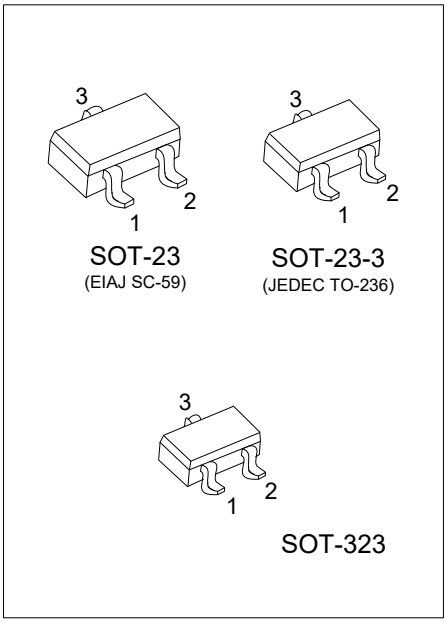
BSS138

Power MOSFET

N-CHANNEL LOGIC LEVEL ENHANCEMENT MODE



■ DESCRIPTION

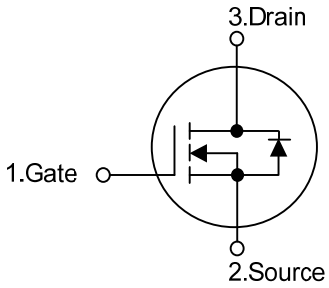
This device employs advanced MOSFET technology and features low gate charge while maintaining low on-resistance.

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

■ FEATURES

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

■ SYMBOL



■ ORDERING INFORMATION

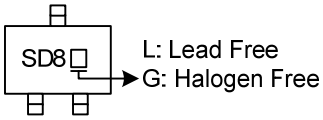
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
BSS138L-AE2-R	BSS138G-AE2-R	SOT-23-3	G	S	D	Tape Reel
BSS138L-AE3-R	BSS138G-AE3-R	SOT-23	G	S	D	Tape Reel
BSS138L-AL3-R	BSS138G-AL3-R	SOT-323	G	S	D	Tape Reel

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

BSS138G-AE2-R

(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) AE2: SOT-23-3, AE3: SOT-23, AL3: SOT-323
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	50	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	DC	I_D	0.22	A
	Pulse		0.88	
Peak Diode Recovery dv/dt		dv/dt	7.1	V/ns
Power Dissipation	SOT-23-3	P_D	0.4	W
	SOT-23		0.5	W
	SOT-323		0.15	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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 DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-23-3	θ_{JA}	312.5	°C/W
	SOT-23		320	°C/W
	SOT-323		833	°C/W

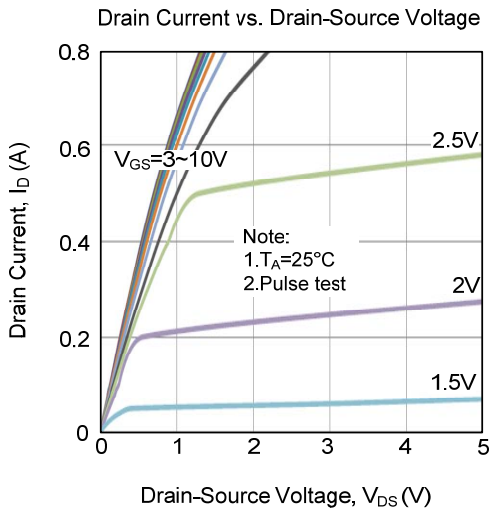
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

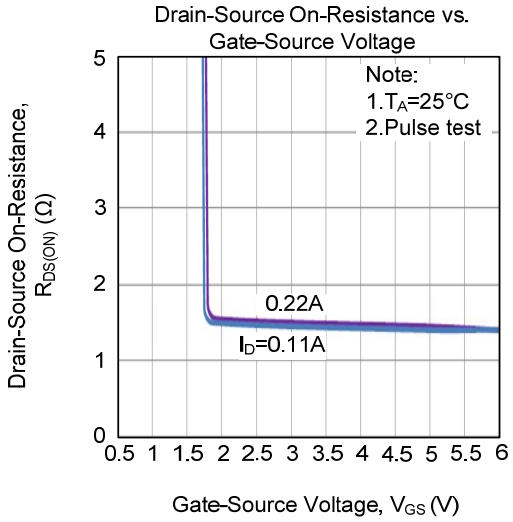
■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

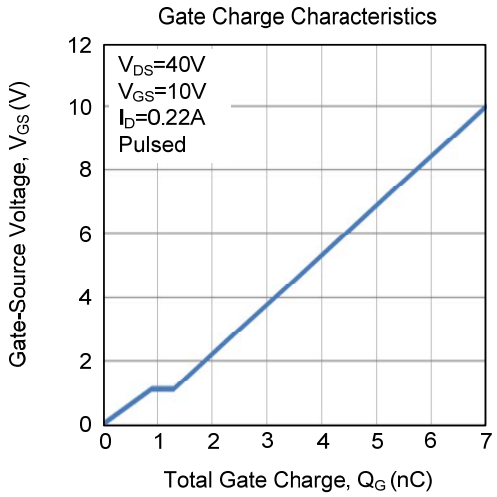
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	50			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA,Referenced to 25°C		72		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=50V, V_{GS}=0V			0.5	μA
		V_{DS}=30V, V_{GS}=0V			0.1	μA
Gate–Body Leakage, Forward	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±100	nA
ON CHARACTERISTICS (Note)						
Gate-Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=1mA	0.5	0.9	1.5	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(TH)}/\Delta T_J$	I_D=1mA, Referenced to 25°C		-2		mV/°C
Static Drain–Source On–Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=0.22A		1.3	3.5	Ω
		V_{GS}=4.5V, I_D=0.22A		1.5	6.0	Ω
		V_{GS}=2.5V, I_D=0.20A		1.9	8.0	Ω
On-State Drain Current	$I_{D(ON)}$	V_{GS}=10 V, V_{DS}=5V	0.2			A
Forward Transconductance	g_{FS}	V_{DS}=10V, I_D=0.22A	0.12	0.5		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1MHz		19		pF
Output Capacitance	C_{OSS}			9.5		pF
Reverse Transfer Capacitance	C_{RSS}			4.5		pF
SWITCHING PARAMETERS (Note)						
Total Gate Charge	Q_G	V_{DS}=40V, V_{GS}=10V, I_D=0.22A		7		nC
Gate Source Charge	Q_{GS}			0.9		nC
Gate Drain Charge	Q_{GD}			0.4		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{DD}=30V, I_D=0.22A,V_{GS}=10V, R_G=6Ω		0.8		ns
Turn-ON Rise Time	t_R			15		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			6.5		ns
Turn-OFF Fall-Time	t_F			14		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Max. Diode Forward Current	I_S				0.22	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}= 0V, I_S=0.44A (Note)		0.8	1.4	V
Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_S=0.22A, d_I/d_t=100A/μs		17		ns
Reverse Recovery Charge	Q_{rr}			7		nC

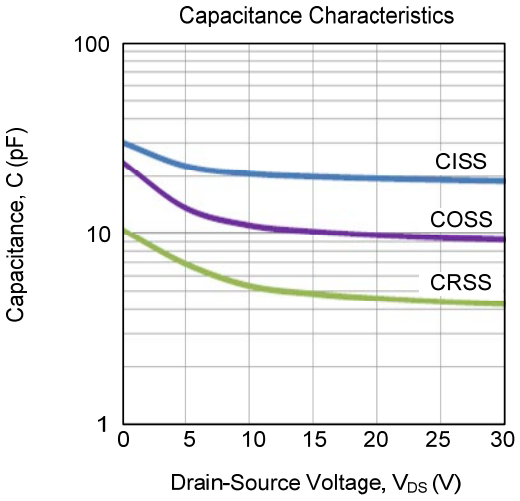
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

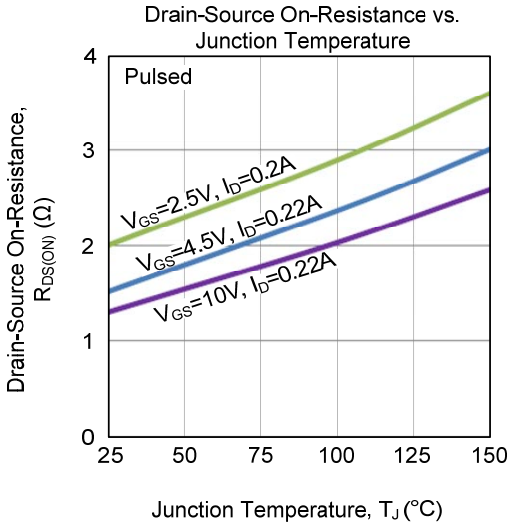
■ TYPICAL CHARACTERISTICS

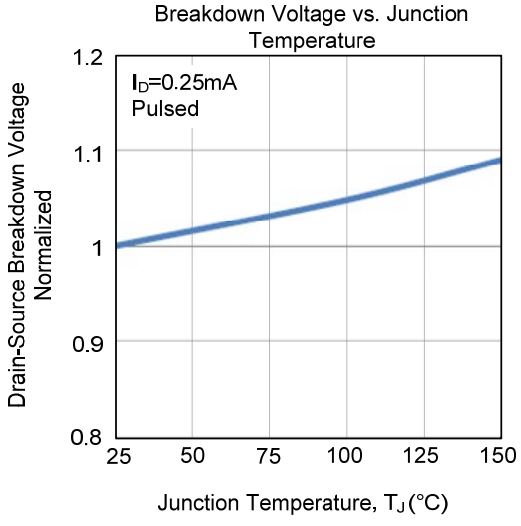




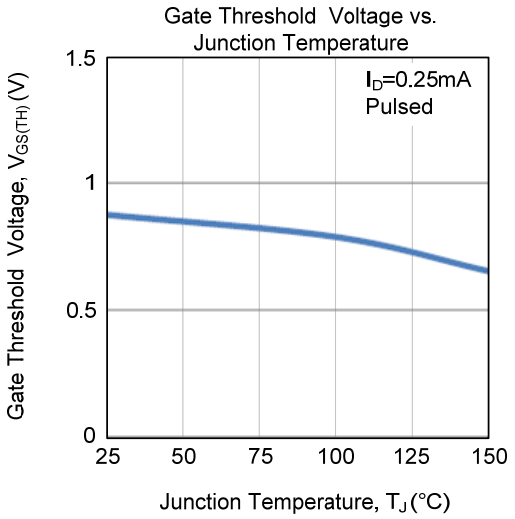


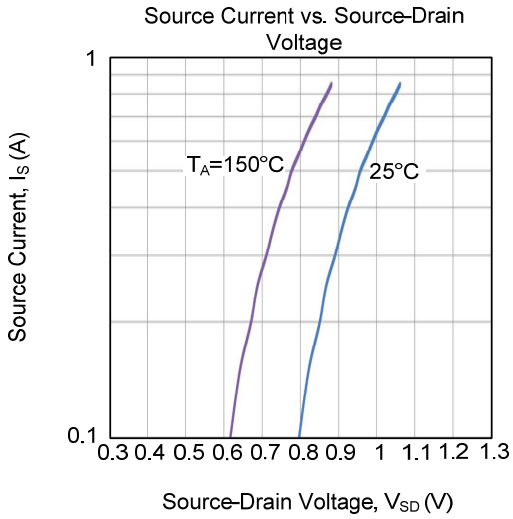


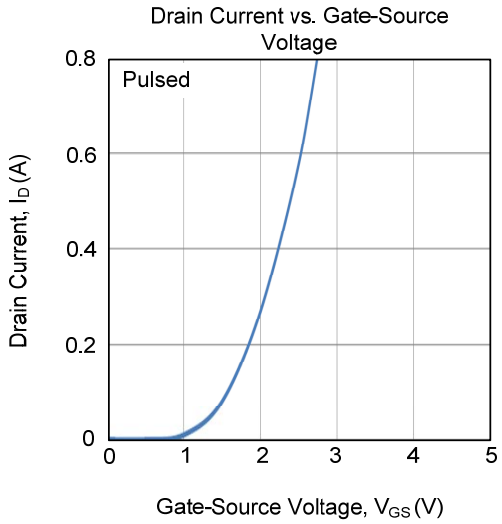


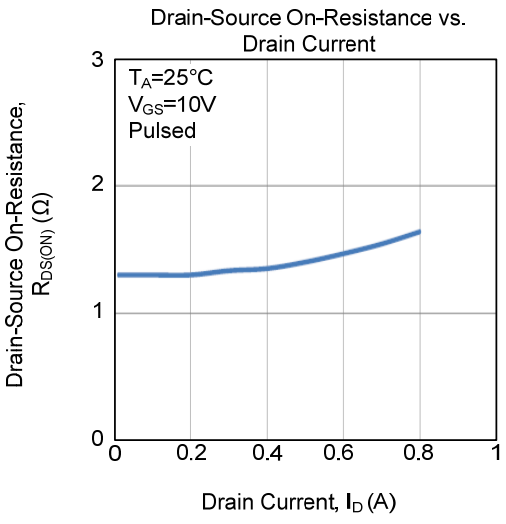


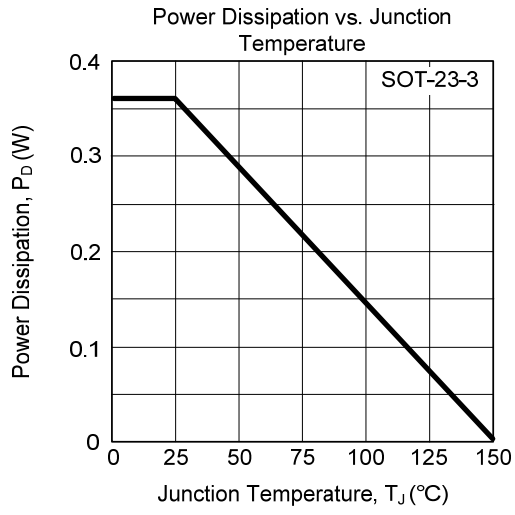
■ TYPICAL CHARACTERISTICS (Cont.)

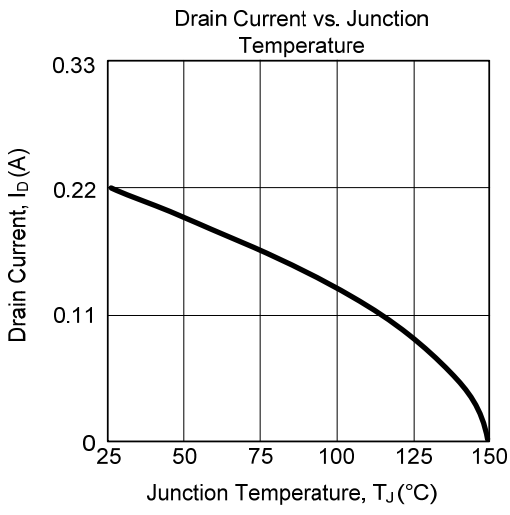






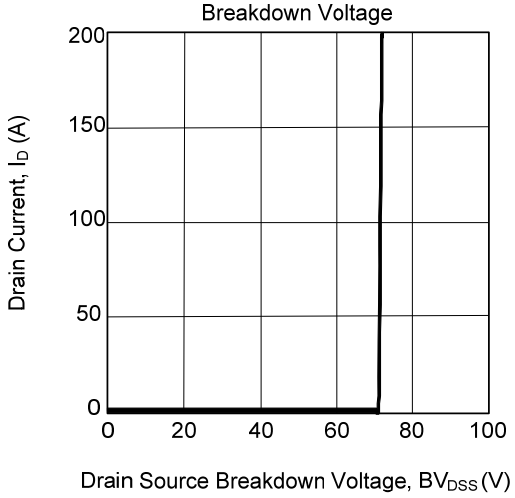




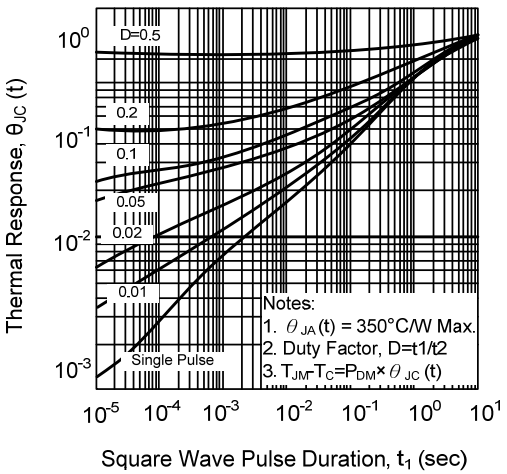


■ TYPICAL CHARACTERISTICS (Cont.)

Drain Current vs. Drain-Source Breakdown Voltage



Transient Thermal Response Curve



Safe Operating Area