

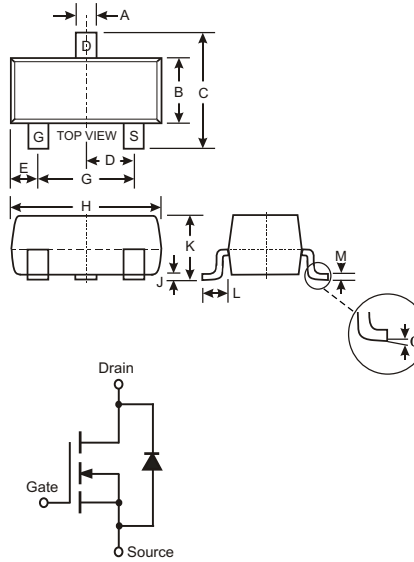
N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead Free/RoHS Compliant (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking (See Page 2): K38
- 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 | BSS138 | Units |
|--|-----------------------------------|-------------|-------|
| Drain-Source Voltage | V _{DS} | 50 | V |
| Drain-Gate Voltage R _{GS} 20K | 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 _{JA} | 417 | C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | C |

Electrical Characteristics @ T_A = 25 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 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} = 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 A |
| Static Drain-Source On-Resistance | R _{DS(ON)} | | 1.4 | 3.5 | | V _{GS} = 10V, I _D = 0.22A |
| Forward Transconductance | g _{FS} | 100 | | | mS | V _{DS} = 25V, I _D = 0.2A, f = 1.0KHz |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C _{iSS} | | | 50 | pF | V _{DS} = 10V, V _{GS} = 0V f = 1.0MHz |
| 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 |
| Turn-Off Delay Time | t _{D(OFF)} | | | 20 | ns | |

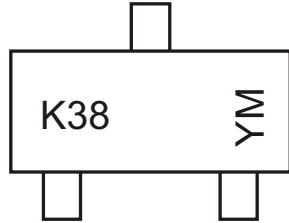
- Notes:
1. Device mounted on FR-5 PCB 1.0 x 0.75 x 0.062 inch pad layout as shown on Diodes, Inc. suggested pad layout AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
 2. Short duration test pulse used to minimize self-heating effect.
 3. No purposefully added lead.

Ordering Information (Note 4)

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

Notes: 4. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

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 |

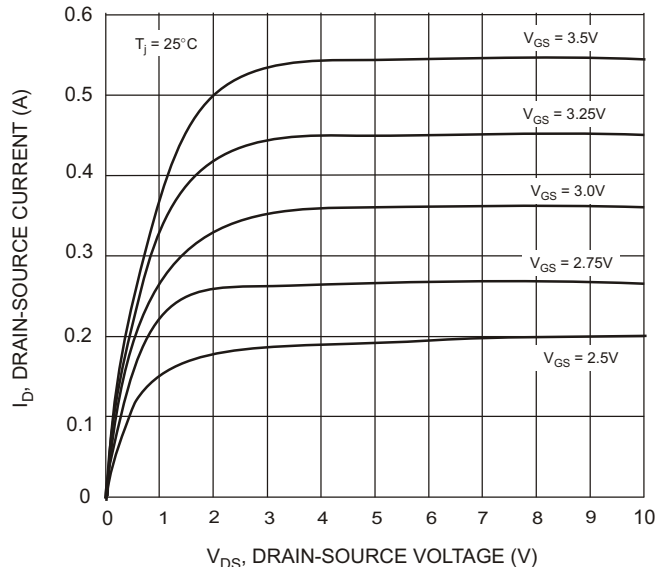


Fig. 1 Drain-Source Current vs. Drain-Source Voltage

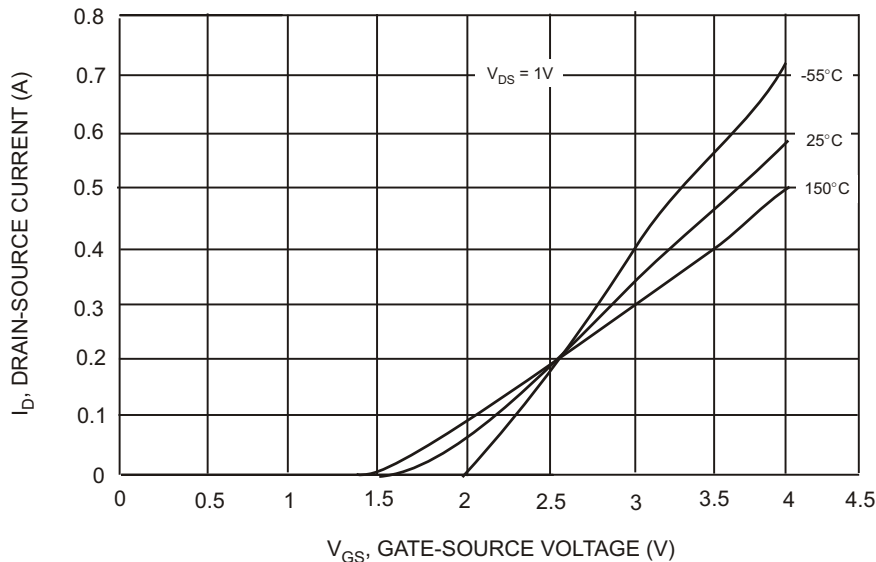


Fig. 2 Transfer Characteristics

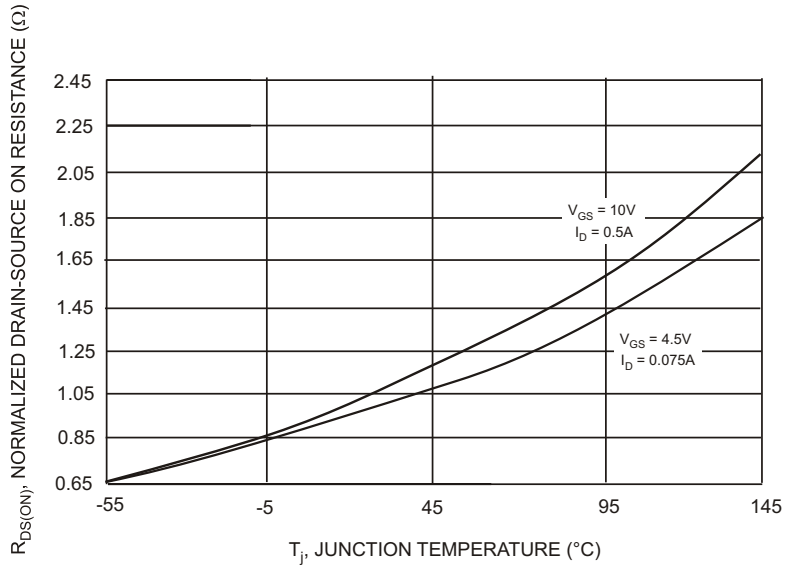


Fig. 3 Drain-Source On Resistance vs. Junction Temperature

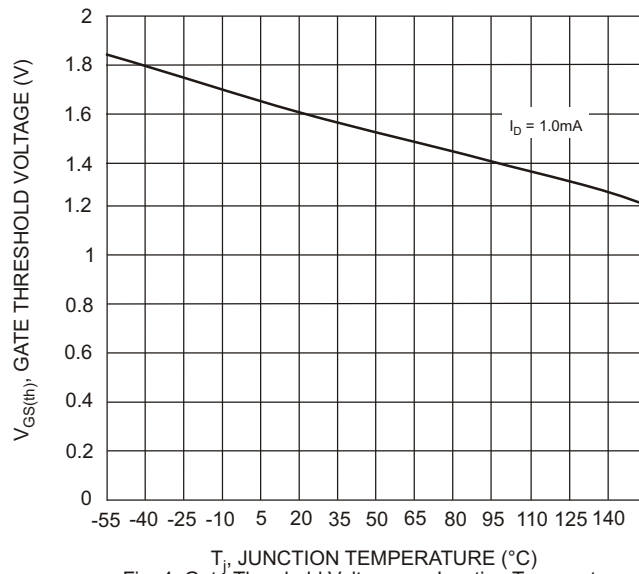


Fig. 4 Gate Threshold Voltage vs. Junction Temperature

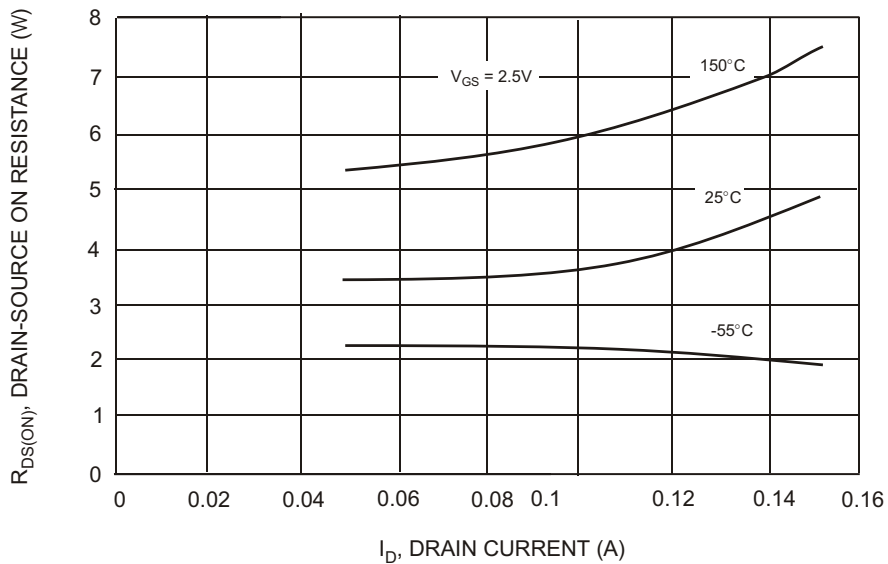


Fig. 5 Drain-Source On Resistance vs. Drain Current

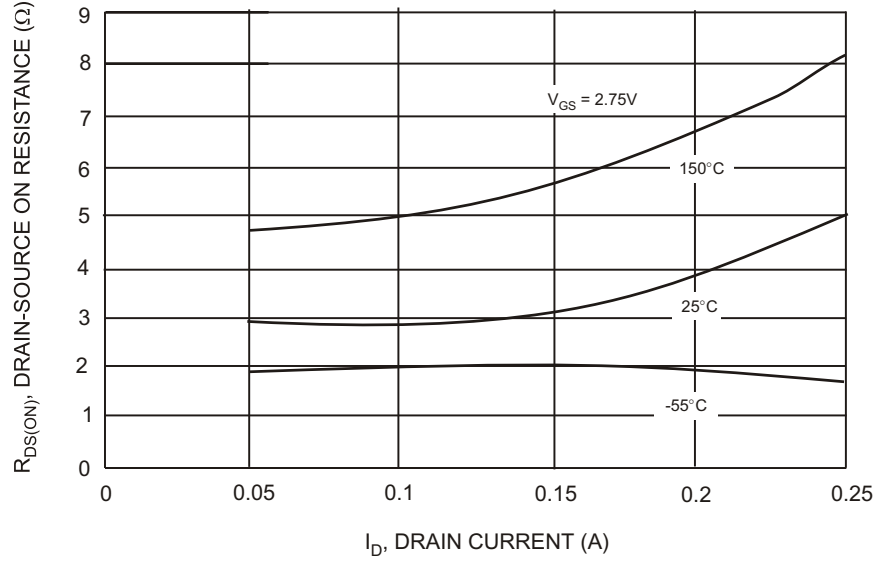


Fig. 6 Drain-Source On Resistance vs. Drain Current

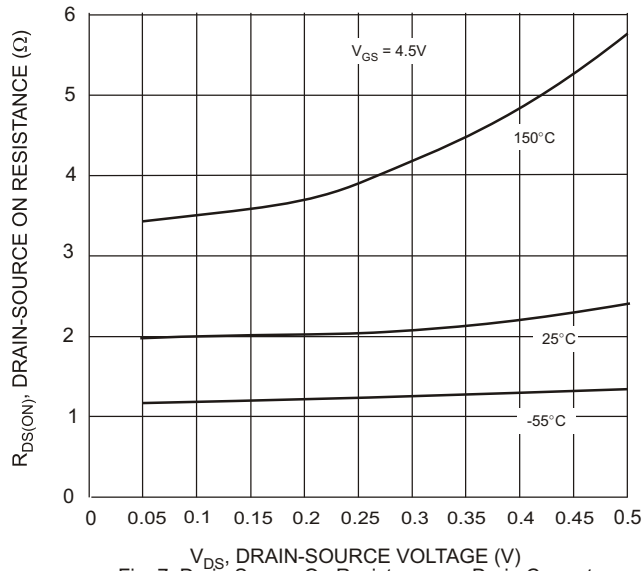


Fig. 7 Drain-Source On Resistance vs. Drain Current

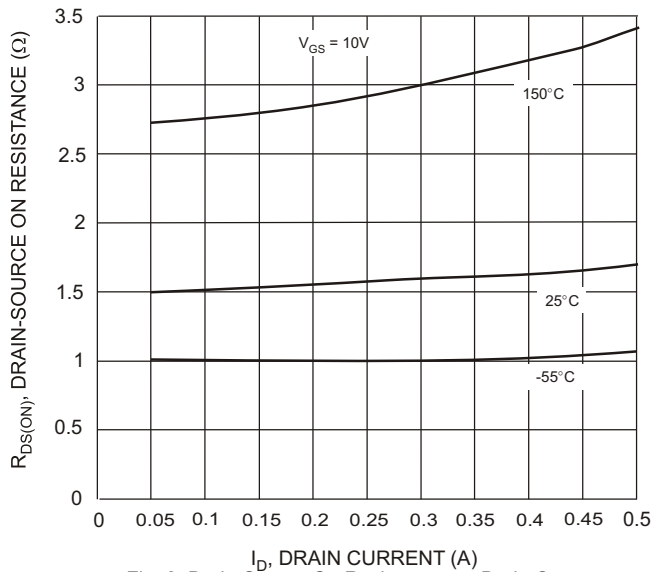


Fig. 8 Drain-Source On Resistance vs. Drain Current

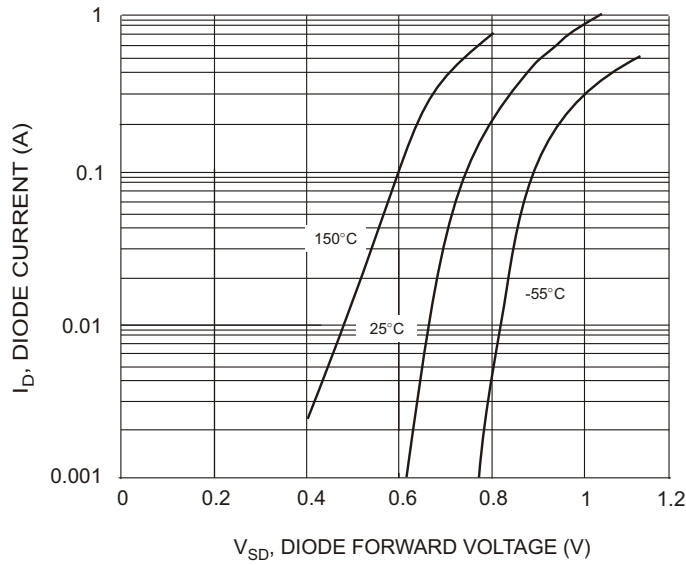


Fig. 9 Body Diode Current vs. Body Diode Voltage

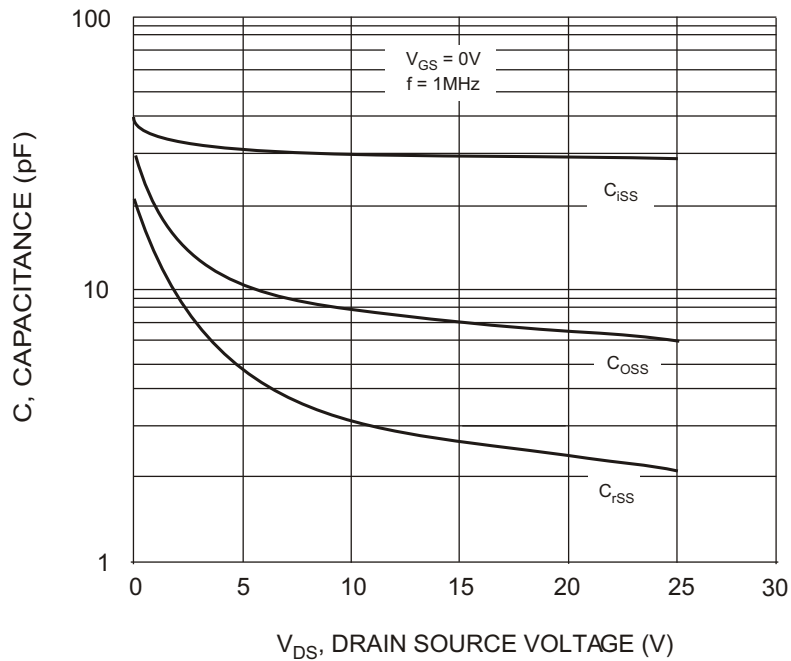


Fig. 10 Capacitance vs. Drain Source Voltage

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