



# DATA SHEET

SEMICONDUCTOR

BSS138

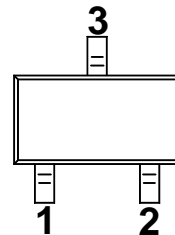
## Power MOSFET 200 mAmps, 50 Volts N-Channel SOT-23

Typical applications are dc-dc converters, power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low Threshold Voltage ( $V_{GS(th)}$ : 0.5V...1.5V) makes it ideal for low voltage applications
- Miniature SOT-23 Surface Mount Package saves board space
- Pb-Free Package May be Available. The G-Suffix Denotes a Pb-Free Lead Finish



SOT-23 (TO-236AB)

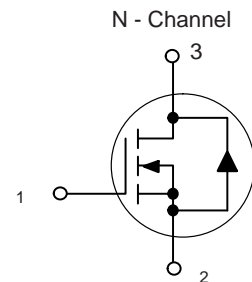


**200 mAmps  
50 VOLTS**

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	50	Vdc
Gate-to-Source Voltage – Continuous	$V_{GS}$	$\pm 20$	Vdc
Drain Current – Continuous @ $T_A = 25^\circ\text{C}$ – Pulsed Drain Current ( $t_p \leq 10 \mu\text{s}$ )	$I_D$ $I_{DM}$	200 800	mA
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	225	mW
Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, for 10 seconds	$T_L$	260	$^\circ\text{C}$

$R_{DS(on)} = 3.5 \Omega$



**MARKING DIAGRAM  
& PIN ASSIGNMENT**

### ORDERING INFORMATION

J1 = Device Code  
W = Work Week

Device	Marking	Shipping
BSS138	J1	3000/Tape&Reel

# ELECTRICAL CHARACTERISTICS

## BSS138

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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#### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage ( $V_{GS} = 0\text{ Vdc}$ , $I_D = 250\text{ }\mu\text{Adc}$ )	$V_{(BR)DSS}$	50	—	—	Vdc
Zero Gate Voltage Drain Current ( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ ) ( $V_{DS} = 50\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )	$I_{DSS}$	— —	— —	0.1 0.5	$\mu\text{Adc}$
Gate-Source Leakage Current ( $V_{GS} = \pm 20\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{Adc}$

#### ON CHARACTERISTICS (Note 1.)

Gate-Source Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = 1.0\text{ mAdc}$ )	$V_{GS(th)}$	0.5	—	1.5	Vdc
Static Drain-to-Source On-Resistance ( $V_{GS} = 2.75\text{ Vdc}$ , $I_D < 200\text{ mAdc}$ , $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ ) ( $V_{GS} = 5.0\text{ Vdc}$ , $I_D = 200\text{ mAdc}$ )	$r_{DS(on)}$	— —	5.6 —	10 3.5	Ohms
Forward Transconductance ( $V_{DS} = 25\text{ Vdc}$ , $I_D = 200\text{ mAdc}$ , $f = 1.0\text{ kHz}$ )	$g_{fs}$	100	—	—	mmhos

#### DYNAMIC CHARACTERISTICS

Input Capacitance	( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{iss}$	—	40	50	pF
Output Capacitance	( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{oss}$	—	12	25	
Transfer Capacitance	( $V_{DG} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{rss}$	—	3.5	5.0	

#### SWITCHING CHARACTERISTICS (Note 2.)

Turn-On Delay Time	( $V_{DD} = 30\text{ Vdc}$ , $I_D = 0.2\text{ Adc}$ ,)	$t_{d(on)}$	—	—	20	ns
Turn-Off Delay Time		$t_{d(off)}$	—	—	20	

1. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
2. Switching characteristics are independent of operating junction temperature.

# DEVICE CHARACTERISTICS

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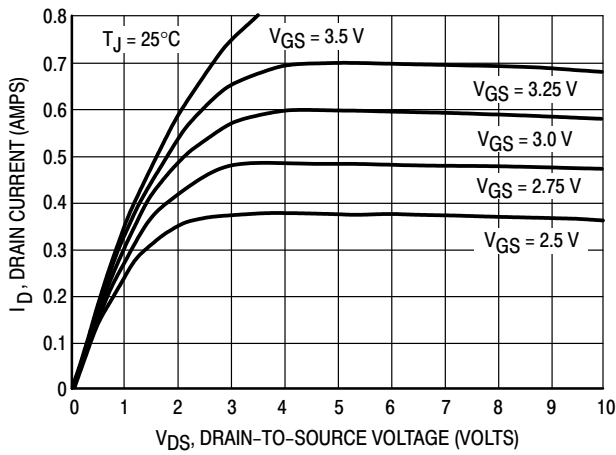


Figure 1. On-Region Characteristics

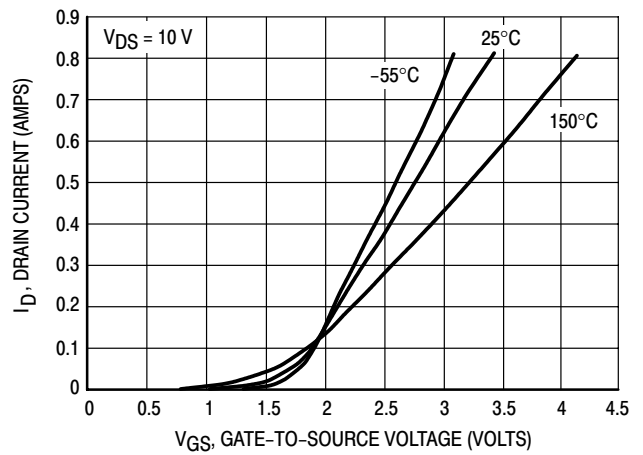


Figure 2. Transfer Characteristics

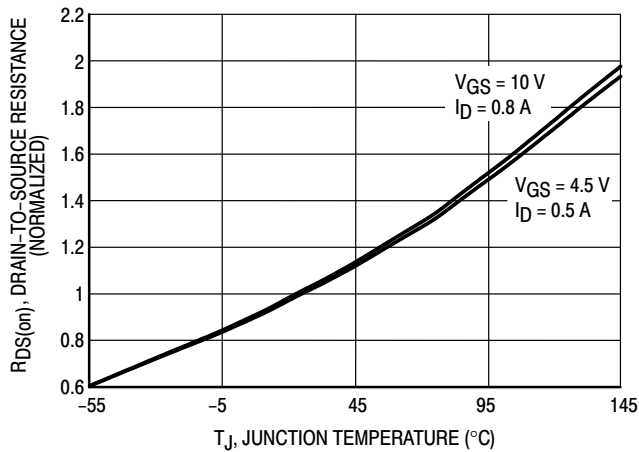


Figure 3. On-Resistance Variation with Temperature

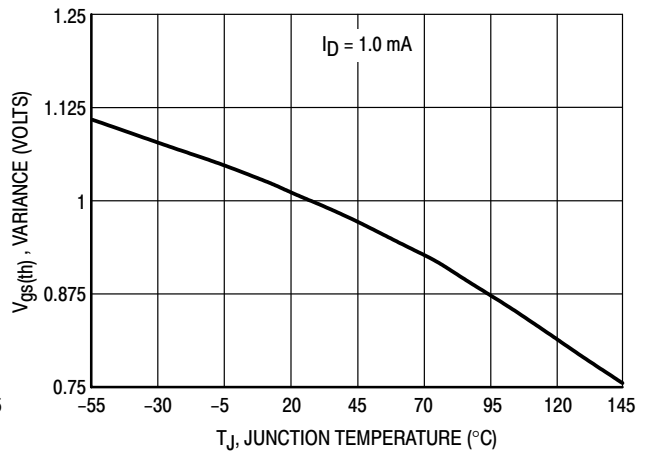


Figure 4. Threshold Voltage Variation with Temperature

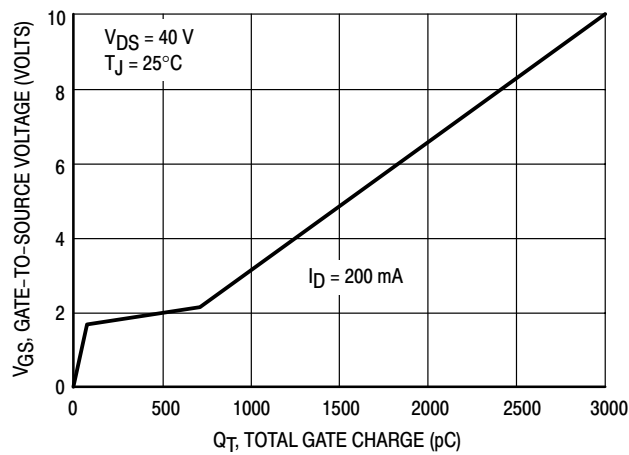


Figure 5. Gate Charge

# DEVICE CHARACTERISTICS

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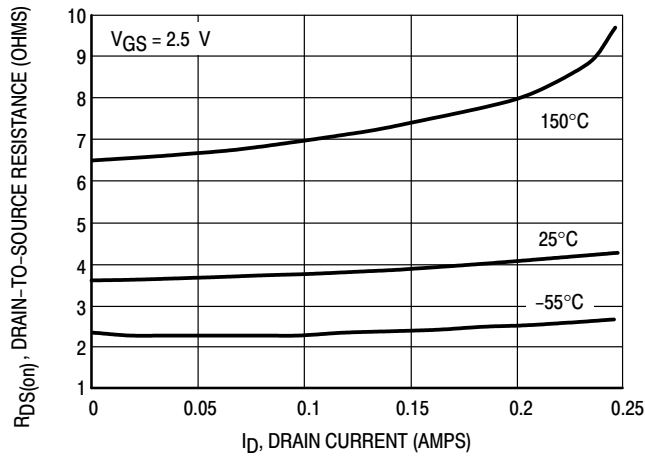


Figure 6. On-Resistance versus Drain Current

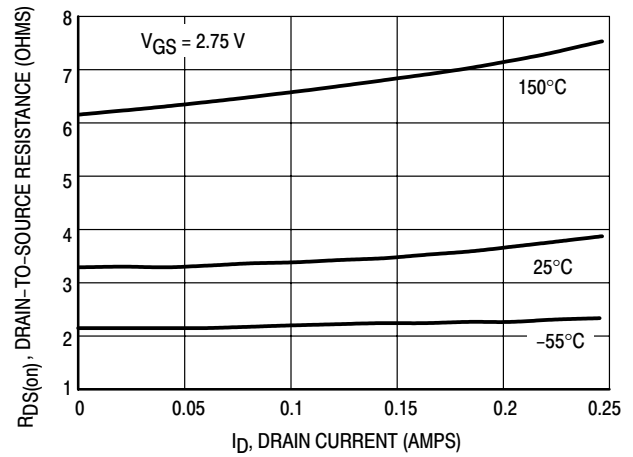


Figure 7. On-Resistance versus Drain Current

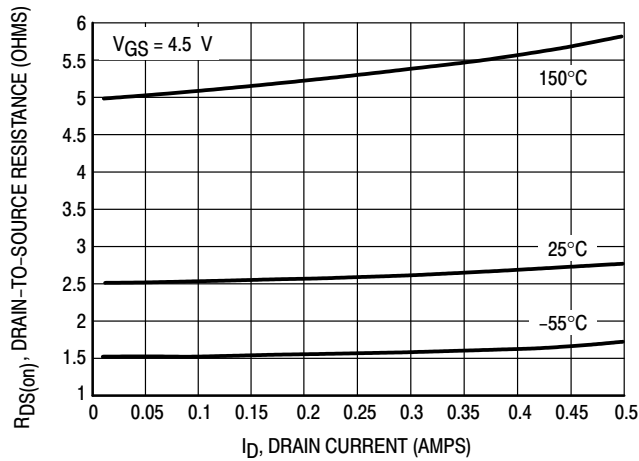


Figure 8. On-Resistance versus Drain Current

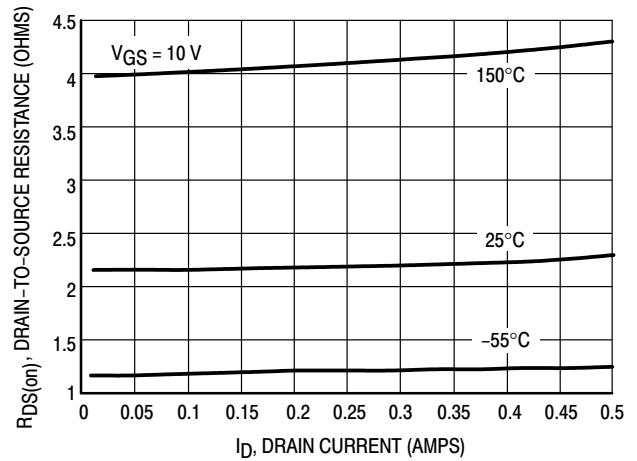


Figure 9. On-Resistance versus Drain Current

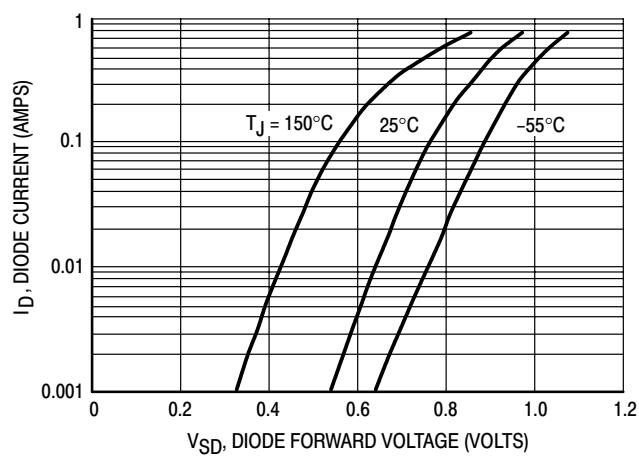


Figure 10. Body Diode Forward Voltage

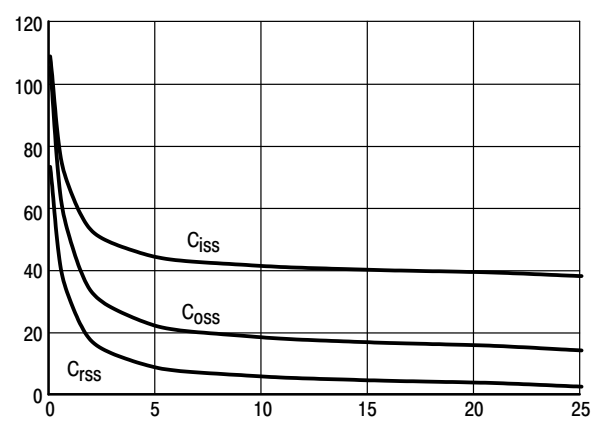
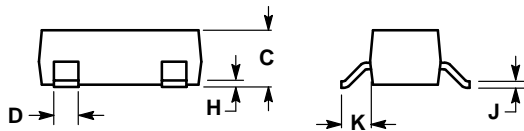
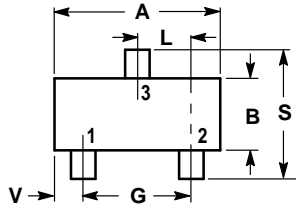


Figure 11. Capacitance

# PACKAGE OUTLINE & DIMENSIONS

## BSS138

### SOT-23



#### NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

- PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

