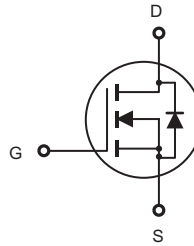


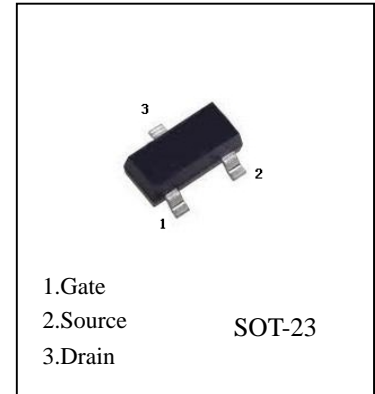
FEATURES

- High density cell design for extremely low $R_{DS(ON)}$
- Rugged and Reliable
- Compact industry standard SOT-23 surface mount package

MARKING: J1



BSS138
N-Channel MOSFET



Absolute Maximum Ratings ($T_A=25^{\circ}C$, unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	50	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous (Note 1) – Pulsed	0.22	A
		0.88	
P_D	Maximum Power Dissipation (Note 1)	0.36	W
	Derate Above $25^{\circ}C$	2.8	mW/ $^{\circ}C$
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to $+150$	$^{\circ}C$
T_L	Maximum Lead Temperature for Soldering Purposes, 1/16" from Case for 10 Seconds	300	$^{\circ}C$
Thermal Characteristics			
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1)	350	$^{\circ}C/W$

BSS138

Electrical Characteristics (TA=25°C, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain–Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	50			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		72		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 50 V, V _{GS} = 0 V			0.5	μA
		V _{DS} = 30 V, V _{GS} = 0 V			100	nA
I _{GSS}	Gate–Body Leakage.	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
On Characteristics (Note 2)						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 1 mA	0.8	1.3	1.6	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I _D = 1 mA, Referenced to 25°C		-2		mV/°C
R _{DS(on)}	Static Drain–Source On–Resistance	V _{GS} = 10 V, I _D = 0.22 A V _{GS} = 4.5 V, I _D = 0.22 A			3.5 6.0	Ω
I _{D(on)}	On–State Drain Current	V _{GS} = 10 V, V _{DS} = 5 V	0.2			A
g _{FS}	Forward Transconductance	V _{DS} = 10V, I _D = 0.22 A	0.12			S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz		27		pF
C _{oss}	Output Capacitance			13		pF
C _{rss}	Reverse Transfer Capacitance			6		pF
R _G	Gate Resistance	V _{GS} = 15 mV, f = 1.0 MHz		9		Ω
Switching Characteristics (Note 2)						
t _{d(on)}	Turn–On Delay Time	V _{DD} = 30 V, I _D = 0.29 A, V _{GS} = 10 V, R _{GEN} = 6 Ω		2.5	5	ns
t _r	Turn–On Rise Time			9	18	ns
t _{d(off)}	Turn–Off Delay Time			20	36	ns
t _f	Turn–Off Fall Time			7	14	ns
Q _g	Total Gate Charge	V _{DS} = 25 V, I _D = 0.22 A, V _{GS} = 10 V		1.7	2.4	nC
Q _{gs}	Gate–Source Charge			0.1		nC
Q _{gd}	Gate–Drain Charge			0.4		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain–Source Diode Forward Current				0.22	A
V _{SD}	Drain–Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 0.44 A (Note 2)		0.8	1.4	V

Notes:

- R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design.



a) 350°C/W when mounted on a minimum pad..

Scale 1 : 1 on letter size paper

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

BSS138 Typical Characteristics

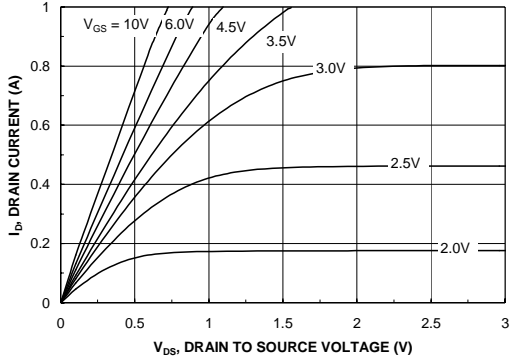


Figure 1. On-Region Characteristics.

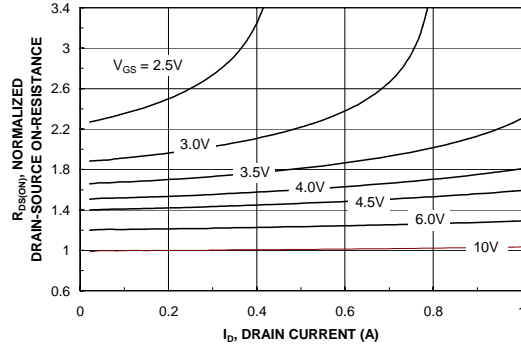


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

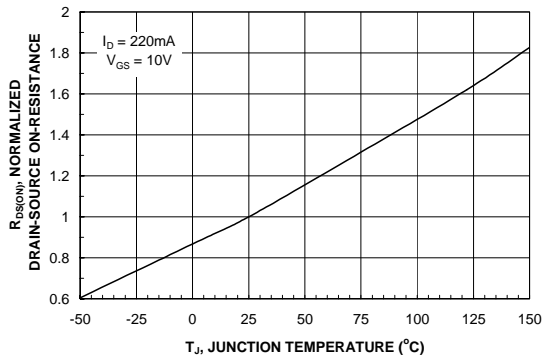


Figure 3. On-Resistance Variation with Temperature.

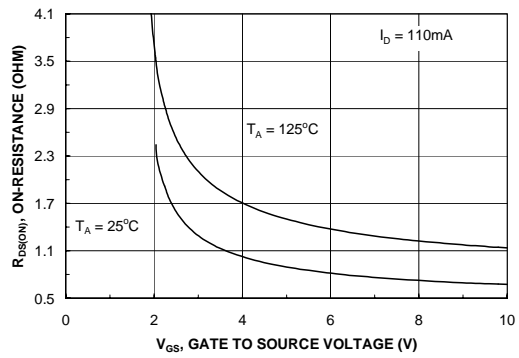


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

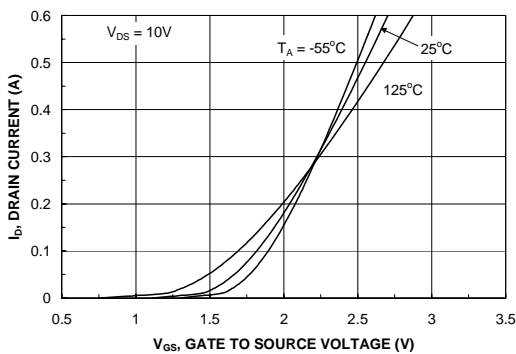


Figure 5. Transfer Characteristics.

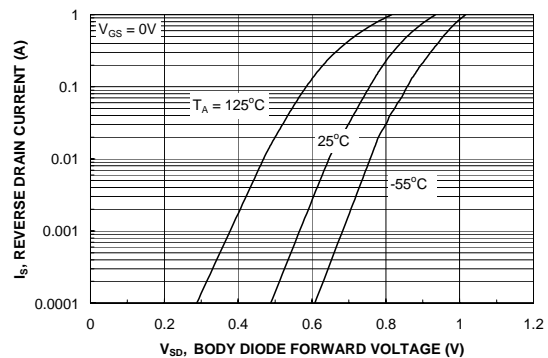


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

BSS138 Typical Characteristics

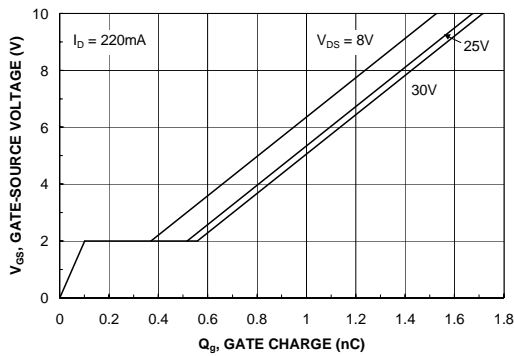


Figure 7. Gate Charge Characteristics.

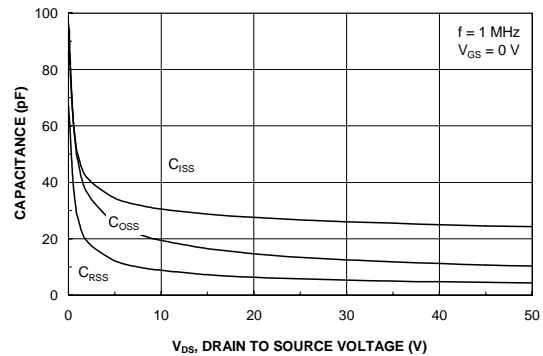


Figure 8. Capacitance Characteristics.

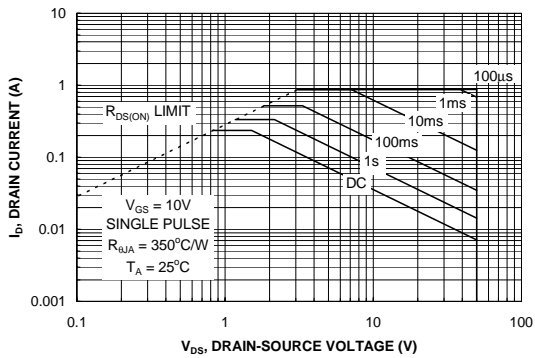


Figure 9. Maximum Safe Operating Area.

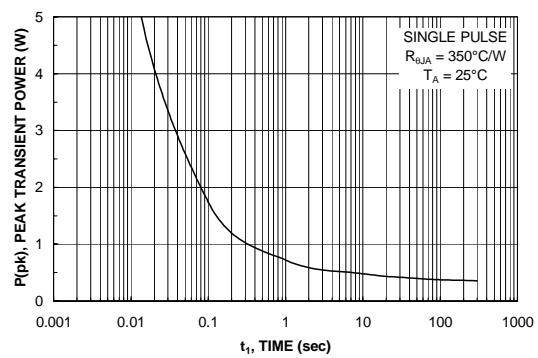


Figure 10. Single Pulse Maximum Power Dissipation.

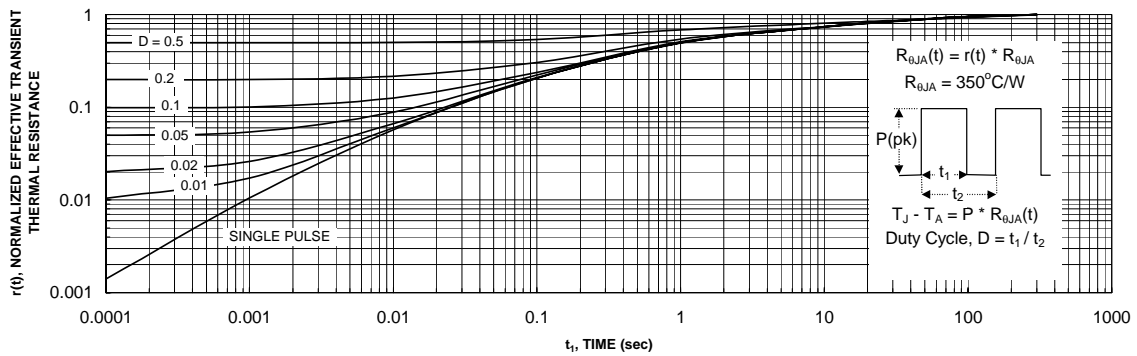


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1a. Transient thermal response will change depending on the circuit board design.