

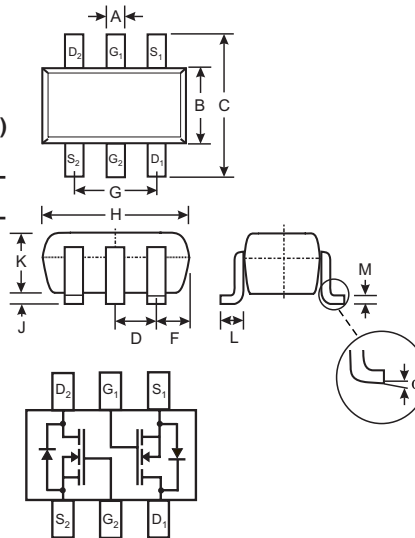
## DUAL N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

### Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Available in Lead Free/RoHS Compliant Version (Note 4)
- Qualified to AEC-Q101 Standards for High Reliability

### Mechanical Data

- Case: SOT-363
- 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
- Also Available in Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe). Please see Ordering Information, Note 6, on Page 2
- Terminal Connections: See Diagram
- Marking Code (See Page 2): K38
- Ordering & Date Code Information: See Page 2
- Weight: 0.006 grams (approximate)



| SOT-363              |              |      |
|----------------------|--------------|------|
| Dim                  | Min          | Max  |
| A                    | 0.10         | 0.30 |
| B                    | 1.15         | 1.35 |
| C                    | 2.00         | 2.20 |
| D                    | 0.65 Nominal |      |
| F                    | 0.30         | 0.40 |
| H                    | 1.80         | 2.20 |
| J                    | —            | 0.10 |
| K                    | 0.90         | 1.00 |
| L                    | 0.25         | 0.40 |
| M                    | 0.10         | 0.25 |
| $\alpha$             | 0°           | 8°   |
| All Dimensions in mm |              |      |

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

| Characteristic                          | Symbol          | BSS138DW    | Units                     |
|---|-----------------|-------------|---------------------------|
| Drain-Source Voltage                    | $V_{DSS}$       | 50          | V                         |
| Drain-Gate Voltage (Note 3)             | $V_{DGR}$       | 50          | V                         |
| Gate-Source Voltage                     | $V_{GSS}$       | $\pm 20$    | V                         |
| Drain Current (Note 1)                  | $I_D$           | 200         | mA                        |
| Total Power Dissipation (Note 1)        | $P_d$           | 200         | mW                        |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 625         | $^\circ\text{C}/\text{W}$ |
| 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   |
|-------------------------------------|--------------|-----|-----|-----------|---------------|--|
| <b>OFF CHARACTERISTICS (Note 2)</b> |              |     |     |           |               |  |
| Drain-Source Breakdown Voltage      | $BV_{DSS}$   | 50  | 75  | —         | V             | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$                       |
| Zero Gate Voltage Drain Current     | $I_{DSS}$    | —   | —   | 0.5       | $\mu\text{A}$ | $V_{DS} = 50\text{V}, V_{GS} = 0\text{V}$                        |
| Gate-Body Leakage                   | $I_{GSS}$    | —   | —   | $\pm 100$ | nA            | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$                    |
| <b>ON CHARACTERISTICS (Note 2)</b>  |              |     |     |           |               |  |
| 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       | $\Omega$      | $V_{GS} = 10\text{V}, I_D = 0.22\text{A}$                        |
| Forward Transconductance            | $g_{FS}$     | 100 | —   | —         | mS            | $V_{DS} = 25\text{V}, I_D = 0.2\text{A}, f = 1.0\text{KHz}$      |
| <b>DYNAMIC CHARACTERISTICS</b>      |              |     |     |           |               |  |
| Input Capacitance                   | $C_{iss}$    | —   | —   | 50        | pF            | $V_{DS} = 10\text{V}, V_{GS} = 0\text{V}$<br>$f = 1.0\text{MHz}$ |
| Output Capacitance                  | $C_{oss}$    | —   | —   | 25        | pF            |  |
| Reverse Transfer Capacitance        | $C_{rss}$    | —   | —   | 8.0       | pF            |  |
| <b>SWITCHING CHARACTERISTICS</b>    |              |     |     |           |               |  |
| Turn-On Delay Time                  | $t_{D(ON)}$  | —   | —   | 20        | ns            | $V_{DD} = 30\text{V}, I_D = 0.2\text{A}, R_{GEN} = 50\Omega$     |
| Turn-Off Delay Time                 | $t_{D(OFF)}$ | —   | —   | 20        | ns            |  |

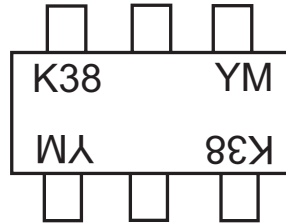
- Note: 1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
2. Short duration test pulse used to minimize self-heating effect.
3.  $R_{GS} \leq 20\Omega$ .
4. No purposefully added lead.

**Ordering Information** (Note 5)

| Device     | Packaging | Shipping         |
|------------|-----------|------------------|
| BSS138DW-7 | SOT-363   | 3000/Tape & Reel |

- Notes: 5. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.  
6. For Lead Free/RoHS Compliant version part number, please add "-F" suffix to the part number above. Example: BSS138DW-7-F.

**Marking Information**



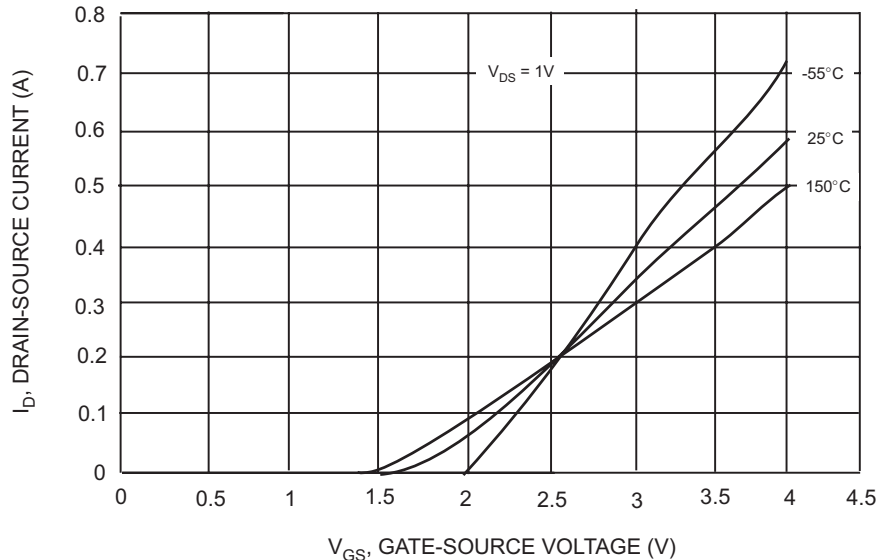
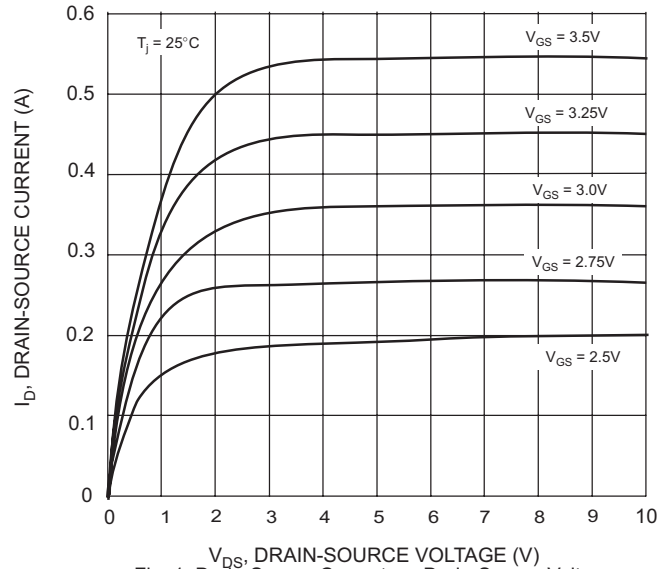
K38 = Product Type Marking Code  
YM = Date Code Marking  
Y = Year ex: N = 2002  
M = Month ex: 9 = September

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   |



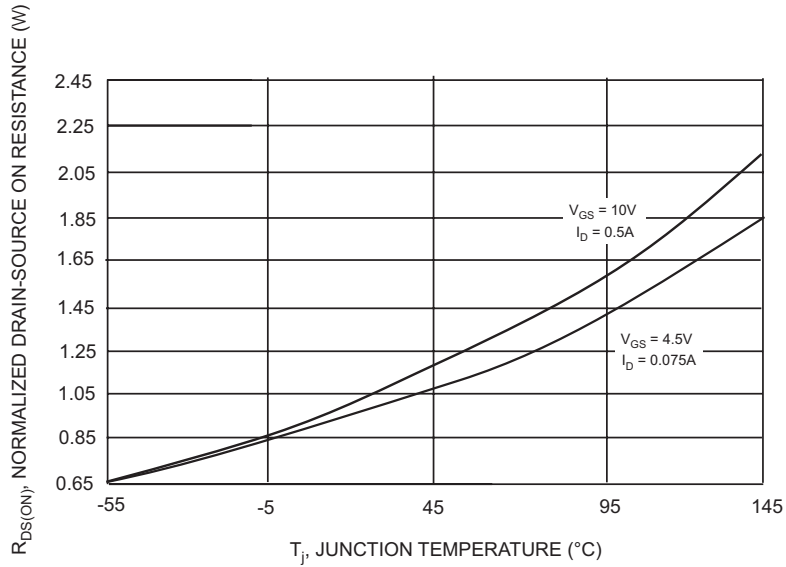


Fig. 3 Drain-Source On Resistance vs. Junction Temperature

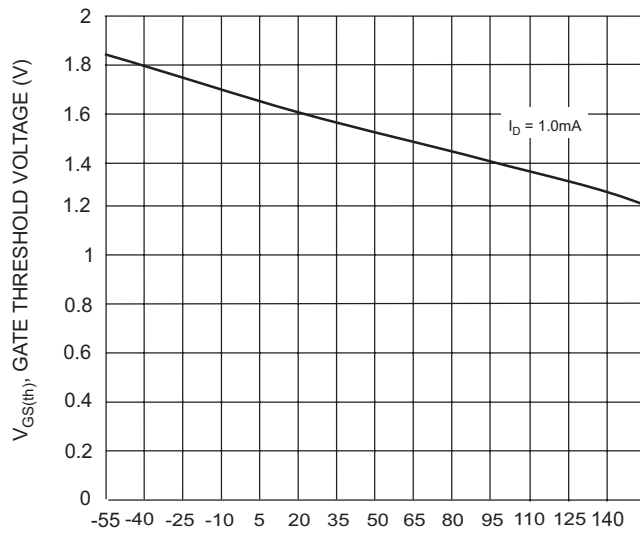


Fig. 4 Gate Threshold Voltage vs. Junction Temperature

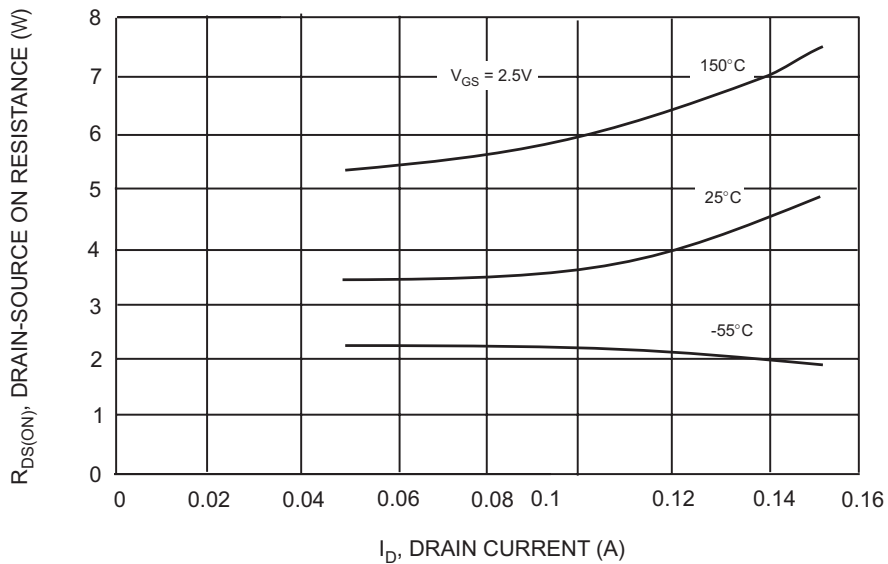


Fig. 5 Drain-Source On Resistance vs. Drain Current

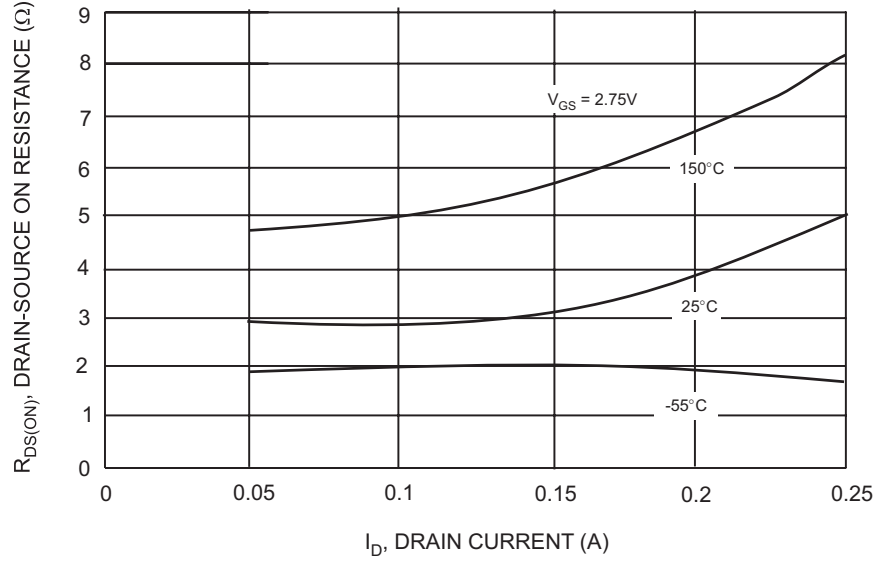


Fig. 6 Drain-Source On Resistance vs. Drain Current

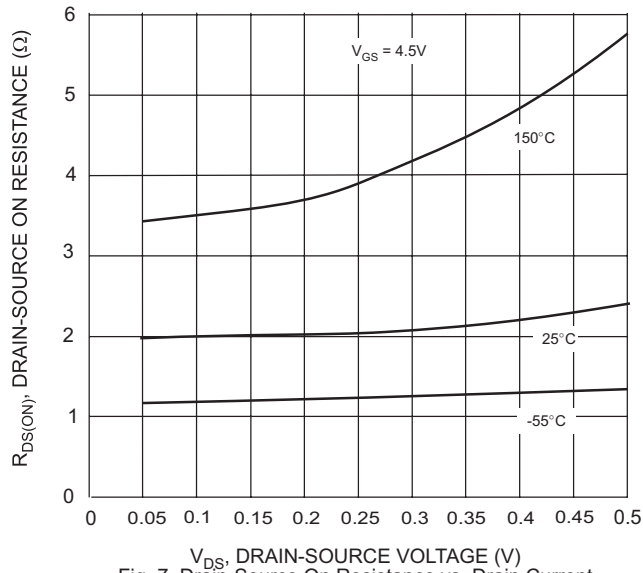


Fig. 7 Drain-Source On Resistance vs. Drain Current

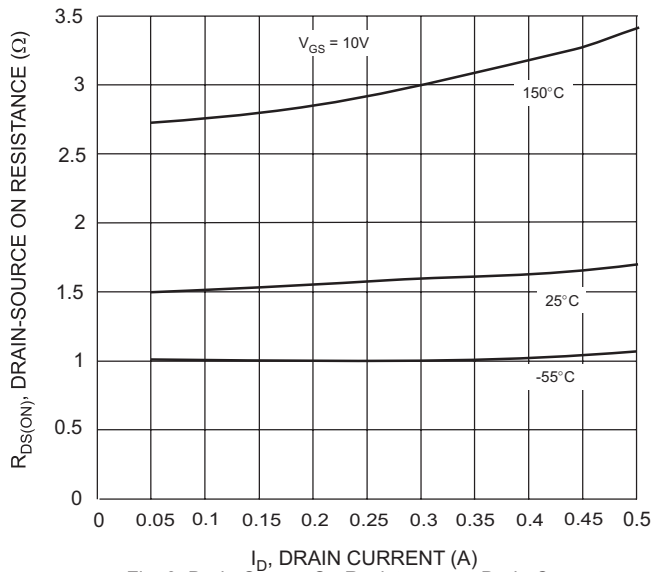


Fig. 8 Drain-Source On Resistance vs. Drain Current

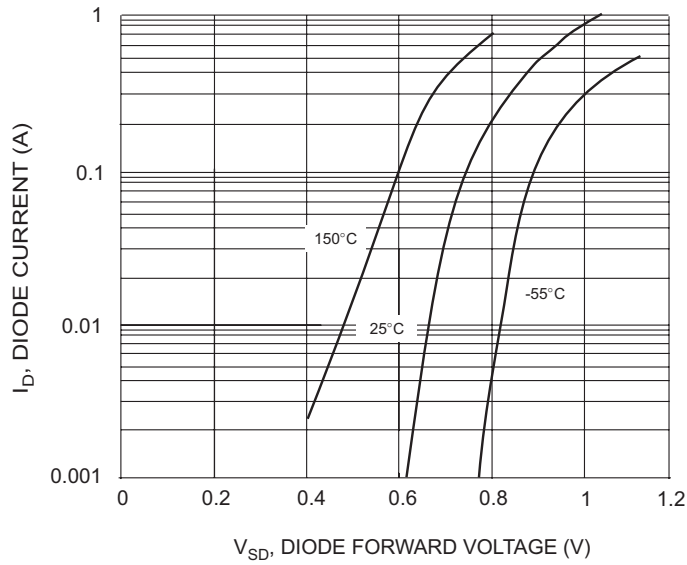


Fig. 9 Body Diode Current vs. Body Diode Voltage

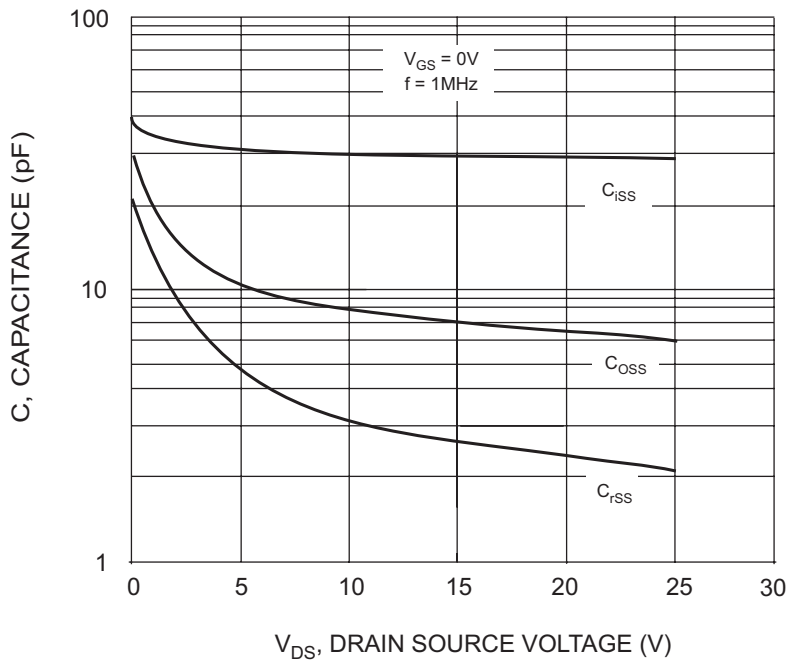


Fig. 10 Capacitance vs. Drain Source Voltage