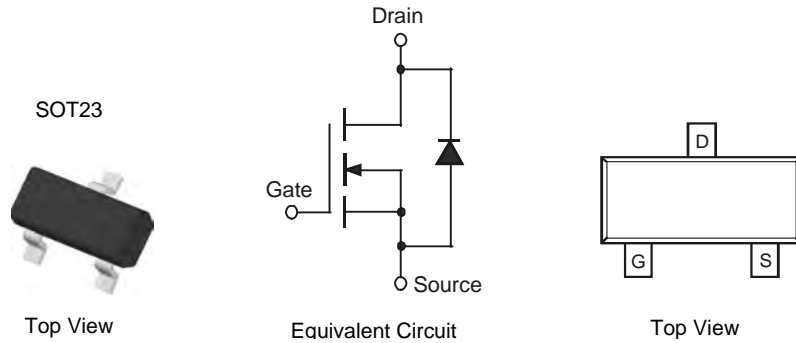


Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead, Halogen and Antimony Free, RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Weight: 0.008 grams (approximate)

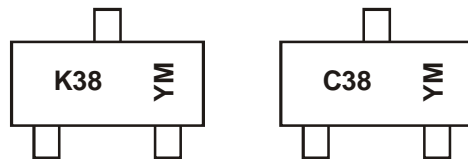


Ordering Information (Note 3)

| Part Number | Qualification | Case | Packaging |
|-------------|---------------|-------|------------------|
| BSS138-7-F | Commercial | SOT23 | 3000/Tape & Reel |
| BSS138Q-7-F | Automotive | SOT23 | 3000/Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free.
 2. Product manufactured with Date Code V9 (week 33, 2008) and newer are built with Green Molding Compound. Product manufactured prior to Date Code V9 are built with Non-Green Molding Compound and may contain Halogens or Sb₂O₃ Fire Retardants.
 3. For packaging details, go to our website at <http://www.diodes.com>.

Marking Information



K = SAT (Shanghai Assembly / Test site)
 C = CAT (Chengdu Assembly / Test site)
 38 = 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 | ... | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|------|
| Code | J | K | L | M | N | P | R | ... | Y | Z | A | B | C | D | E |

| 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 | Value | Units |
|--|------------------|-------|-------|
| Drain-Source Voltage | V _{DSS} | 50 | V |
| Drain-Gate Voltage R _{GS} ≤ 20KΩ | V _{DGR} | 50 | V |
| Gate-Source Voltage | V _{GSS} | ±20 | V |
| Gate-Source Voltage Non repetitive, Pulse width < 50μs | | ±40 | V |
| Drain Current | I _D | 200 | mA |
| Pulsed Drain Current (10μs pulse duty cycle = 1%) | I _{DM} | 1 | A |

Thermal Characteristics @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Units |
|--|-----------------------------------|-------------|-------|
| Power Dissipation (Note 4) | P _D | 300 | mW |
| Thermal Resistance, Junction to Ambient (Note 4) | R _{θJA} | 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 5) | | | | | | |
| 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 5) | | | | | | |
| 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-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>.
 - Short duration pulse test used to minimize self-heating effect.

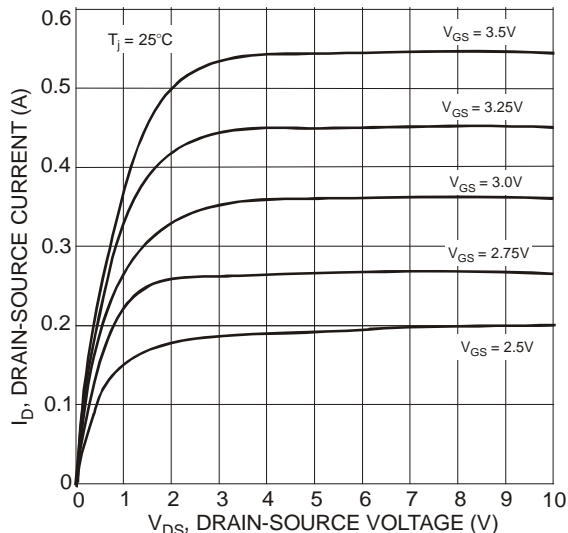


Fig. 1 Drain-Source Current vs. Drain-Source Voltage

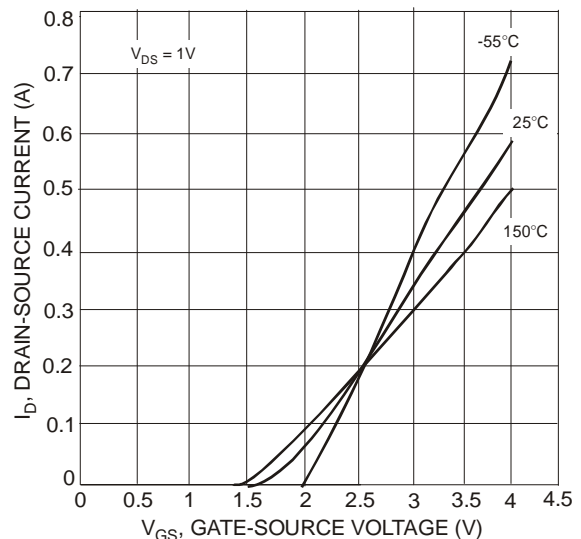


Fig. 2 Transfer Characteristics

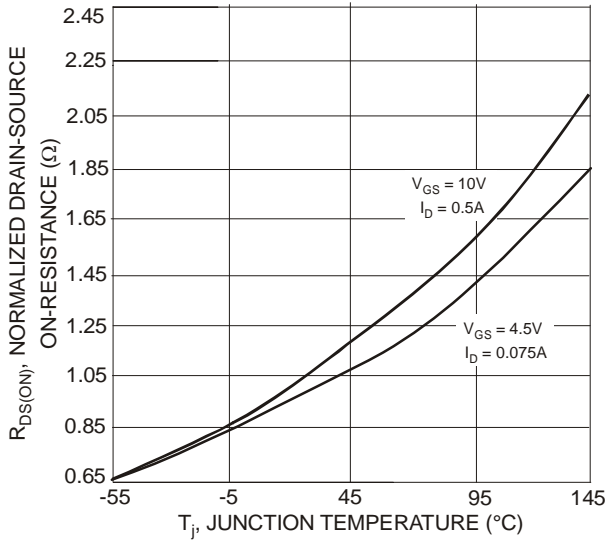


Fig. 3 Drain-Source On-Resistance vs. Junction Temperature

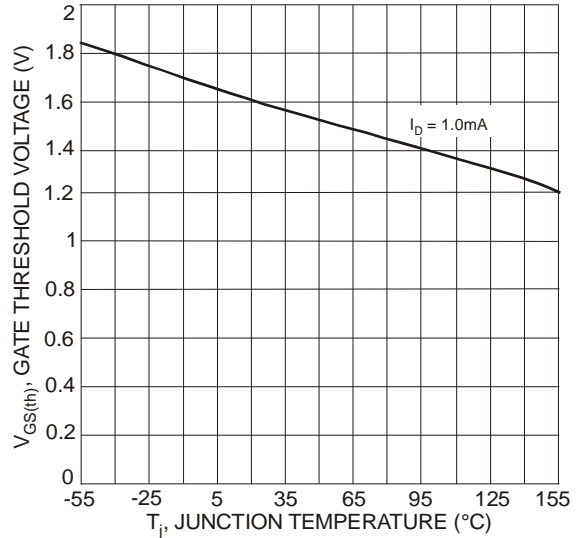


Fig. 4 Gate Threshold Voltage vs. Junction Temperature

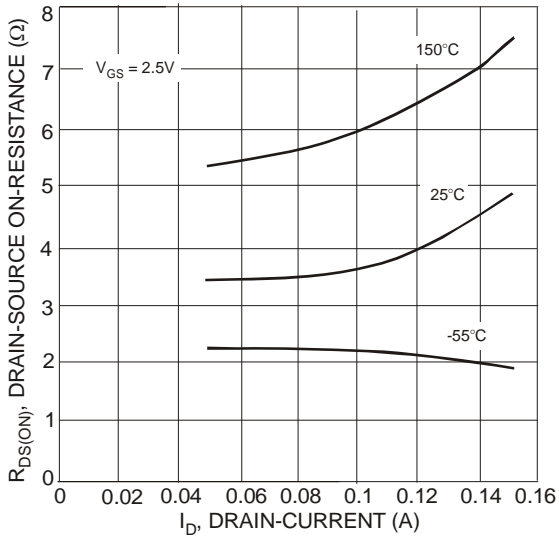


Fig. 5 Drain-Source On-Resistance vs. Drain-Current

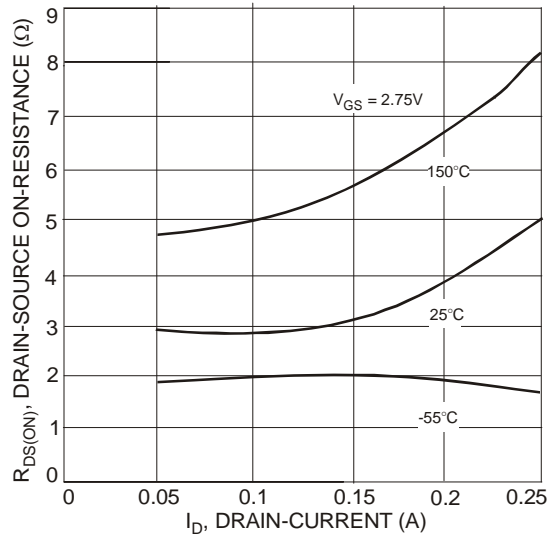


Fig. 6 Drain-Source On-Resistance vs. Drain-Current

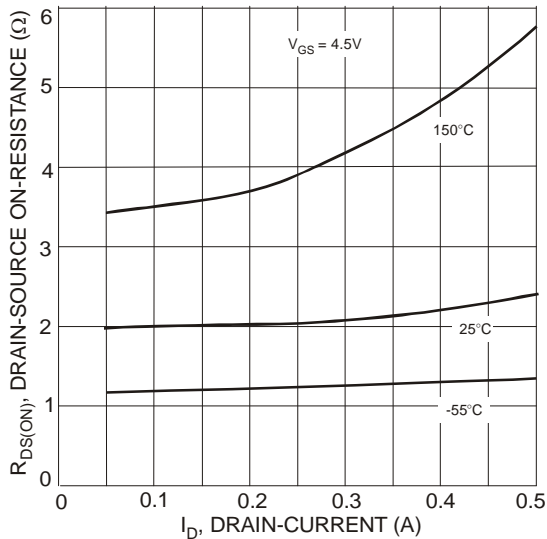


Fig. 7 Drain-Source On-Resistance vs. Drain-Current

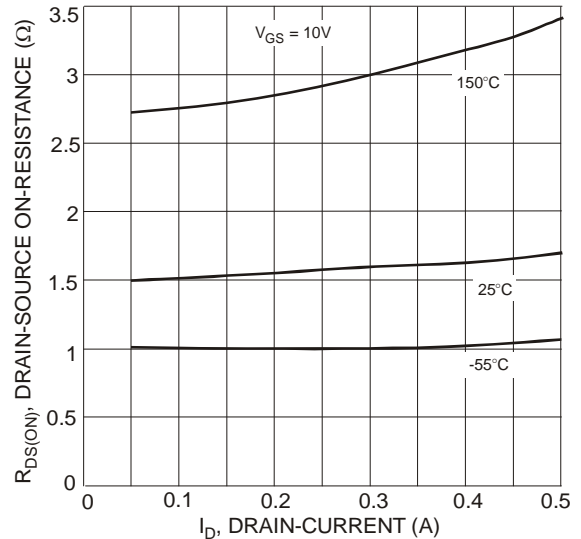


Fig. 8 Drain-Source On Resistance vs. Drain-Current

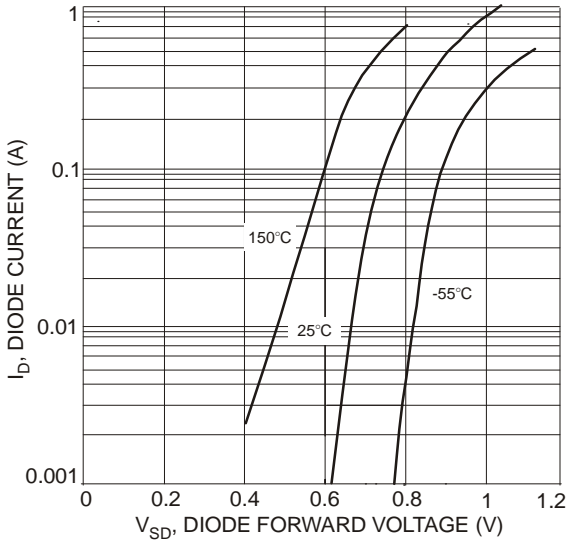


Fig. 9 Body Diode Current vs. Body Diode Voltage

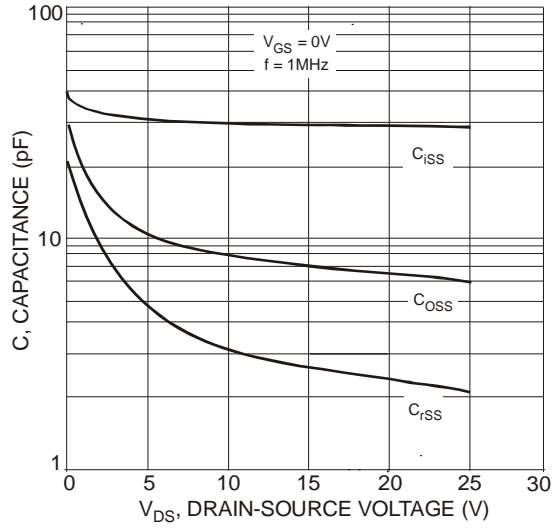
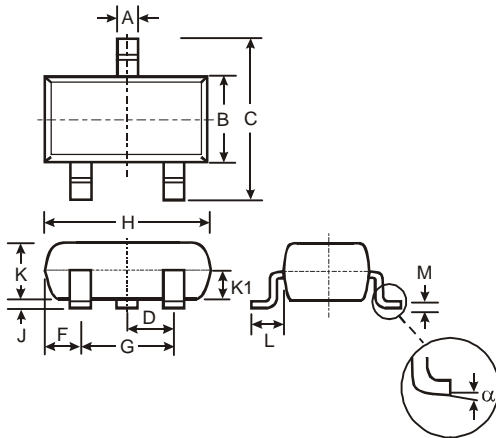


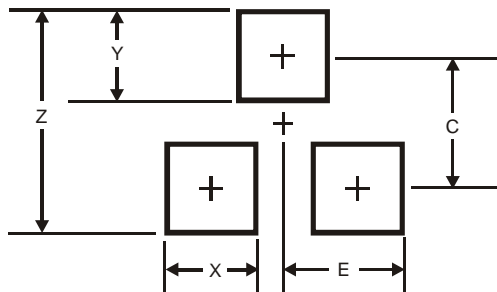
Fig. 10 Capacitance vs. Drain-Source Voltage

Package Outline Dimensions



| SOT23 | | | |
|----------------------|-------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.903 | 1.10 | 1.00 |
| K1 | - | - | 0.400 |
| L | 0.45 | 0.61 | 0.55 |
| M | 0.085 | 0.18 | 0.11 |
| α | 0° | 8° | - |
| All Dimensions in mm | | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |

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