

## BSS138

Power MOSFET

### N-CHANNEL LOGIC LEVEL ENHANCEMENT MODE

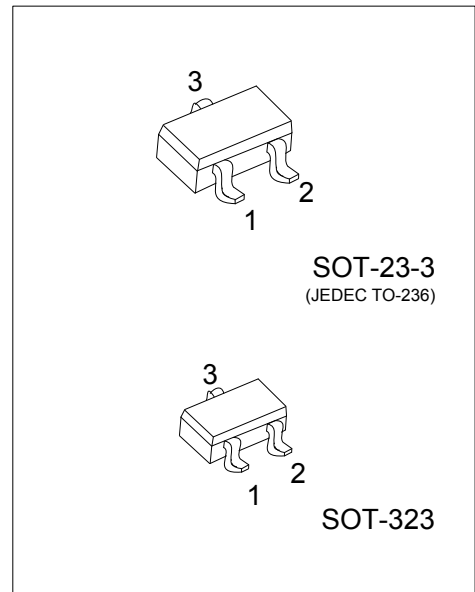
#### DESCRIPTION

This device employs advanced MOSFET technology and features low gate charge while maintaining low on-resistance.

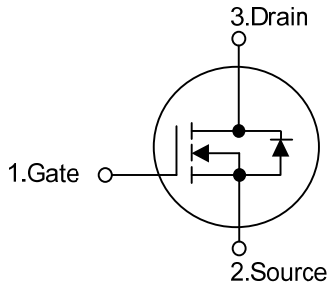
Optimized for switching applications, this device improves the overall efficiency of DC/DC converters and allows operation to higher switching frequencies.

#### FEATURES

- \*  $R_{DS(ON)} \leq 3.5\Omega @ V_{GS}=10V, I_D=0.22A$
- $R_{DS(ON)} \leq 6.0\Omega @ V_{GS}=4.5V, I_D=0.22A$
- $R_{DS(ON)} \leq 8.0\Omega @ V_{GS}=2.5V, I_D=0.20A$
- \* Low Capacitance
- \* Low Gate Charge
- \* Fast Switching Capability
- \* Avalanche Energy Specified



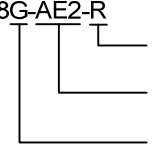
#### SYMBOL



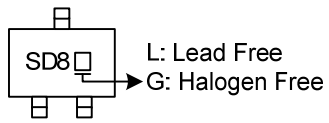
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
BSS138L-AE2-R	BSS138G-AE2-R	SOT-23-3	G	S	D	Tape Reel
BSS138L-AL3-R	BSS138G-AL3-R	SOT-323	G	S	D	Tape Reel

Note: Pin Assignment: G: Gate S: Source D: Drain

<p>BSS138G-AE2-R</p>  <ul style="list-style-type: none"> <li>(1)Packing Type</li> <li>(2)Package Type</li> <li>(3)Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) AE2: SOT-23-3, AL3: SOT-323</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul>
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	50	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	DC	$I_D$	0.22	A
	Pulse		0.88	
Power Dissipation	SOT-23-3	$P_D$	0.36	W
	SOT-323		0.15	
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL CHARACTERISTICS

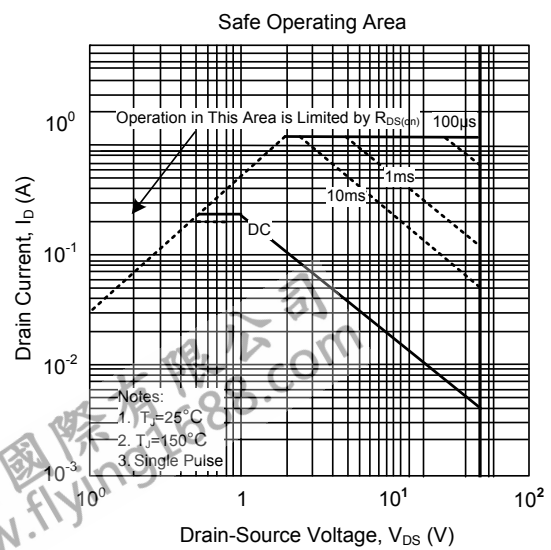
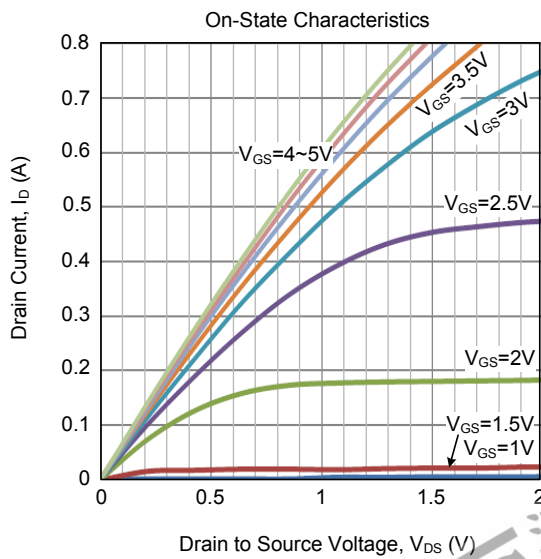
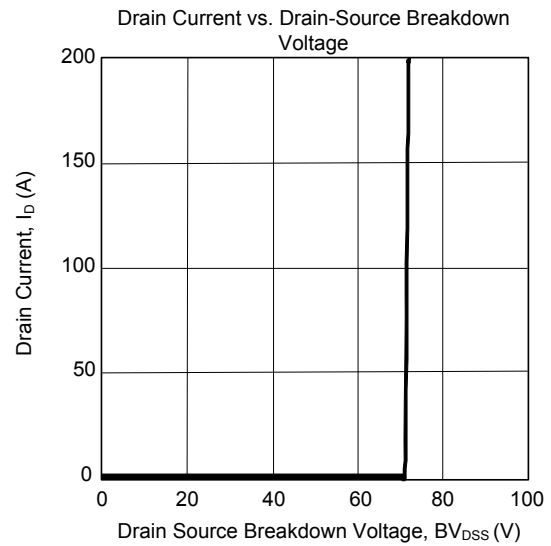
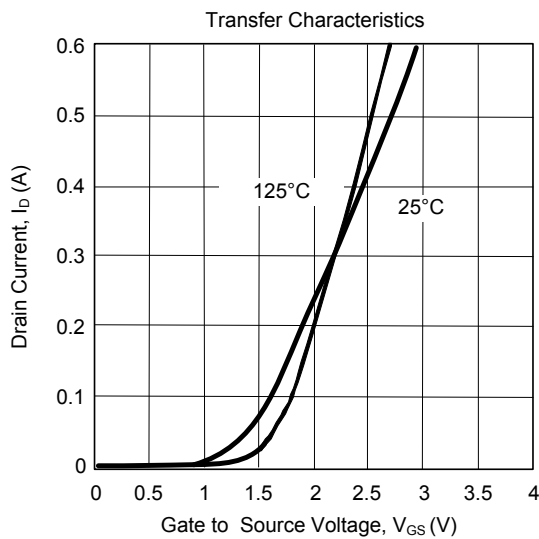
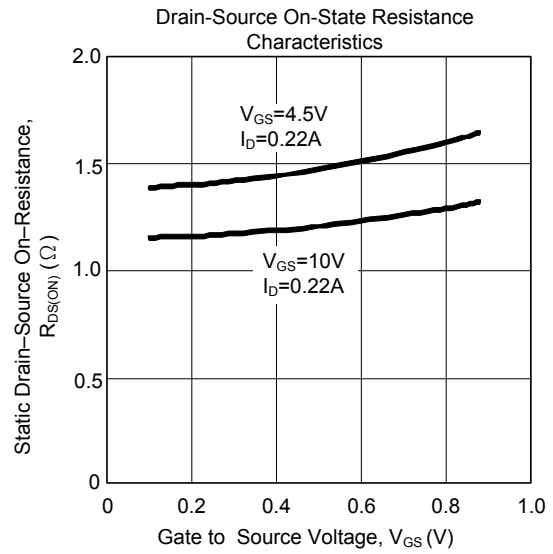
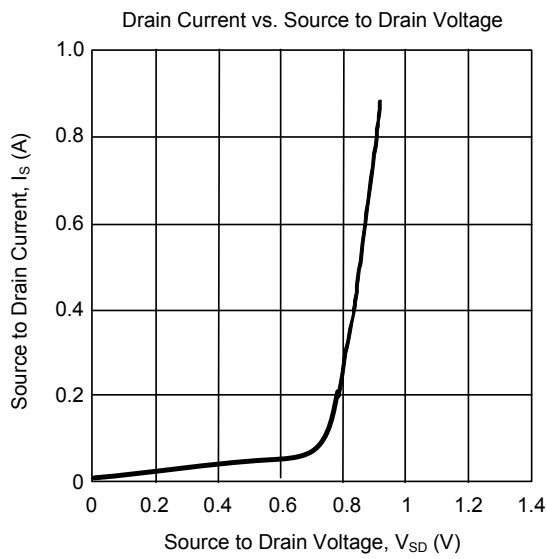
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-23-3	$\theta_{JA}$	350	$^\circ\text{C/W}$
	SOT-323		833	

■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

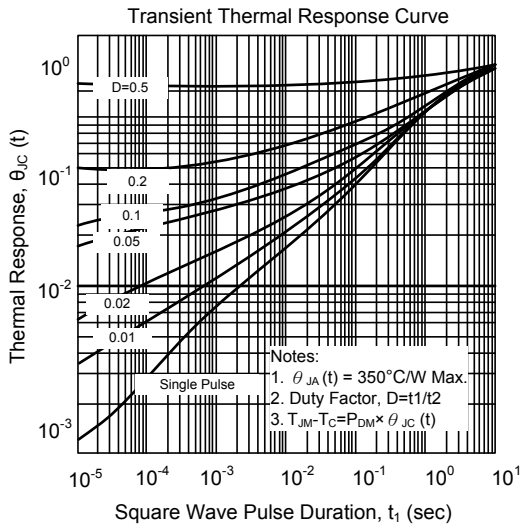
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	50			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$ , Referenced to $25^\circ\text{C}$		72		$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=50\text{V}, V_{GS}=0\text{V}$			0.5	$\mu\text{A}$
		$V_{DS}=30\text{V}, V_{GS}=0\text{V}$			0.1	
Gate-Body Leakage, Forward	$I_{GSS}$	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
<b>ON CHARACTERISTICS (Note)</b>						
Gate-Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=1\text{mA}$	0.8	1.3	1.5	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(TH)}/\Delta T_J$	$I_D=1\text{mA}$ , Referenced to $25^\circ\text{C}$		-2		$\text{mV}/^\circ\text{C}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=0.22\text{A}$		0.7	3.5	$\Omega$
		$V_{GS}=4.5\text{V}, I_D=0.22\text{A}$		1.0	6.0	$\Omega$
		$V_{GS}=2.5\text{V}, I_D=0.20\text{A}$			8.0	$\Omega$
On-State Drain Current	$I_{D(ON)}$	$V_{GS}=10\text{V}, V_{DS}=5\text{V}$	0.2			A
Forward Transconductance	$g_{FS}$	$V_{DS}=10\text{V}, I_D=0.22\text{A}$	0.12	0.5		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$		27		pF
Output Capacitance	$C_{OSS}$			13		pF
Reverse Transfer Capacitance	$C_{RSS}$			6		pF
<b>SWITCHING PARAMETERS (Note)</b>						
Total Gate Charge	$Q_G$	$V_{DS}=25\text{V}, V_{GS}=10\text{V}, I_D=0.22\text{A}$		1.7	2.4	nC
Gate Source Charge	$Q_{GS}$			0.1		nC
Gate Drain Charge	$Q_{GD}$			0.4		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30\text{V}, I_D=0.29\text{A}, V_{GS}=10\text{V}, R_G=6\Omega$		2.5	5	ns
Turn-ON Rise Time	$t_R$			9	18	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			20	36	ns
Turn-OFF Fall-Time	$t_F$			7	14	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Max. Diode Forward Current	$I_S$				0.22	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0\text{V}, I_S=0.44\text{A}$ (Note)		0.8	1.4	V

Note: Pulse test, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$

## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



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