

## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- **Lead Free/RoHS Compliant (Note 4)**
- **"Green" Device (Note 5 and 6)**

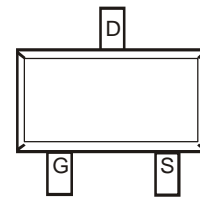
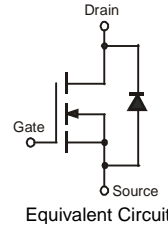
## Mechanical Data

- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound, Note 6. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.006 grams (approximate)



TOP VIEW

SOT-323



TOP VIEW

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

Characteristic	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	50	V
Drain-Gate Voltage (Note 1)	$V_{DGR}$	50	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current (Note 2)	$I_D$	200	mA

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 2)	$P_d$	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 3)</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 3)</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	$V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
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	

- Notes:
1.  $R_{GS} \leq 20\text{K}\Omega$ .
  2. 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>.
  3. Short duration pulse test used to minimize self-heating effect.
  4. No purposefully added lead.
  5. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  6. Product manufactured with Date Code 0627 (week 27, 2006) and newer are built with Green Molding Compound. Product manufactured prior to Date Code 0627 are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

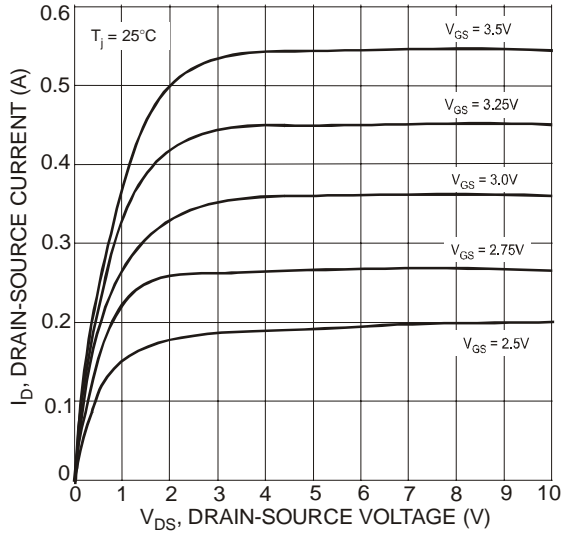


Fig. 1 Drain-Source Current vs. Drain-Source Voltage

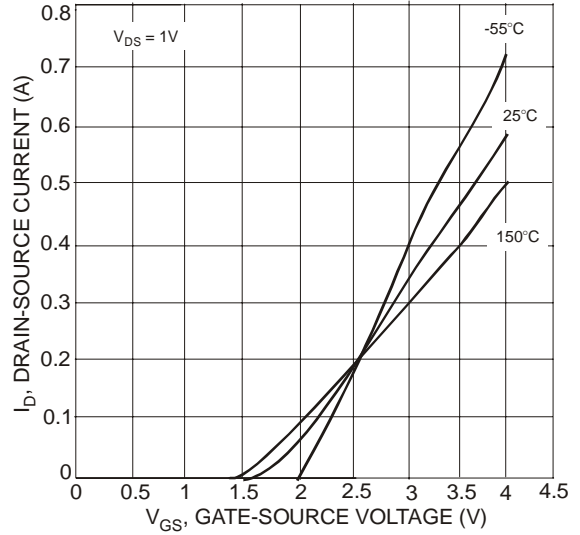


Fig. 2 Transfer Characteristics

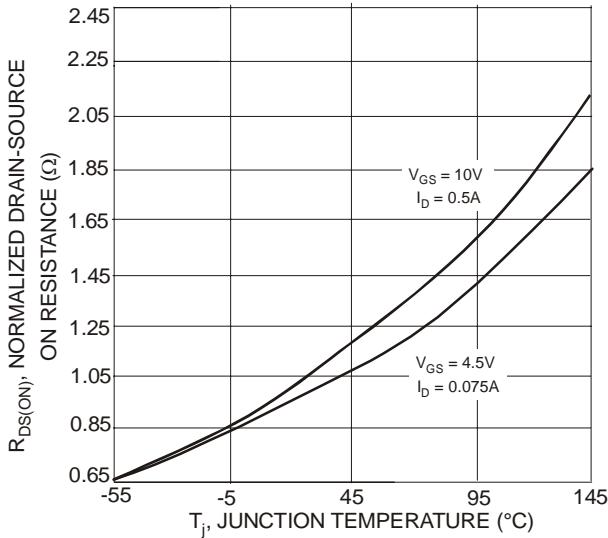


Fig. 3 Drain-Source On Resistance vs. Junction Temperature

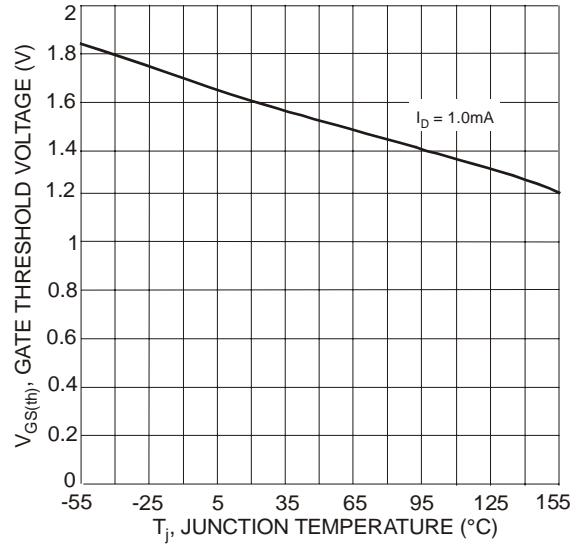


Fig. 4 Gate Threshold Voltage vs. Junction Temperature

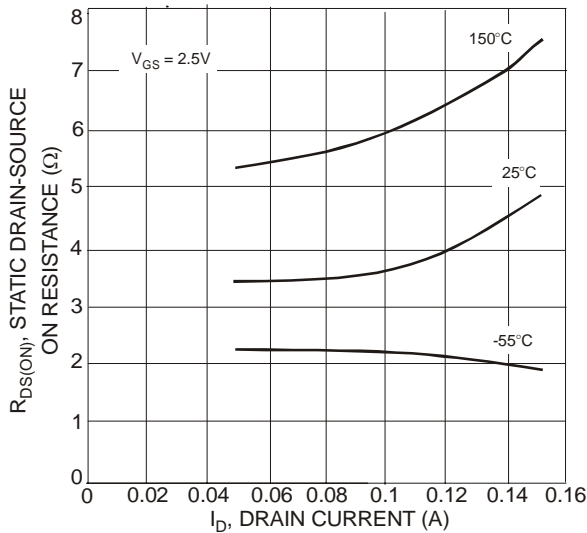


Fig. 5 Drain-Source On Resistance vs. Drain Current

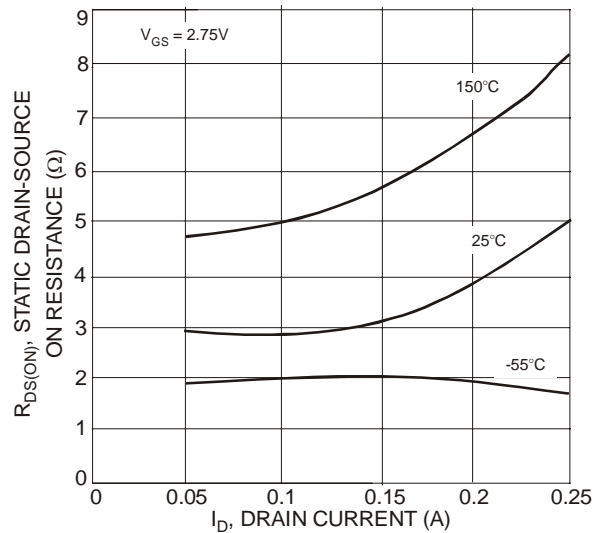


Fig. 6 Drain-Source On Resistance vs. Drain Current

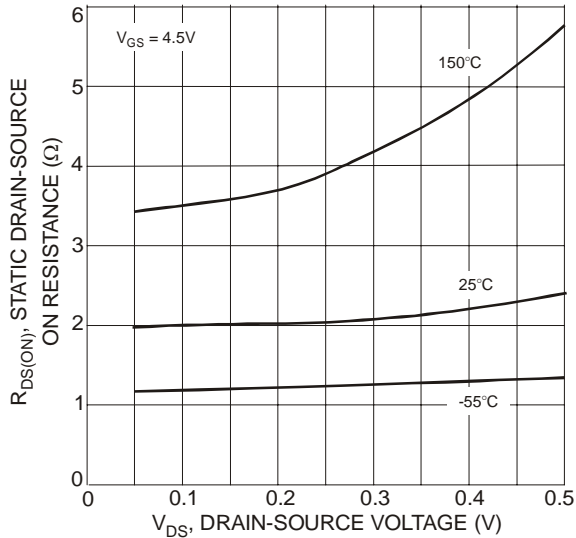


Fig. 7 Drain-Source On Resistance vs. Drain Current

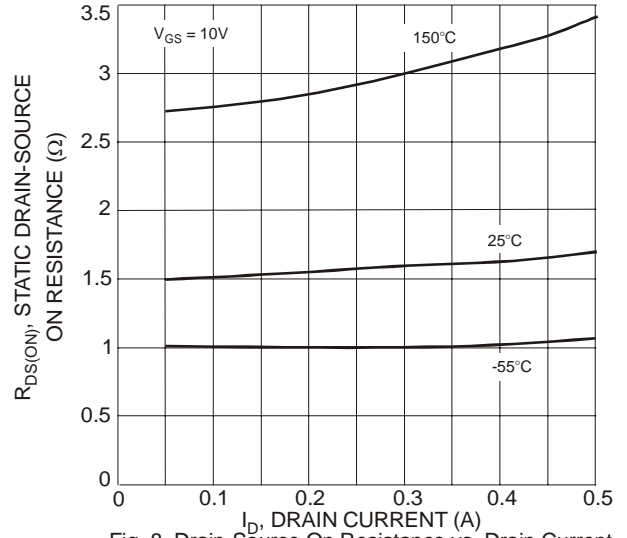


Fig. 8 Drain-Source On Resistance vs. Drain Current

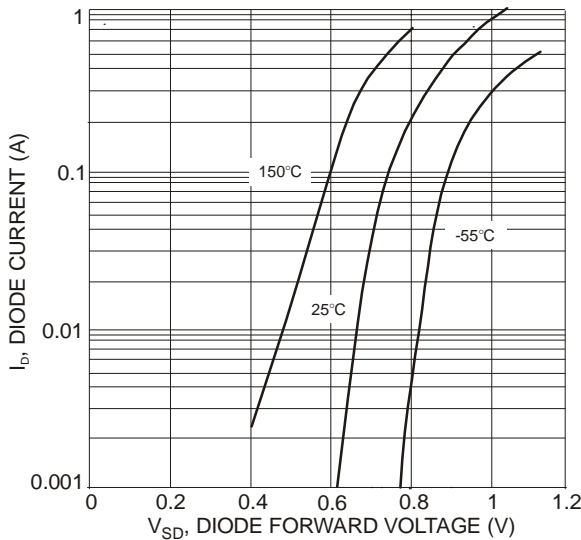


Fig. 9 Body Diode Current vs. Body Diode Voltage

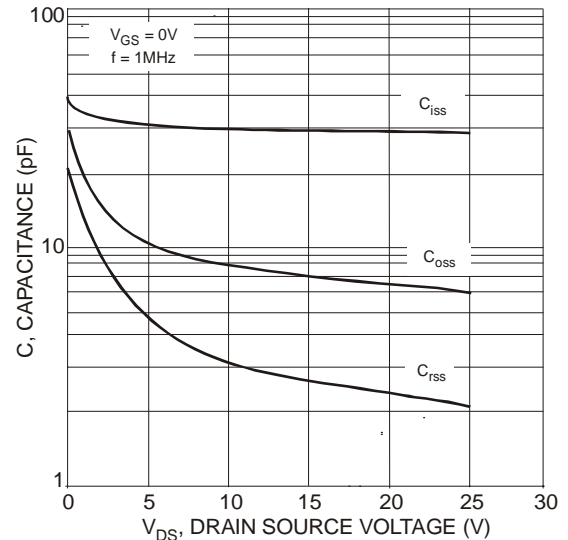


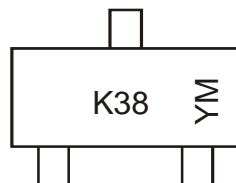
Fig. 10 Capacitance vs. Drain Source Voltage

**Ordering Information** (Note 6 & 7)

Part Number	Case	Packaging
BSS138W -7-F	SOT-323	3000/Tape & Reel

Notes: 7. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**

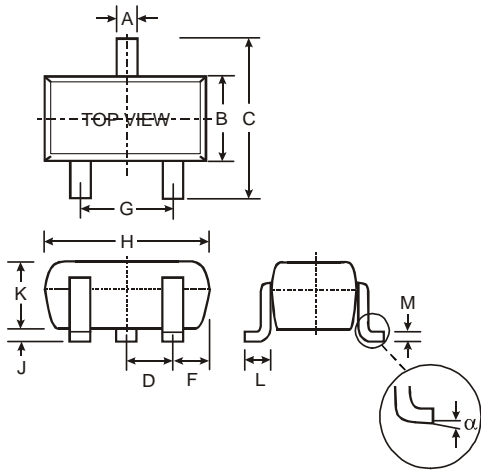


K38 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

Date Code Key

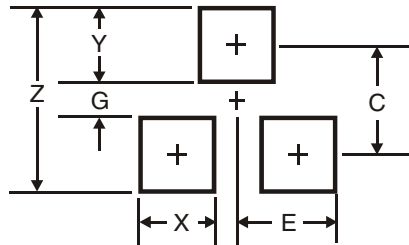
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Code	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	Z
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Code	1	2	3	4	5	6	7	8	9	O	N	D			

**Package Outline Dimensions**



SOT-323		
Dim	Min	Max
A	0.25	0.40
B	1.15	1.35
C	2.00	2.20
D	0.65 Nominal	
F	0.30	0.40
G	1.20	1.40
H	1.80	2.20
J	0.0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.18
α	0°	8°
All Dimensions in mm		

**Suggested Pad Layout**



Dimensions	Value (in mm)
Z	2.8
G	1.0
X	0.7
Y	0.9
C	1.9
E	0.65

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