

DUAL N-CANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR
Product Summary

| | | |
|---------------|----------------------------|--|
| $V_{(BR)DSS}$ | $R_{DS(ON) \text{ max}}$ | $I_D \text{ max}$ $T_A = +25^\circ\text{C}$ |
| 50V | $3.5\Omega @ V_{GS} = 10V$ | 200mA |

Description

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- Load Switch

Features

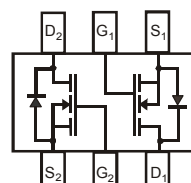
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Notes 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Weight: 0.006 grams (approximate)



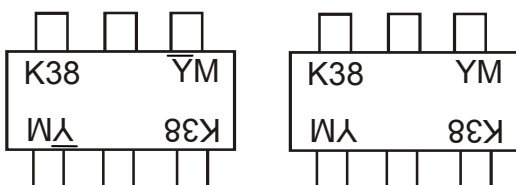
TOP VIEW


 TOP VIEW
Internal Schematic

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|--------------|---------|------------------|
| BSS138DW-7-F | SOT-363 | 3000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information


K38 = Product Type Marking Code
 YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)
 YM = Date Code Marking for CAT (Chengdu Assembly/ Test site)
 Y or Y = Year (ex: A = 2013)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | S | T | U | V | W | X | Y | Z | A | B | C | D | E | F | G |
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | |
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D | | | |

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | BSS138DW | Units |
|-----------------------------|------------------|----------|-------|
| Drain-Source Voltage | V _{DSS} | 50 | V |
| Drain-Gate Voltage (Note 7) | V _{DGR} | 50 | V |
| Gate-Source Voltage | V _{GSS} | ±20 | V |
| Drain Current (Note 5) | I _D | 200 | mA |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | BSS138DW | Units |
|---|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | P _D | 200 | mW |
| Thermal Resistance, Junction to Ambient | R _{θJA} | 625 | °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 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 50 | 75 | — | V | V _{GS} = 0V, I _D = 250μA |
| 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 6) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 0.5 | 1.2 | 1.5 | V | V _{DS} = V _{GS} , I _D = 250μA |
| 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 = 1.0KHz |
| 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} = 50Ω |
| Turn-Off Delay Time | t _{D(OFF)} | — | — | 20 | ns | |

- Notes:
- 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>.
 - Short duration pulse test used to minimize self-heating effect.
 - R_{GS} ≤ 20KΩ.

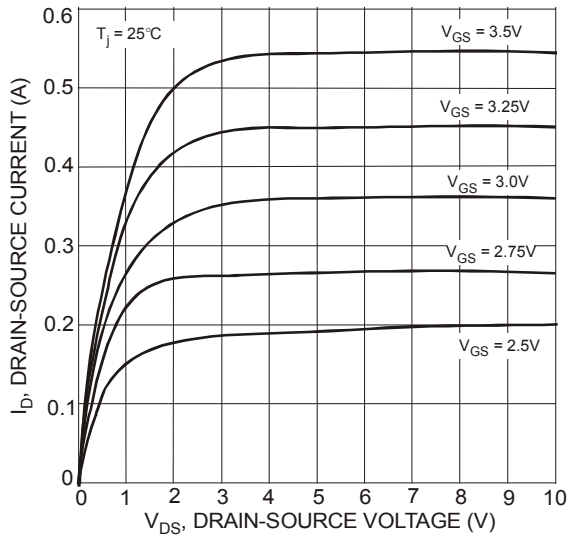


Fig. 1 Drain-Source Current vs. Drain-Source Voltage

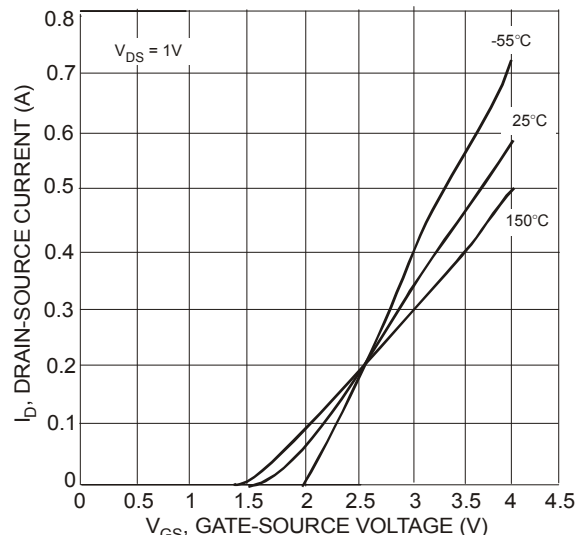


Fig. 2 Transfer Characteristics

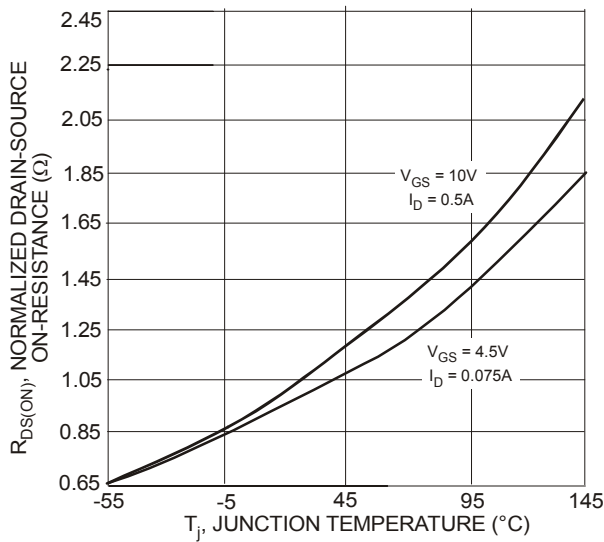


Fig. 3 Drain-Source On Resistance vs. Junction Temperature

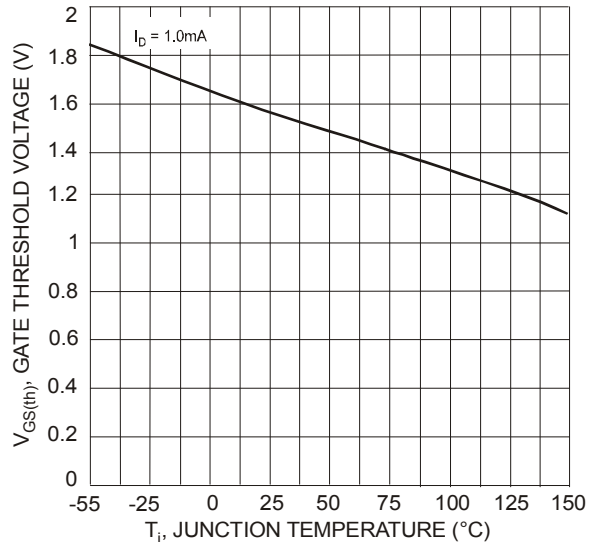


Fig. 4 Gate Threshold Voltage vs. Junction Temperature

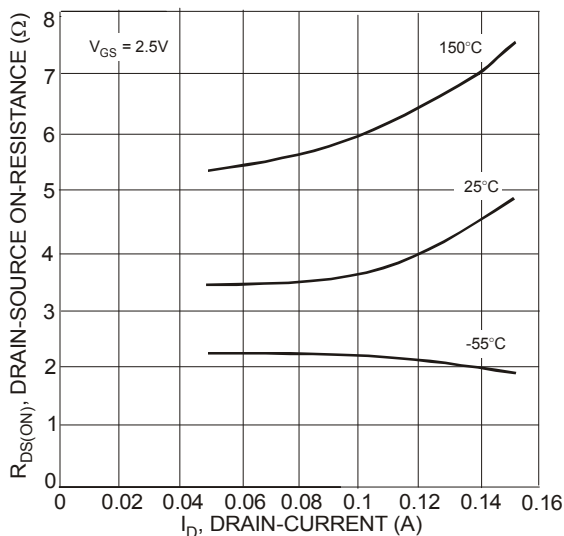


Fig. 5 Drain-Source On-Resistance vs. Drain-Current

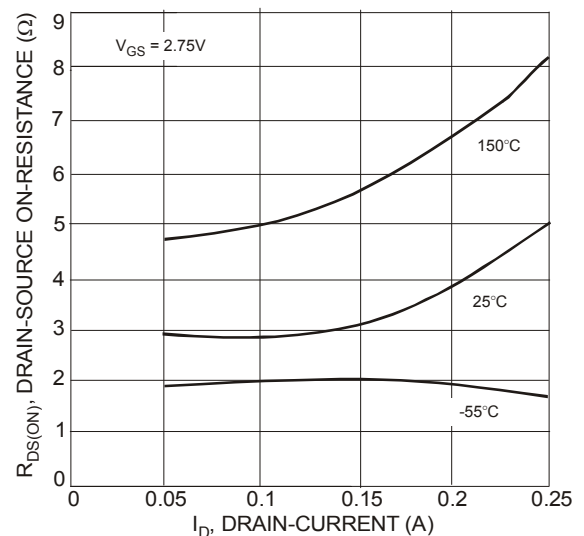


Fig. 6 Drain-Source On-Resistance vs. Drain-Current

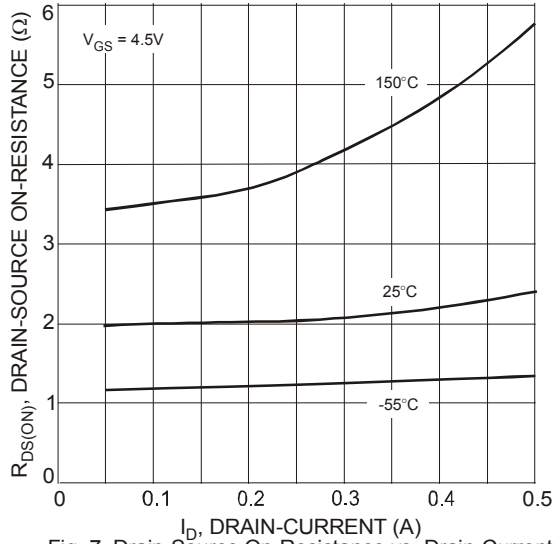


Fig. 7 Drain-Source On-Resistance vs. Drain-Current

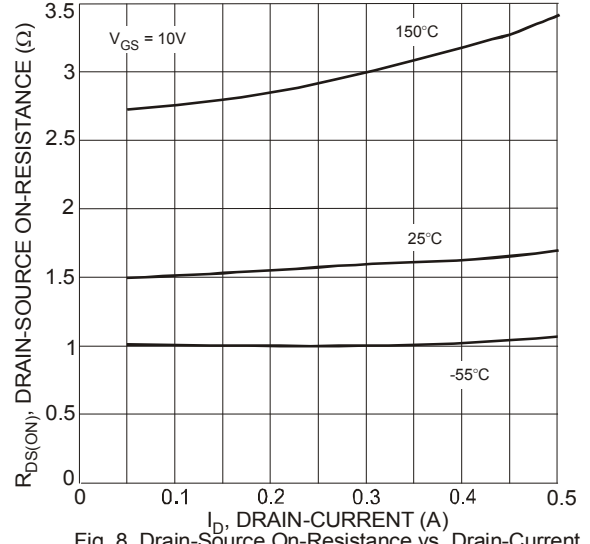


Fig. 8 Drain-Source On-Resistance vs. Drain-Current

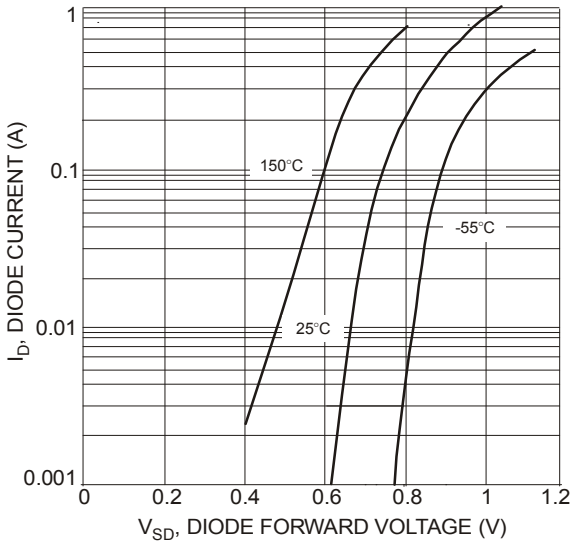


Fig. 9 Body Diode Current vs. Body Diode Voltage

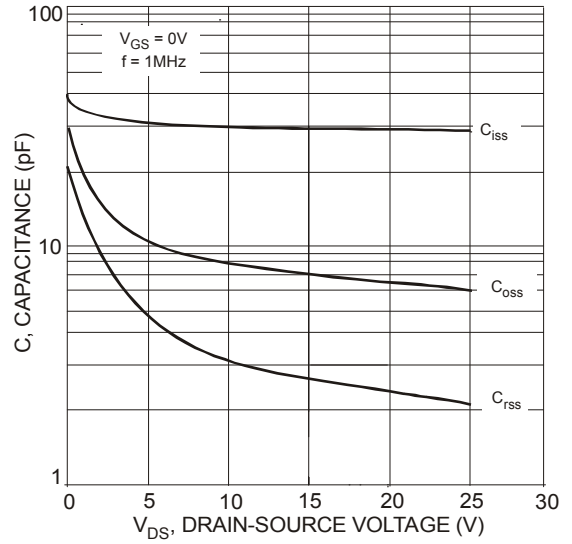
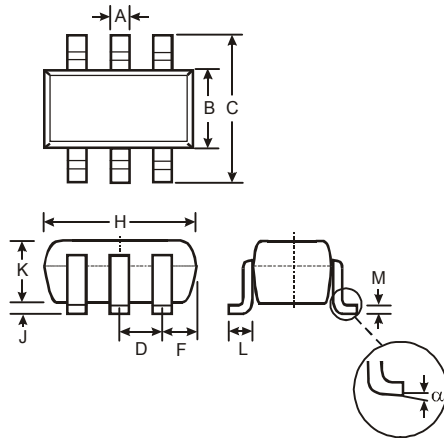


Fig. 10 Capacitance vs. Drain-Source Voltage

Package Outline Dimensions

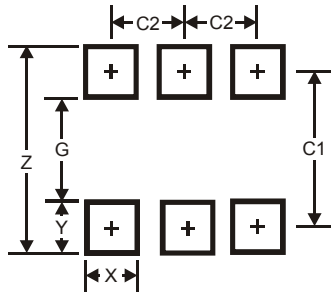
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT363 | | | |
|-----------------------------|----------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.10 | 0.30 | 0.25 |
| B | 1.15 | 1.35 | 1.30 |
| C | 2.00 | 2.20 | 2.10 |
| D | 0.65 Typ | | |
| F | 0.40 | 0.45 | 0.425 |
| H | 1.80 | 2.20 | 2.15 |
| J | 0 | 0.10 | 0.05 |
| K | 0.90 | 1.00 | 1.00 |
| L | 0.25 | 0.40 | 0.30 |
| M | 0.10 | 0.22 | 0.11 |
| α | 0° | 8° | - |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.5 |
| G | 1.3 |
| X | 0.42 |
| Y | 0.6 |
| C1 | 1.9 |
| C2 | 0.65 |

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