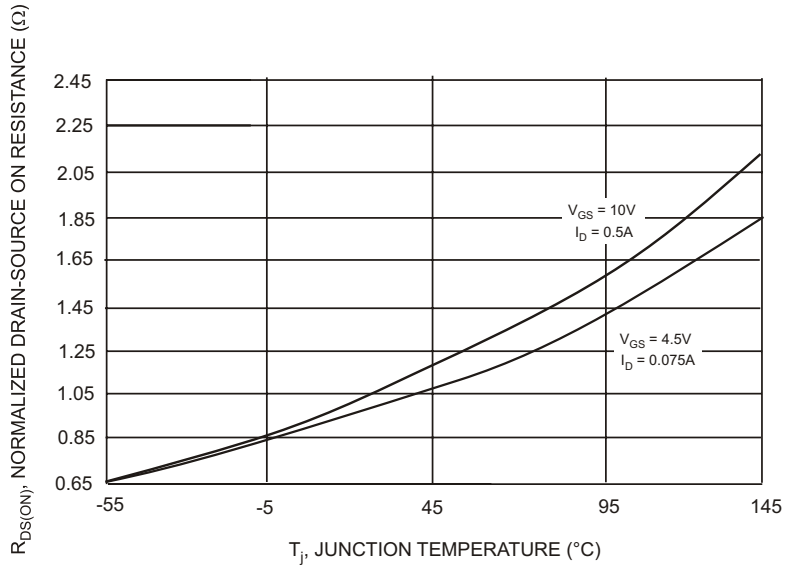


Fig. 3 Drain-Source On Resistance vs. Junction Temperature

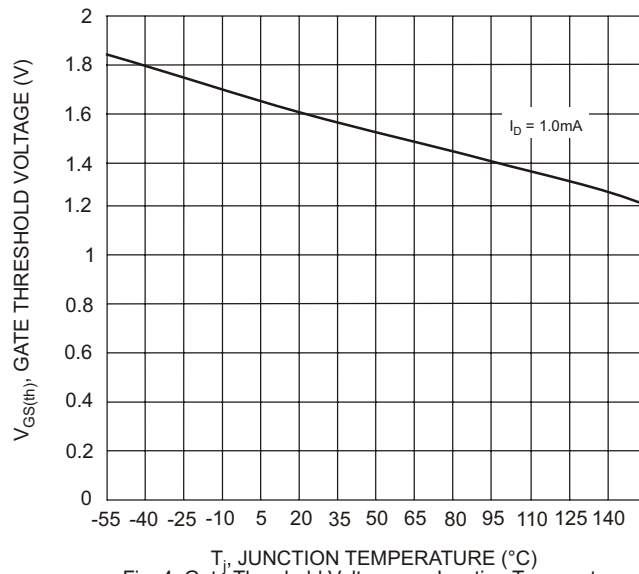


Fig. 4 Gate Threshold Voltage vs. Junction Temperature

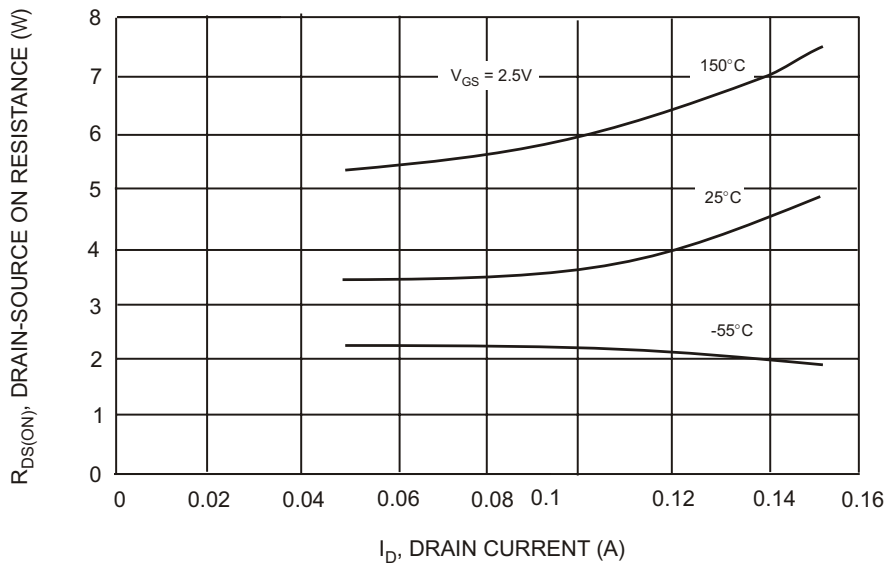


Fig. 5 Drain-Source On Resistance vs. Drain Current

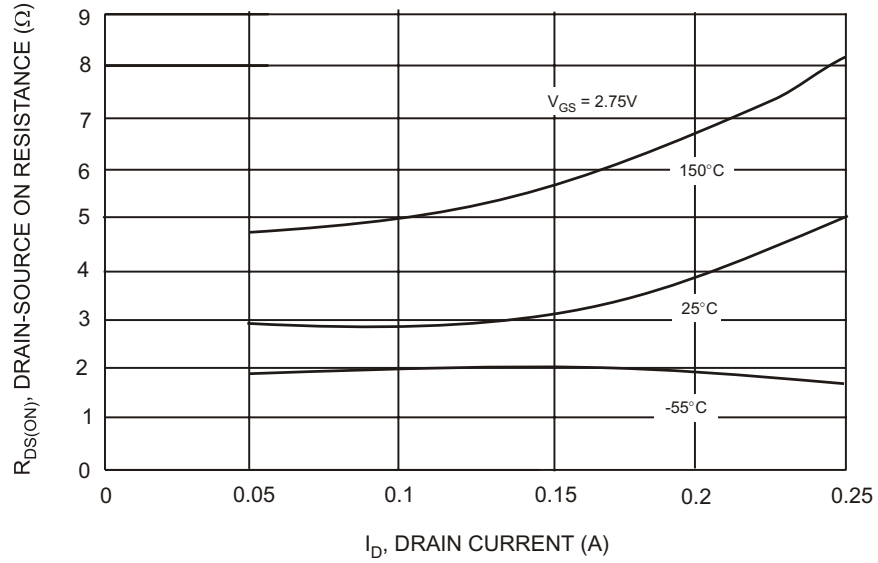


Fig. 6 Drain-Source On Resistance vs. Drain Current

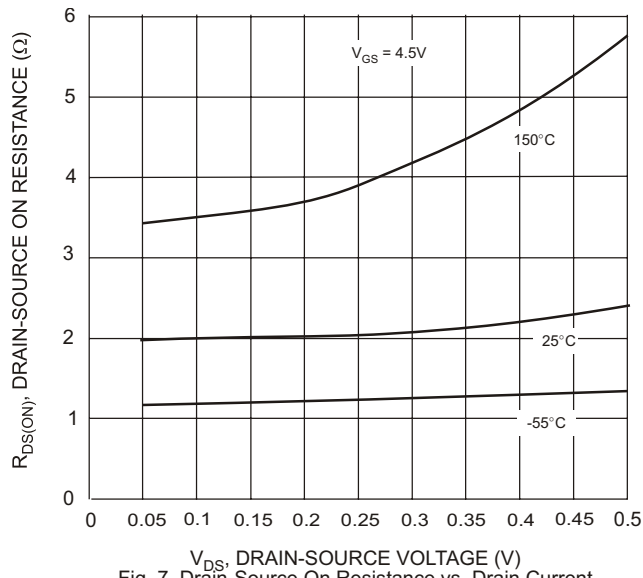


Fig. 7 Drain-Source On Resistance vs. Drain Current

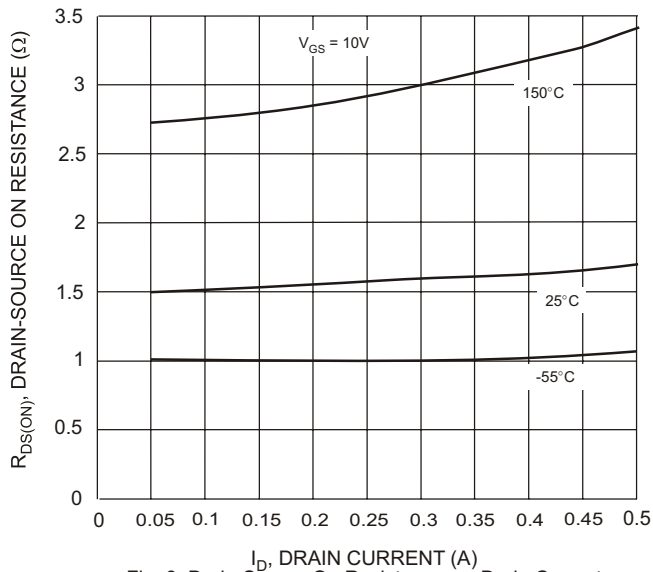


Fig. 8 Drain-Source On Resistance vs. Drain Current

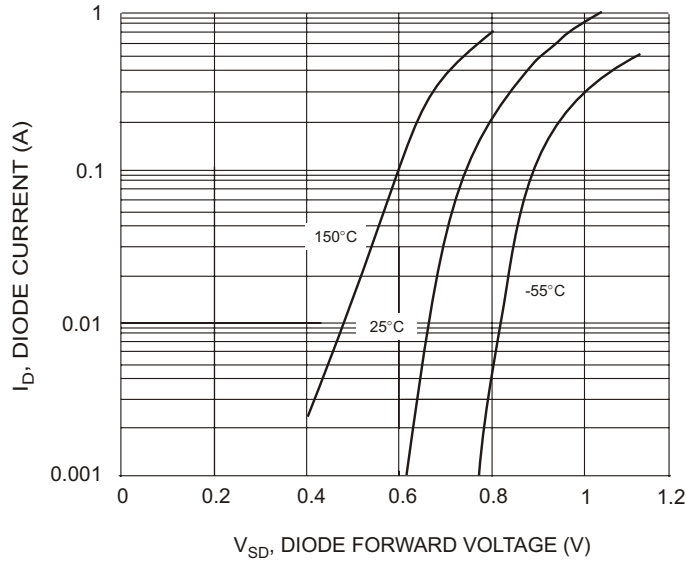


Fig. 9 Body Diode Current vs. Body Diode Voltage

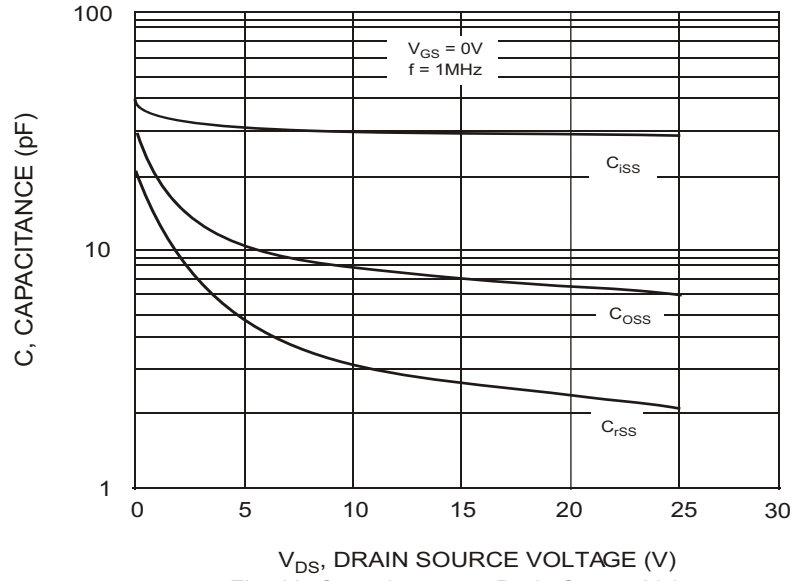


Fig. 10 Capacitance vs. Drain Source Voltage



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.