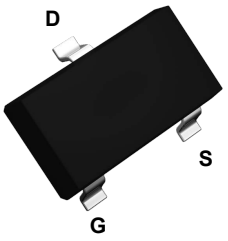
GOOD-ARK
SEMICONDUCTOR

BSS138

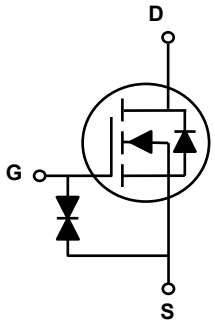
50V N-Channel MOSFET

Main Product Characteristics

BV_{DSS}	50V
$R_{DS(ON)}$	3.5Ω @ 10V (Max.)
	6Ω @ 4.5V (Max.)
I_D	0.28A



SOT-23



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

Description

The BSS138 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supplies and a wide variety of other applications.

Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	50	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_A=25°C)	I_D	0.28	A
Drain Current-Continuous (T_A=70°C)		0.23	
Drain Current-Pulsed (T_A=25°C)[1]	I_{DM}	1.12	A
Power Dissipation (T_A=25°C)	P_D	0.44	W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	350	°C/W
Operating Junction Temperature Range	T_J	-50 To +175	°C
Storage Temperature Range	T_{STG}	-50 To +175	°C

Electrical Characteristics (T_J=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On / Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250uA	50	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=50V, V_{GS}=0V, T_A=25°C	-	-	1	uA
Zero Gate Voltage Drain Current		V_{DS}=40V, V_{GS}=0V, T_A=125°C	-	-	100	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±10	uA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250uA	0.8	-	1.5	V
Drain-Source On-State Resistance[2]	$R_{DS(ON)}$	V_{GS}=10V, I_D=0.22A	-	-	3.5	Ω
		V_{GS}=4.5V, I_D=0.22A	-	-	6	Ω
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	V_{DS}=10V, V_{GS}=10V, I_D=0.25A	-	1.5	-	nC
Gate-Source Charge	Q_{gs}		-	0.31	-	
Gate-Drain Charge	Q_{gd}		-	0.44	-	
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=30V, V_{GS}=10V, R_G=3.3Ω, I_D=0.3A	-	4.0	-	nS
Rise Time	t_r		-	2.7	-	
Turn-Off Delay Time	$t_{d(off)}$		-	9.4	-	
Fall Time	t_f		-	33	-	
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, F=1MHz	-	30	-	pF
Output Capacitance	C_{oss}		-	6.1	-	
Reverse Transfer Capacitance	C_{rss}		-	3.1	-	
Source-Drain Ratings and Characteristics						
Source Drain Current (Body Diode)	I_{SD}	T_A=25°C	-	-	0.28	A
Diode Forward Voltage[2]	V_{SD}	V_{GS}=0V, I_{SD}=0.2A, T_J=25°C	-	0.88	1.3	V
Reverse Recovery Time	T_{rr}	I_F=0.5A, V_R=10V dI/dt=100A/us,	-	8.2	-	nS
Reverse Recovery Charge	Q_{rr}		-	3.2	-	nC

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. Pulse test: Pulse width ≤300us, duty cycle ≤2%.

Typical Electrical and Thermal Characteristic Curves

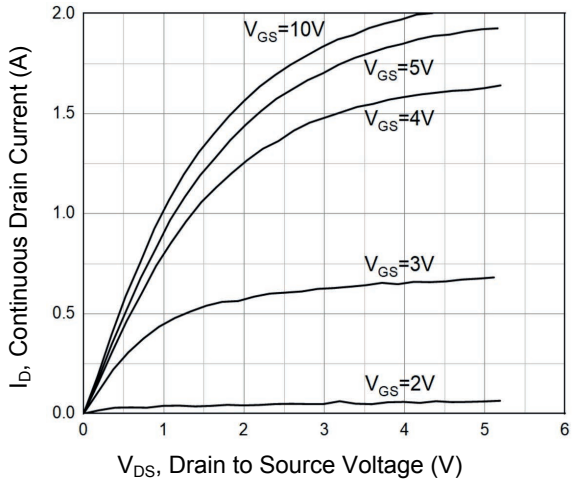


Figure 1. Typical Output Characteristics

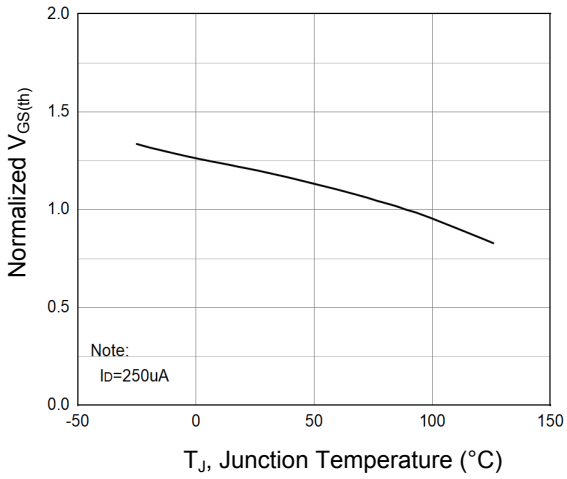


Figure 2. Normalized Threshold Voltage vs. T_J

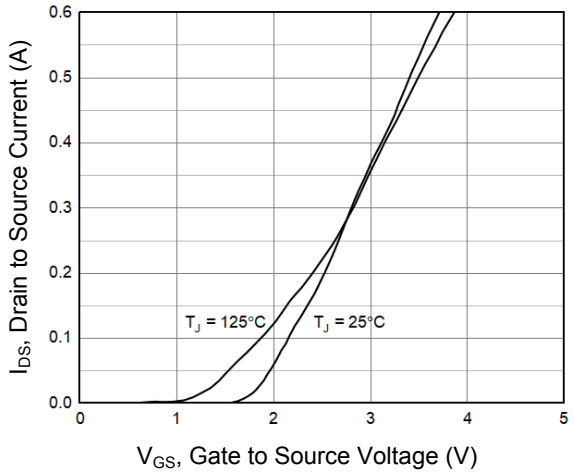


Figure 3. Typical Transfer Characteristics

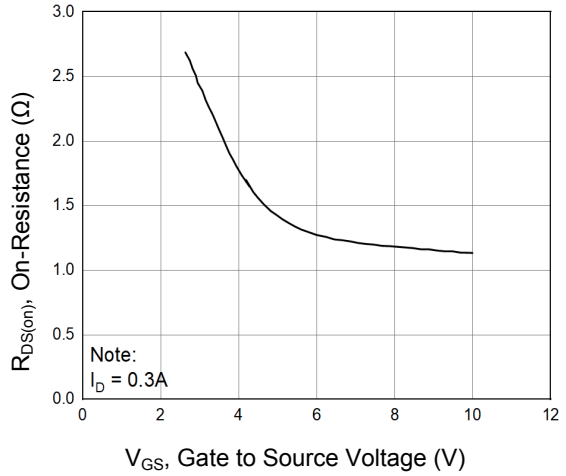


Figure 4. $R_{DS(on)}$ vs. V_{GS}

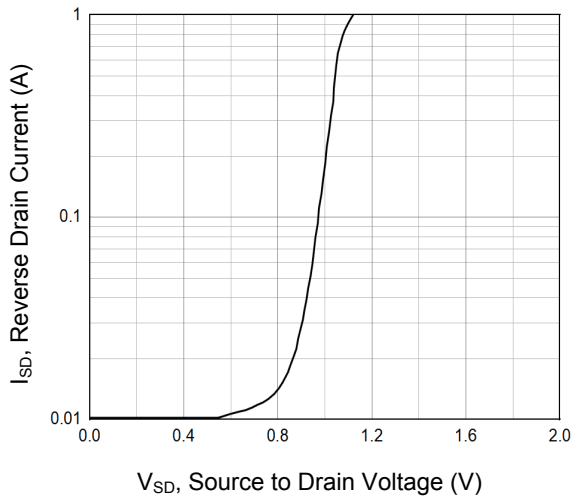


Figure 5. Typical Source-Drain Diode Forward Voltage

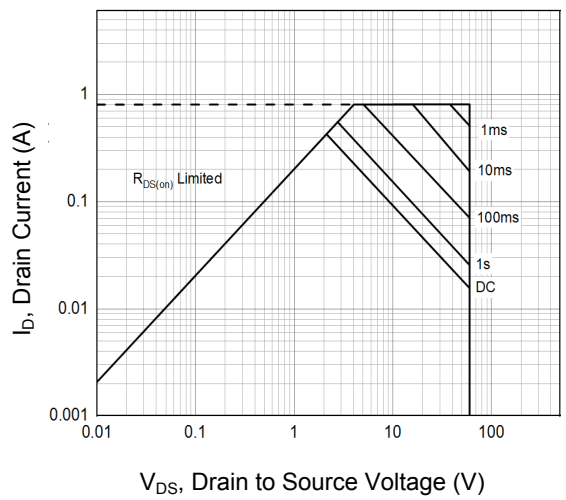


Figure 6. Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

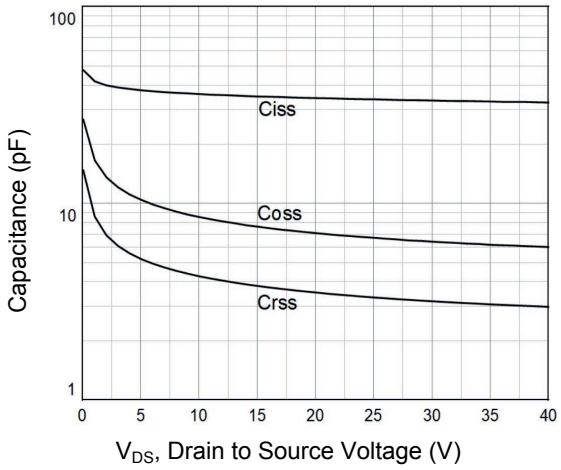


Figure 7. Capacitance Characteristics

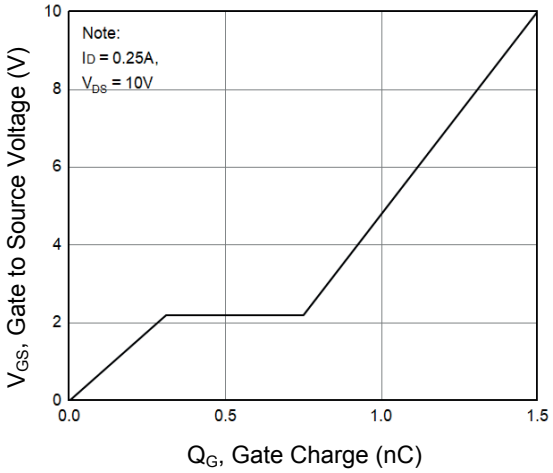


Figure 8. Gate Charge Characteristics

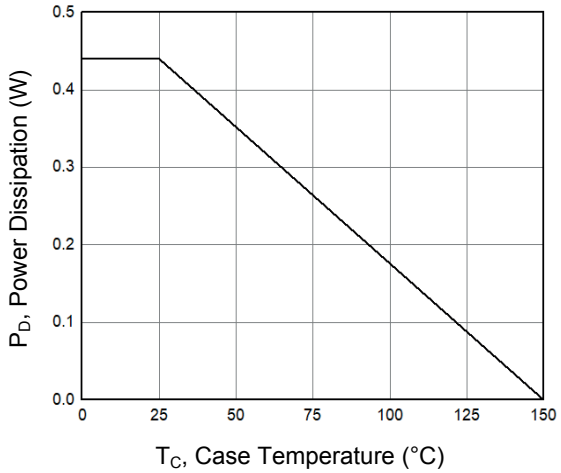


Figure 9. Power Dissipation vs. T_C

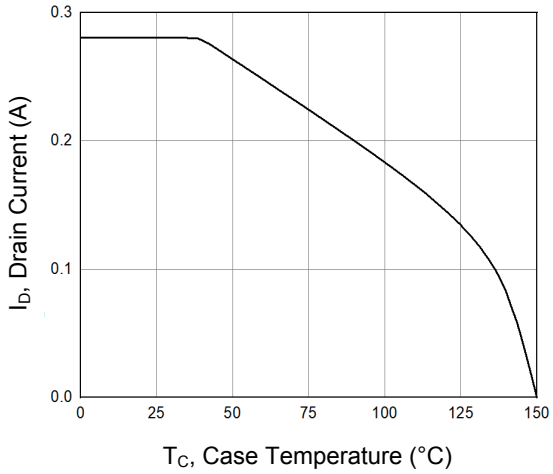
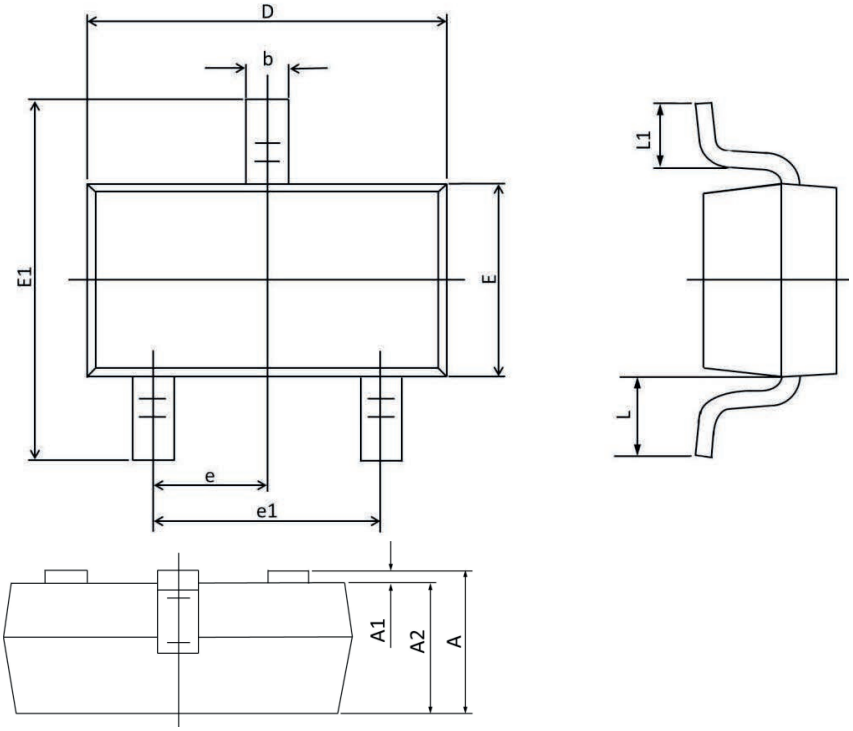


Figure 10. Drain Current vs. T_C

Package Outline Dimensions (SOT-23)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.200	0.035	0.047
A1	0.000	0.100	0.000	0.004
A2	0.900	1.150	0.035	0.045
b	0.300	0.500	0.012	0.020
D	2.800	3.040	0.110	0.120
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.95 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.55 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020

Order Information

Device	Package	Marking	Packaging	SPQ
BSS138	SOT-23	S138	Tape & Reel	3,000 Pcs / Reel