

BSS138LT1

Power MOSFET 200 mA, 50 V

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.

Features

- Low Threshold Voltage ($V_{GS(th)}$: 0.5 V–1.5 V) Makes it Ideal for Low Voltage Applications
- Miniature SOT-23 Surface Mount Package Saves Board Space
- Pb-Free Packages are Available

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}	± 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	$^\circ\text{C}$

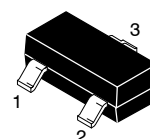
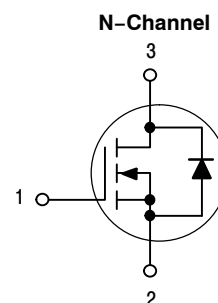
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



ON Semiconductor®

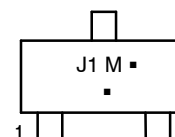
<http://onsemi.com>

200 mA, 50 V
 $R_{DS(on)} = 3.5 \Omega$



SOT-23
CASE 318
STYLE 21

MARKING DIAGRAM



J1 = Device Code
M = Date Code*
▪ = Pb-Free Package
(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
BSS138LT1	SOT-23	3000 Tape & Reel
BSS138LT1G	SOT-23 (Pb-Free)	3000 Tape & Reel
BSS138LT3	SOT-23	10,000 Tape & Reel
BSS138LT3G	SOT-23 (Pb-Free)	10,000 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

BSS138LT1

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 ($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, 25°C) ($V_{DS} = 50\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, 25°C) ($V_{DS} = 50\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, 150°C)	I_{DSS}	– – –	– – –	0.1 0.5 5.0	μAdc
Gate-Source Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	–	–	± 0.1	μAdc

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	Ω
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 Vdc, I _D = 0.2 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.

Typical Electrical Characteristics

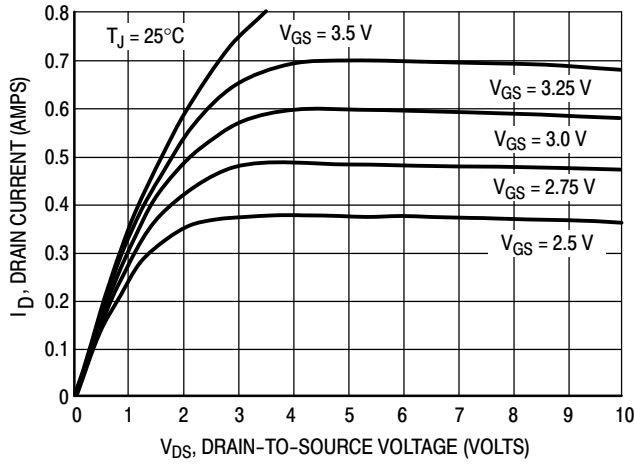


Figure 1. On-Region Characteristics

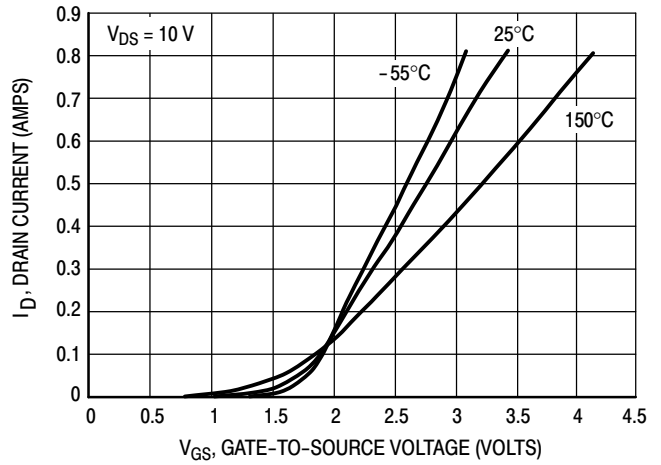


Figure 2. Transfer Characteristics

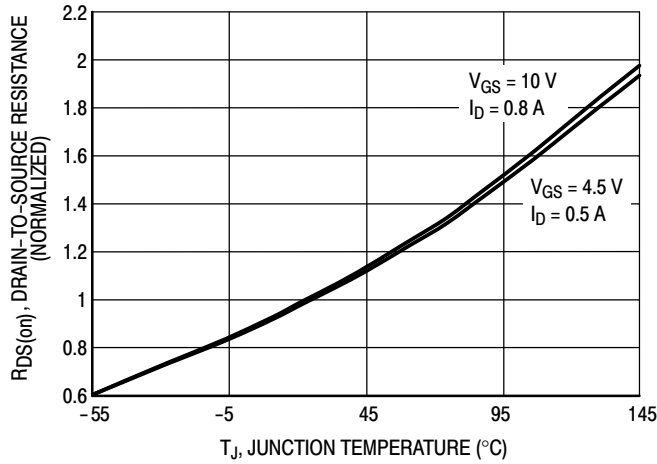


Figure 3. On-Resistance Variation with Temperature

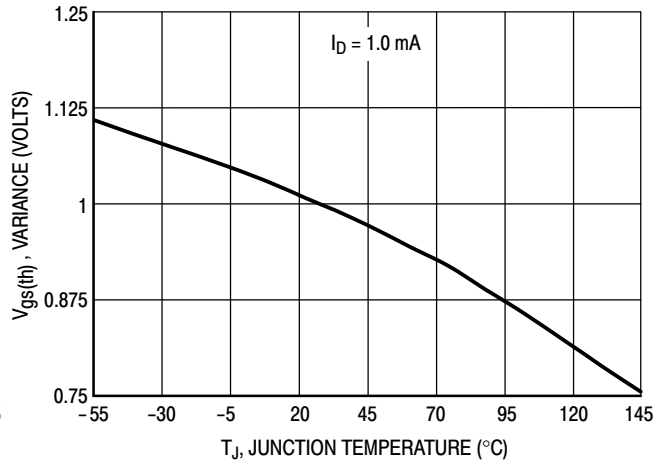


Figure 4. Threshold Voltage Variation with Temperature

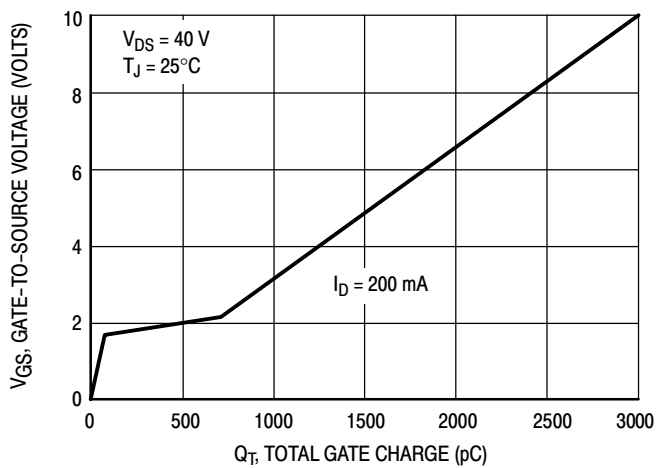


Figure 5. Gate Charge

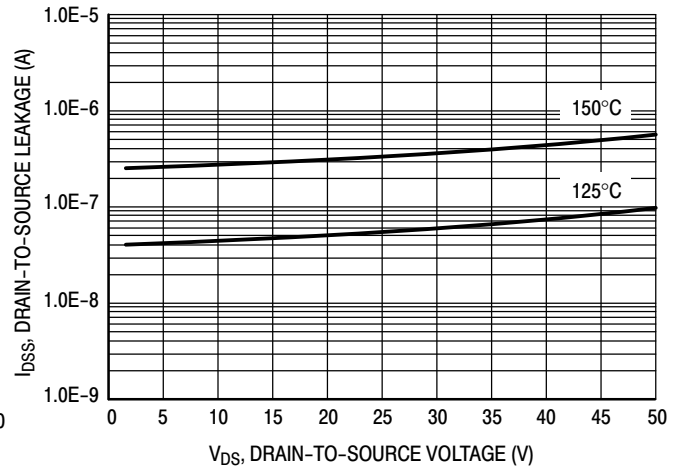


Figure 6. IDSS

TYPICAL ELECTRICAL CHARACTERISTICS

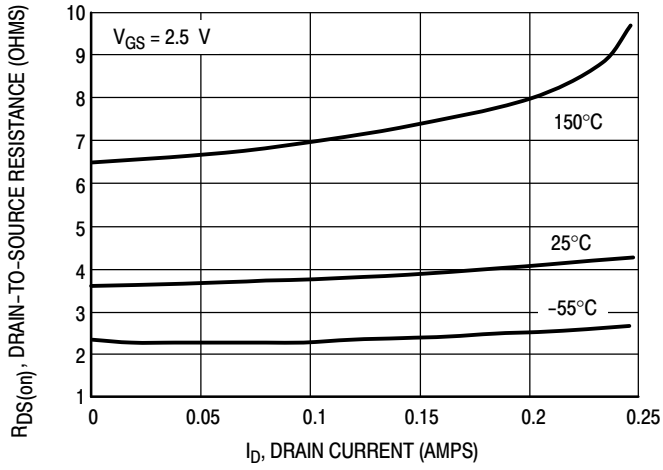


Figure 7. On-Resistance versus Drain Current

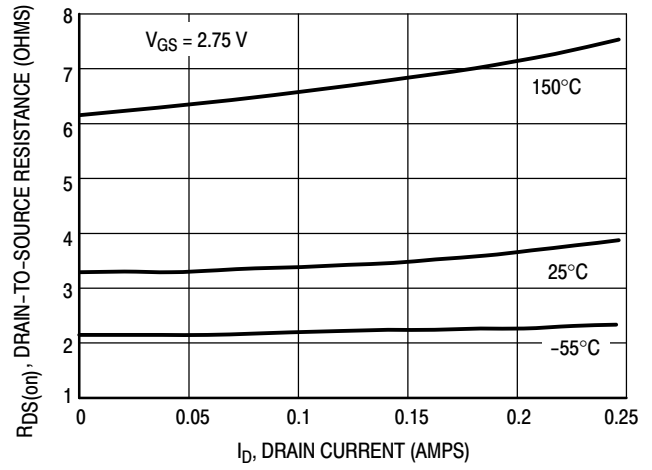


Figure 8. On-Resistance versus Drain Current

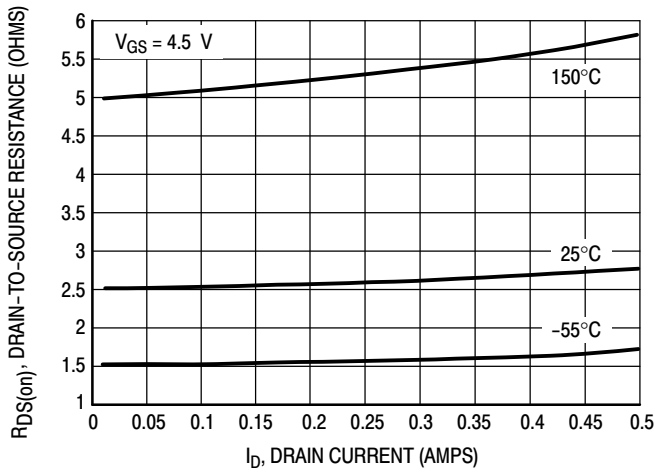


Figure 9. On-Resistance versus Drain Current

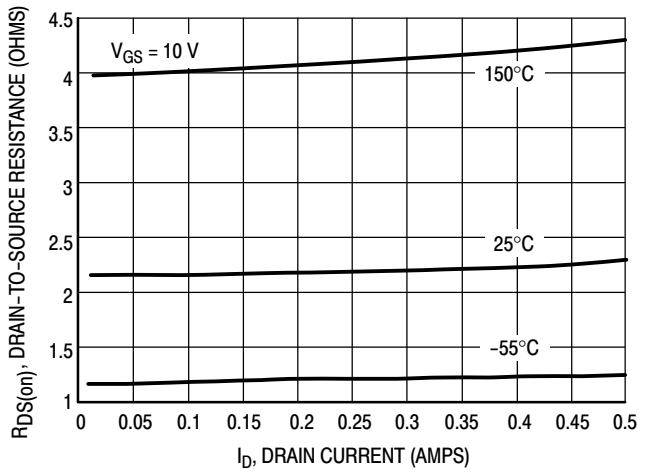


Figure 10. On-Resistance versus Drain Current

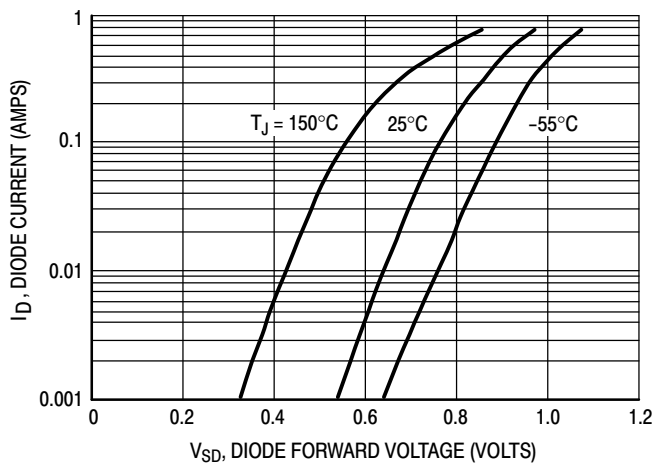


Figure 11. Body Diode Forward Voltage

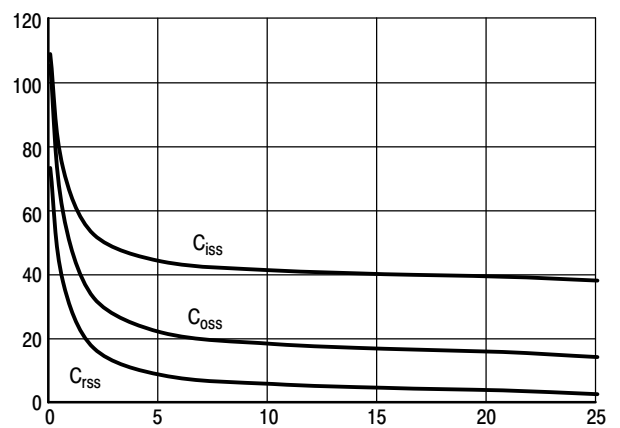
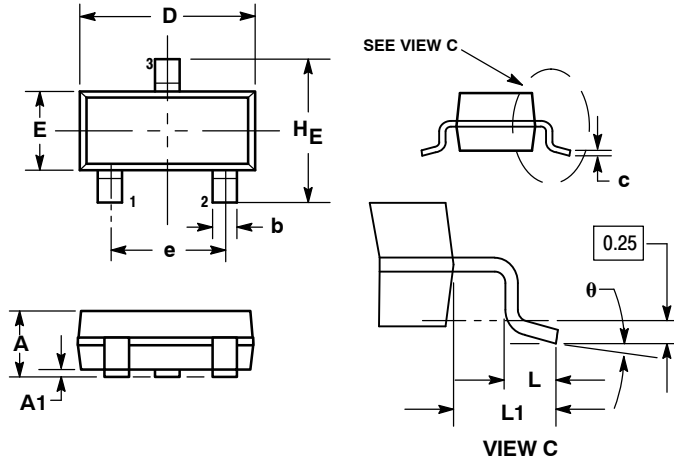


Figure 12. Capacitance

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PACKAGE DIMENSIONS

SOT-23 (TO-236) CASE 318-08 ISSUE AN



NOTES:

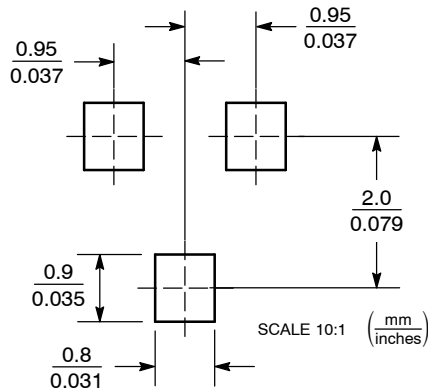
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104

STYLE 21:

- PIN 1. GATE
- SOURCE
- DRAIN

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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