BSS138ECSA

N-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
60V	1.5Ω@10V	0.6A
	1.8Ω@4.5V	

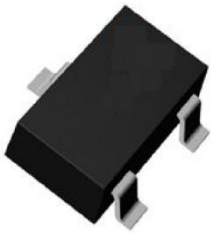
Feature

- Trench power LV MOSFET technology
- Voltage controlled small signal switch
- Low input capacitance
- Fast switching speed

Application

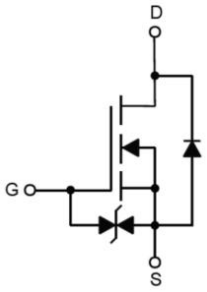
- Battery operated systems
- Solid-state relays
- Direct logic-level interface :TTL / CMOS

Package

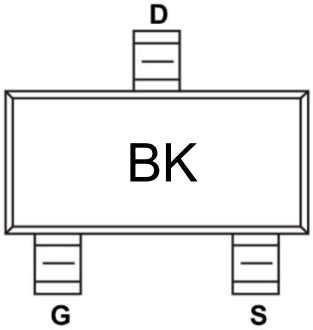


SOT-23

Circuit diagram



Marking



Absolute maximum ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	0.6	A
Continuous Drain Current (T_A=100℃)	I_D (100℃)	0.38	A
Pulsed Drain Current[1)]	I_{DM}	1.5	A
Power Dissipation[2)]	P_D	0.83	W
Thermal Resistance Junction-to-Ambient[3)]	$R_{\theta JA}$	150	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	℃
Storage Temperature	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_J=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} =0V, I_D =250μA	60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =60V, V_{GS} =0V			1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±10	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	0.5	1.1	1.5	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =0.6A		1.1	1.5	Ω
		V_{GS} =4.5V, I_D =0.2A		1.25	1.8	
Dynamic characteristics[4)]						
Input Capacitance	C_{iss}	V_{DS} =30V, V_{GS} =0V, f =1MHz		25		pF
Output Capacitance	C_{oss}			7		
Reverse Transfer Capacitance	C_{rss}			3		
Total Gate Charge	Q_g	V_{DS} =30V, V_{GS} =10V, I_D =1A		1.4		nC
Gate-Source Charge	Q_{gs}			0.5		
Gate-Drain Charge	Q_{gd}			0.2		
Turn-on delay time	$t_{d(on)}$	V_{DS} =30V, V_{GS} =10V, I_D =1A R_G =2.3Ω		4		nS
Turn-on rise time	t_r			19		
Turn-off delay time	$t_{d(off)}$			9		
Turn-off fall time	t_f			25		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				0.6	A
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S =0.6A			1.3	V
Reverse Recovery Time	T_{rr}	I_F =1A, di/dt =-100A/us		13		nS
Reverse Recovery Charge	Q_{rr}			4		nC

Notes:

1) Repetitive rating; pulse width limited by max. junction temperature.

2) Pd is based on max. junction temperature, using junction-case thermal resistance.

3) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in the still air environment with T_A =25℃.

4) The maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design.

Typical Characteristics

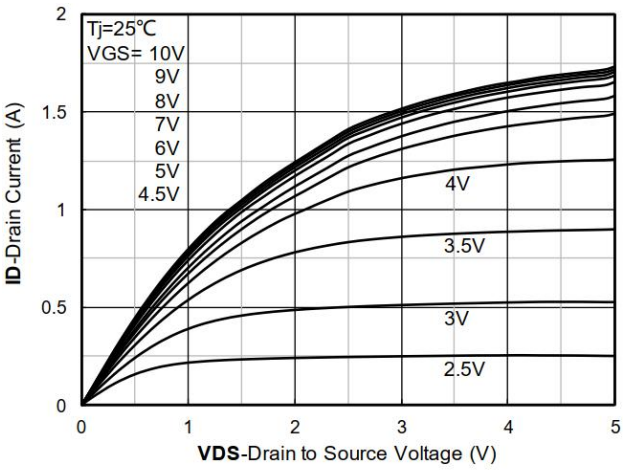


Figure 1. Output Characteristics

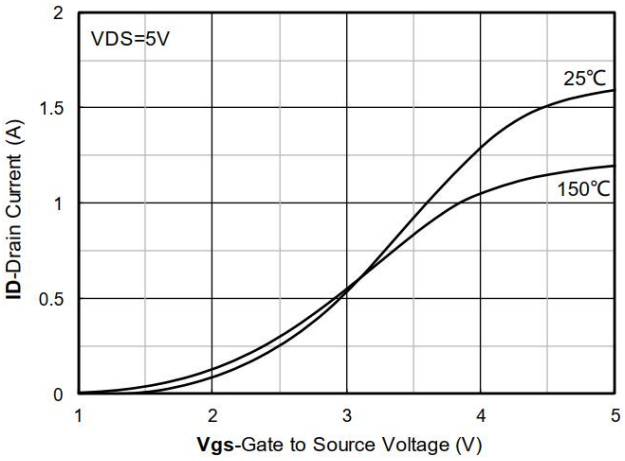


Figure 2. Transfer Characteristics

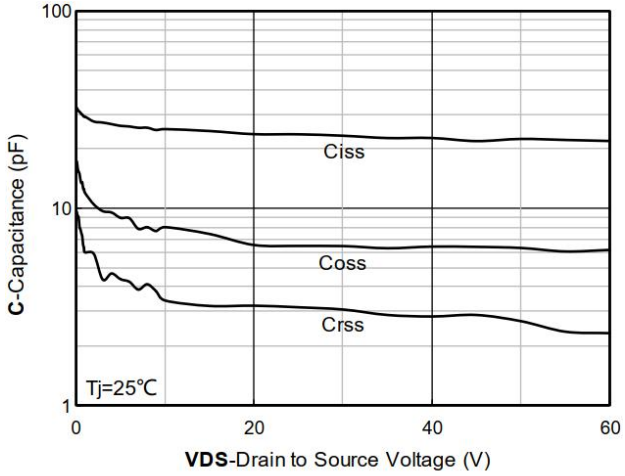


Figure 3. Capacitance Characteristics

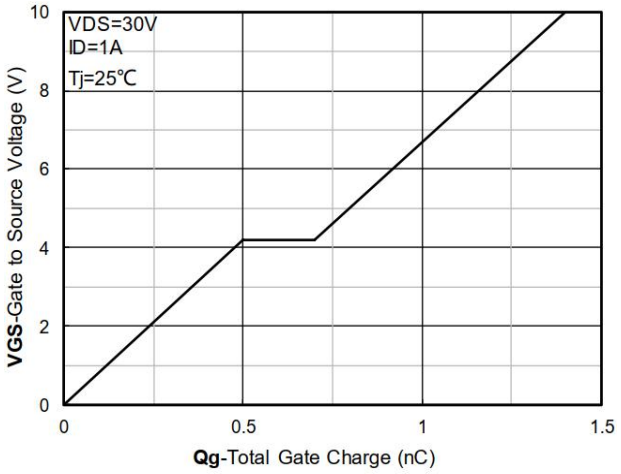


Figure 4. Gate Charge

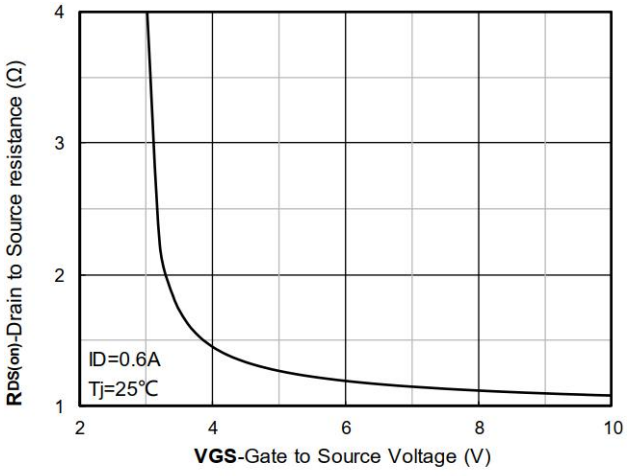


Figure 5. On-Resistance vs Gate to Source Voltage

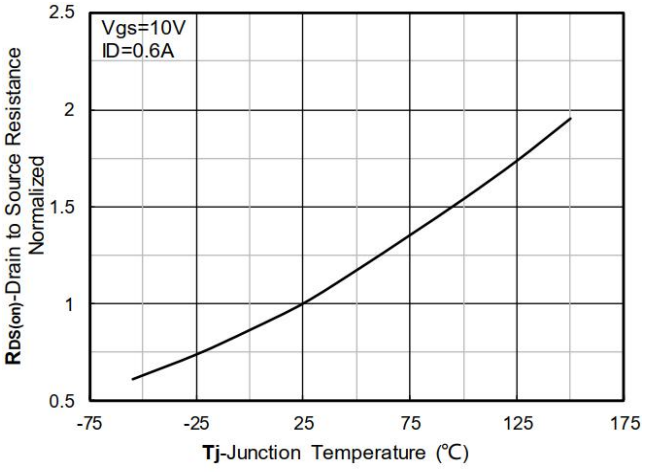


Figure 6. Normalized On-Resistance

Typical Characteristics

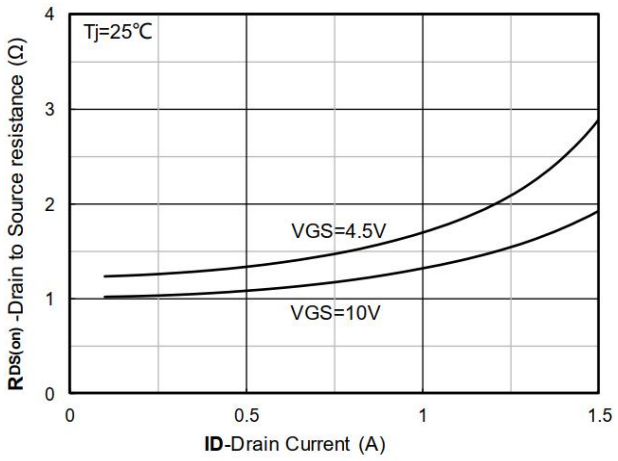


Figure 7. $R_{DS(on)}$ VS Drain Current

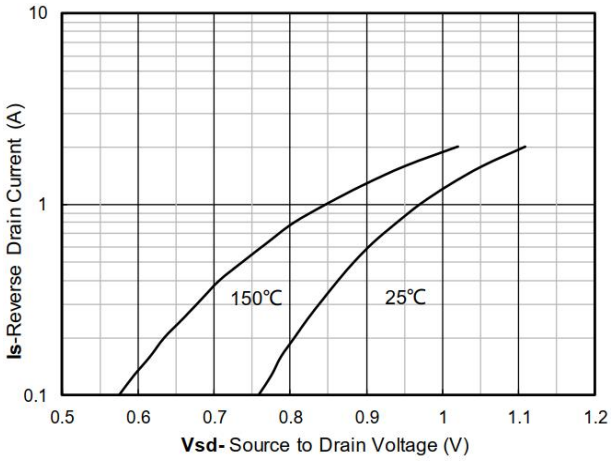


Figure 8. Forward characteristics of reverse diode

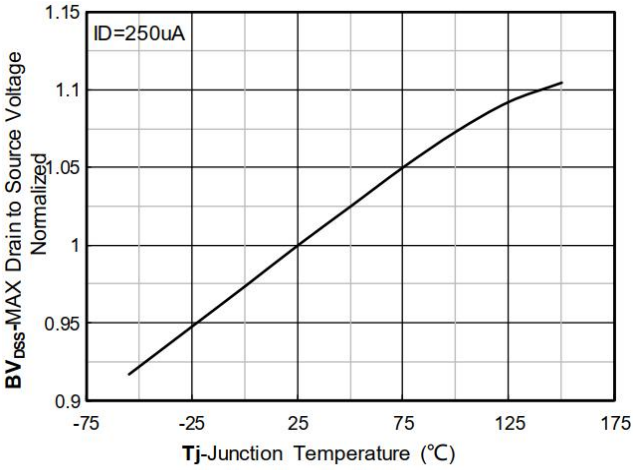


Figure 9. Normalized breakdown voltage

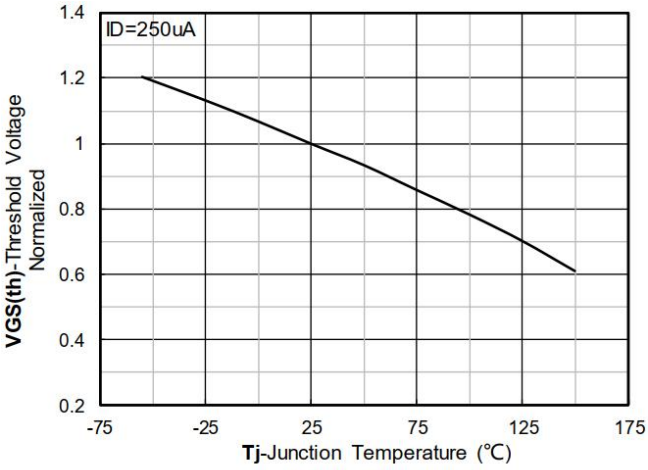


Figure 10. Normalized Threshold voltage

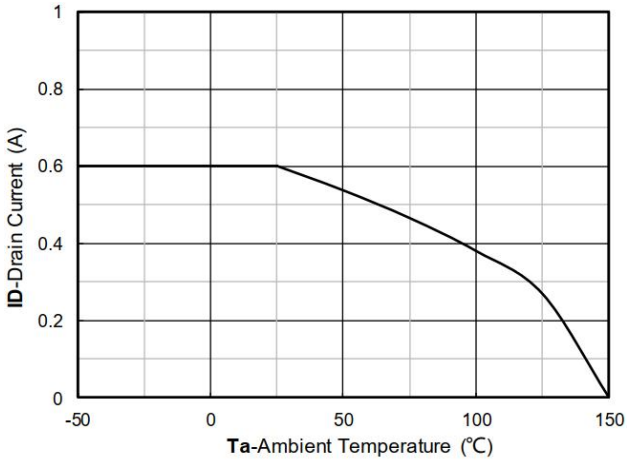


Figure 11. Current dissipation

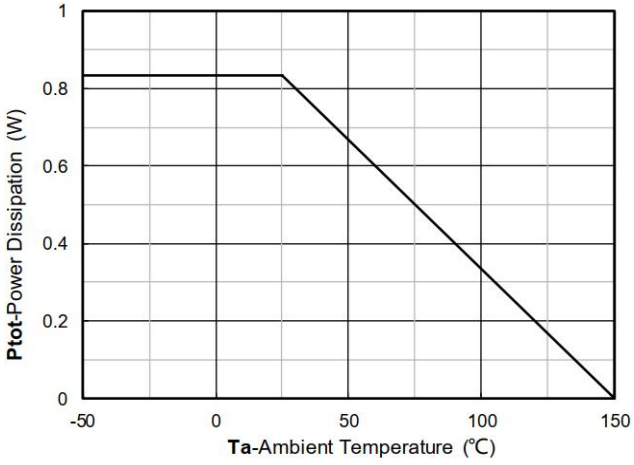


Figure 12. Power dissipation

Typical Characteristics

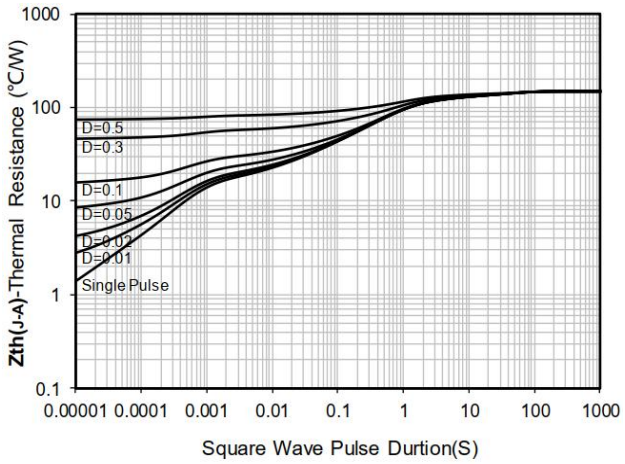


Figure 13. Maximum Transient Thermal Impedance

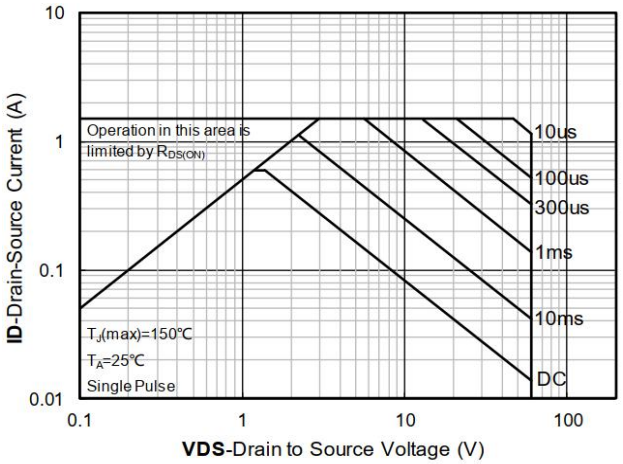
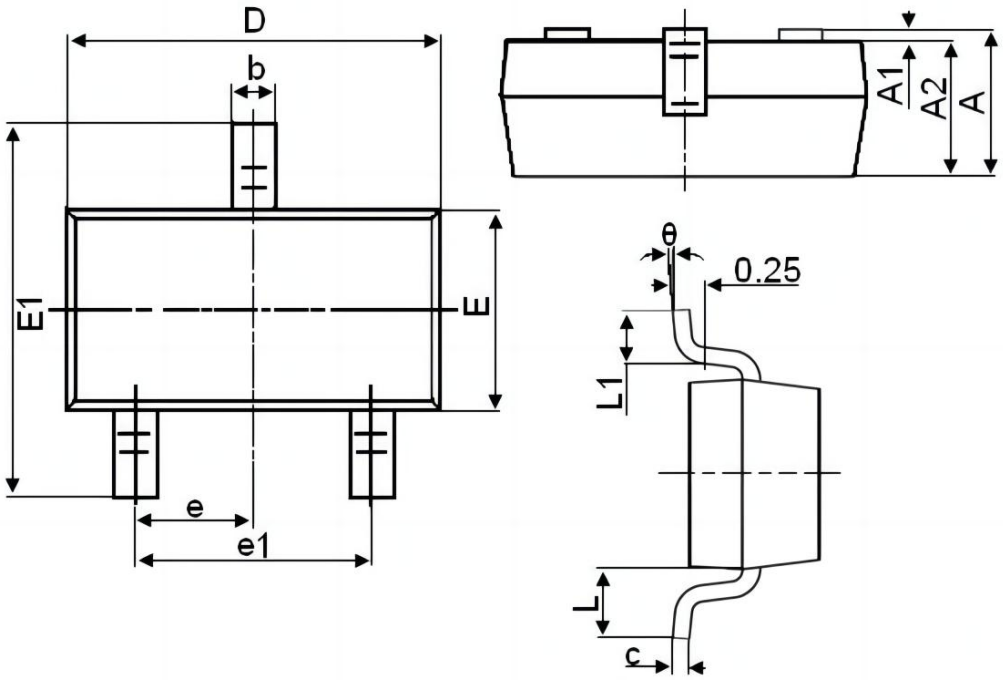


Figure 14. Safe Operation Area

SOT-23 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 REF.		0.037 REF.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°