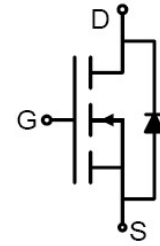


BSS138

N-Channel Enhancement Mosfet

Feature

- 50V,340mA
 $R_{DS(on)} < 2.5 \Omega @ V_{GS}=10V$
 $R_{DS(on)} < 3.0 \Omega @ V_{GS}=4.5V$
- Advanced Trench Technology
- Lead free product is acquired
- Fast Switching Speed
- Low Input/Output Leakage



Schematic Diagram

Application

- Battery operated systems
- Solid-state relays
- Direct logic-level interface



SOT-23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
SS.	BSS138	Sot-23	7 inch	-	3000

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	50	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_a = 25^\circ\text{C}$)	I_D	340	mA
Continuous Drain Current ($T_a = 70^\circ\text{C}$)	I_D	272	mA
Pulsed Drain Current	I_{DM}	1.5	A
Power Dissipation	P_D	0.35	W
Thermal Resistance from Junction to Ambient ⁽⁴⁾	$R_{\theta JA}$	357	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	50	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 50V, V_{GS} = 0V$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage ⁽³⁾	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.8	1.2	1.6	V
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 0.3A$	-	1.1	2.5	Ω
		$V_{GS} = 4.5V, I_D = 0.2A$	-	1.2	3.0	
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1MHz$	-	28.5	-	pF
Output Capacitance	C_{oss}		-	2.7	-	
Reverse Transfer Capacitance	C_{rss}		-	1.78	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 25V, I_D = 0.3A,$ $V_{GS} = 10V, R_G = 6\Omega$	-	2.6	-	ns
Turn-on rise time	t_r		-	18.8	-	
Turn-off delay time	$t_{d(off)}$		-	9.7	-	
Turn-off fall time	t_f		-	47	-	
Total Gate Charge	Q_g	$V_{DS} = 25V, I_D = 0.3A,$ $V_{GS} = 10V$	-	1.7	-	nC
Gate-Source Charge	Q_{gs}		-	0.4	-	
Gate-Drain Charge	Q_{gd}		-	0.24	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V_{DS}	$V_{GS} = 0V, I_S = 0.3A$	-	-	1.2	V
Diode Forward current ⁽⁴⁾	I_S		-	-	340	mA
Reverse Recovery Time	Q_{rr}	$I_F = 0.3A, di_F/dt = -100A/\mu s$	-	2.65	-	nC
Reverse Recovery Charge	T_{rr}		-	12.2	-	ns

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. Surface Mounted on FR4 Board, $t \leq 10$ sec

Test Circuit

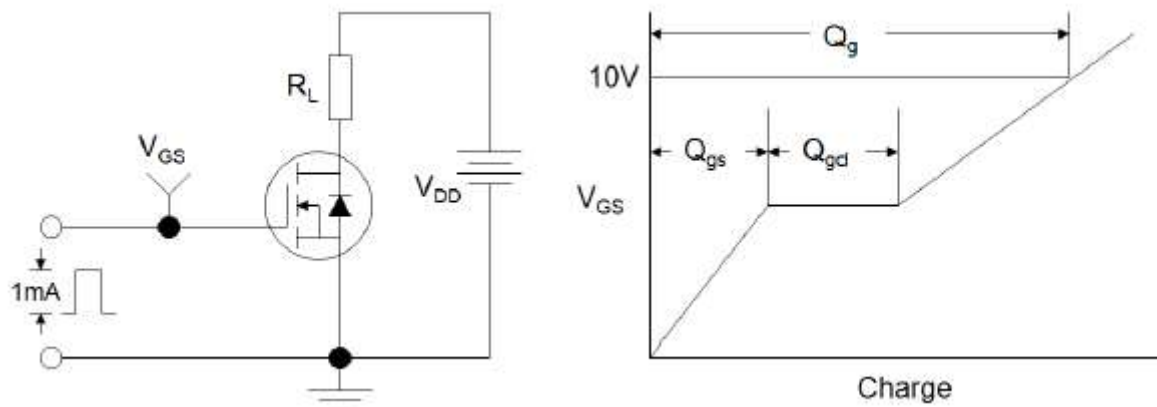


Figure1:Gate Charge Test Circuit & Waveform

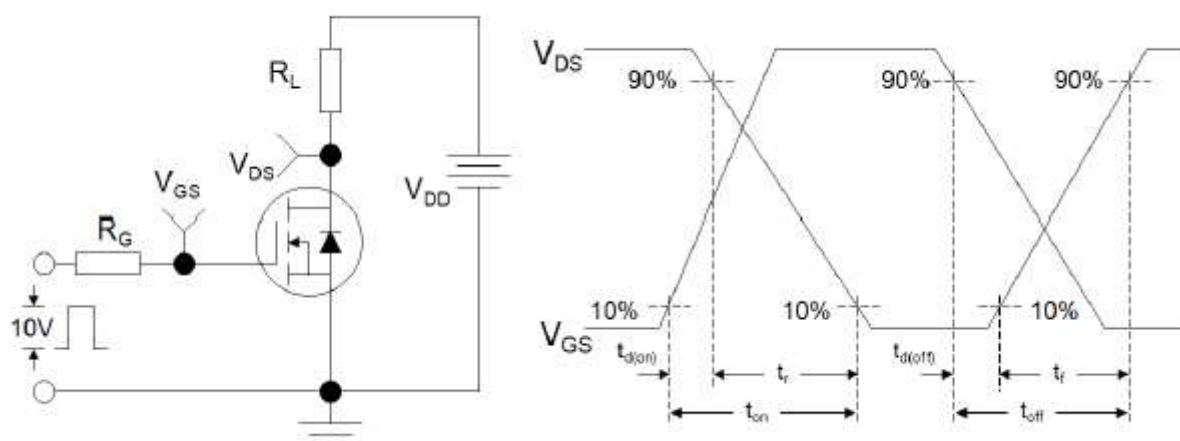


Figure 2: Resistive Switching Test Circuit & Waveforms

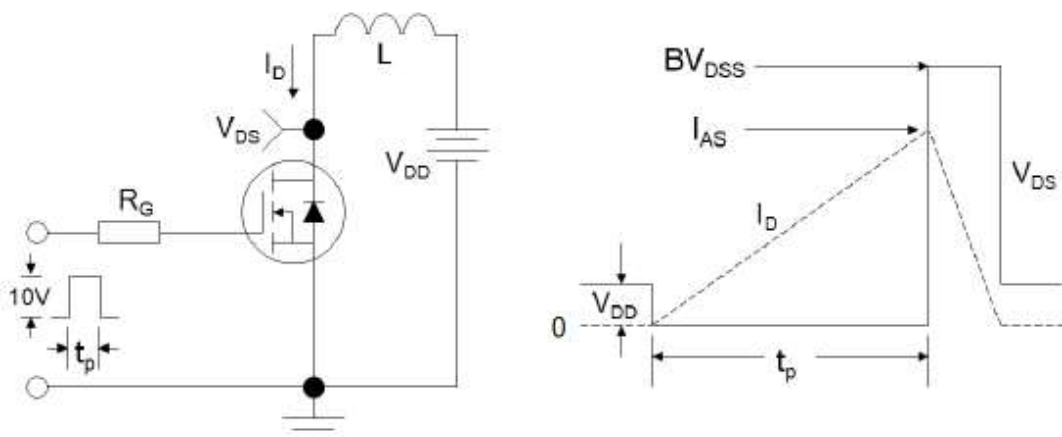


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

■ Typical Performance Characteristics

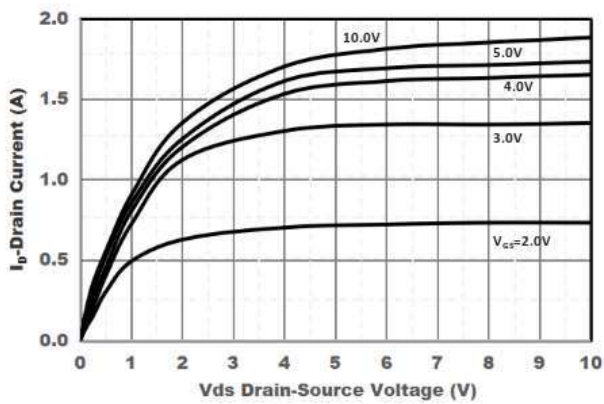


Figure1. Output Characteristics

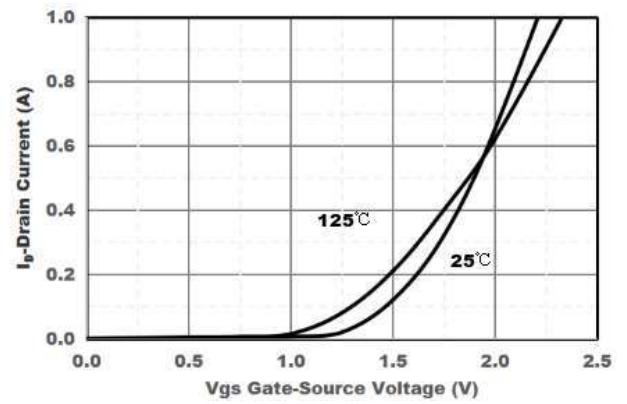


Figure2. Transfer Characteristics

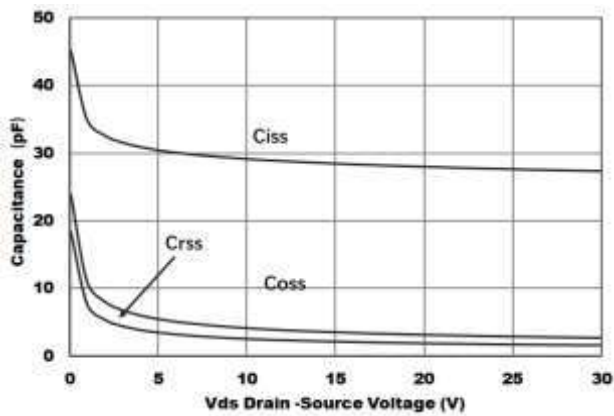


Figure3. Capacitance Characteristics

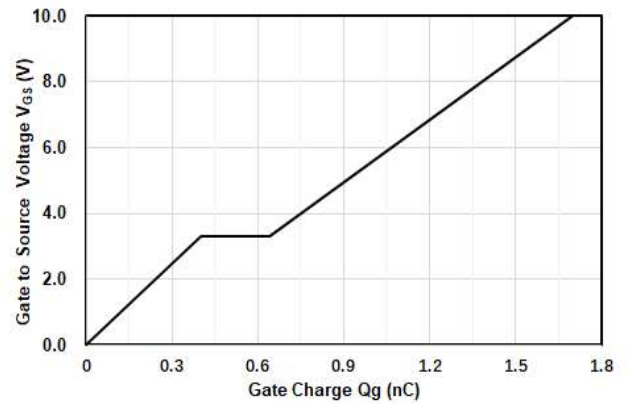


Figure4. Gate Charge

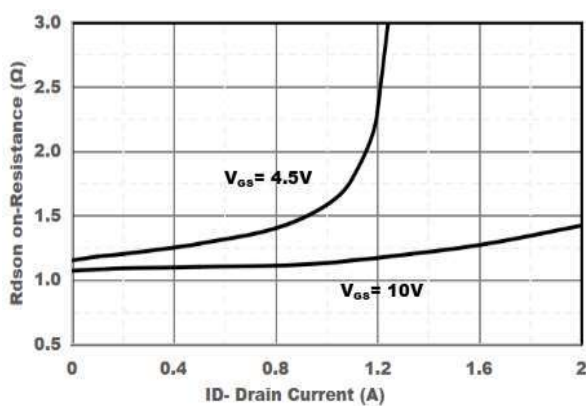


Figure5. Drain-Source on Resistance

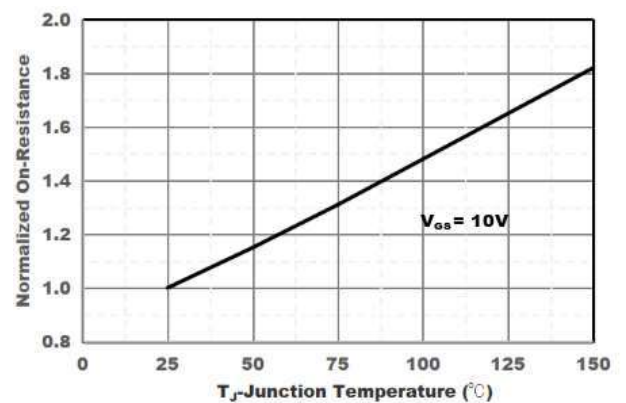


Figure6. Drain-Source on Resistance

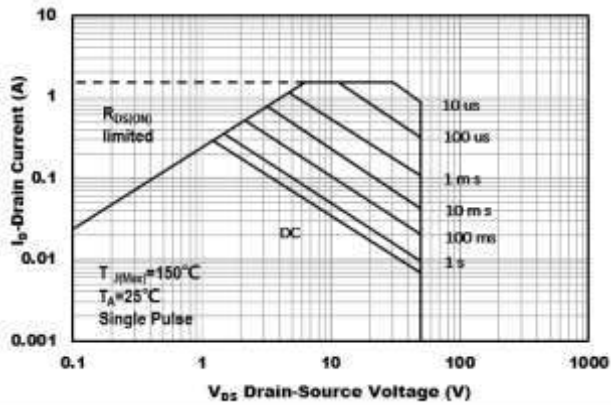


Figure7. Safe Operation Area

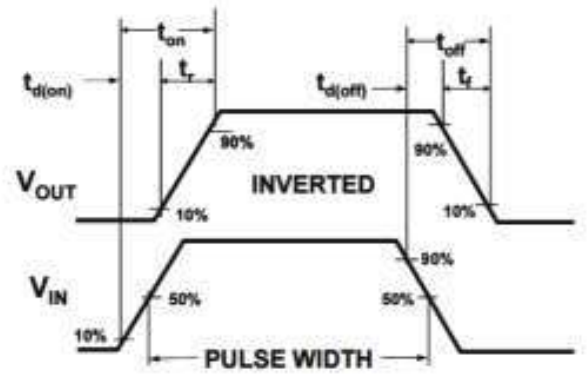
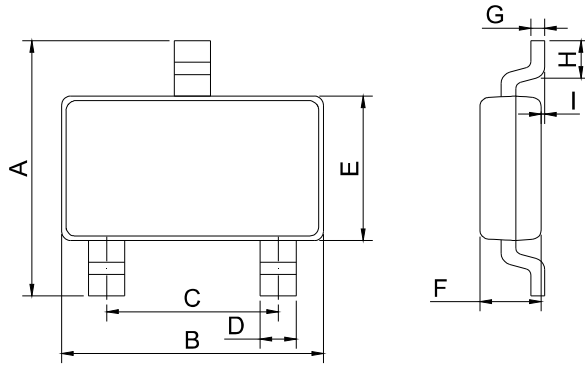


Figure8. Switching wave

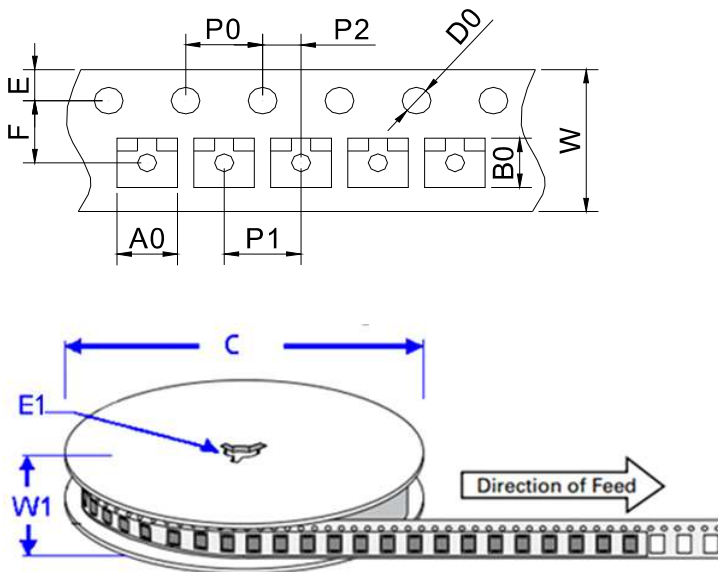
SOT-23 Package Information



SOT-23

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.30	2.40	2.50	0.091	0.095	0.098
B	2.80	2.90	3.00	0.110	0.114	0.118
C	1.90 REF			0.075 REF		
D	0.35	0.40	0.45	0.014	0.016	0.018
E	1.20	1.30	1.40	0.047	0.051	0.055
F	0.90	1.00	1.10	0.035	0.039	0.043
G		0.10	0.15		0.004	0.006
H	0.20			0.008		
I	0		0.10	0		0.004

Package Information-SOT-23



Ref.	Dimensions	
	Millimeters	Inches
A0	3.15 ± 0.3	0.124 ± 0.012
B0	2.77 ± 0.3	0.109 ± 0.012
C	178	7.0
D0	1.50±0.1	0.059 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3±0.3	0.524± 0.012
F	3.5 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.00 ± 0.2	0.315 ± 0.008
W1	11.5±1.0	0.453 ± 0.039