

BSS138W

60V N-Channel Enhancement Mode MOSFET

1. Description

This 60V N-channel MOSFET is based on MDD's unique device design to achieve low $R_{DS(on)}$ and fast switching and good ESD rating performance.

2. Features

- $V_{DS}=60V$, $I_D=0.3A$, $R_{DS(on)typ}=1.8\Omega$ @ $V_{GS}=10V$
- Exceptional on-resistance and maximum DC current capability
- JESD22-A114-B ESD rating of class 2 per human body model.

3. Application

- Load Switch for Portable Devices
- Battery Powered System
- DC-DC converter
- LCD Display inverter

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

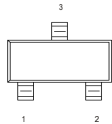
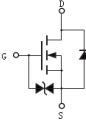
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Note 1)	I_D	0.3	A
Pulsed Drain Current (Note 1)	I_{DM}	1.2	A
Thermal Resistance, Junction-Ambient (Note 2)	$R_{\theta JA}$	500	$^{\circ}C/W$
Power Dissipation	P_D	0.3	W
Junction Temperature	T_J	$-55 \sim +150$	$^{\circ}C$
Storage Temperature	T_{stg}	$-55 \sim +150$	$^{\circ}C$

- Stresses exceeding Maximum Ratings may damage the device.
- Maximum Ratings are stress ratings only.
- Functional operation above the Recommended Operating Conditions is not implied.
- Extended exposure to stresses above the recommended Operating Conditions may affect device reliability

Notes: 1.Pulse width limited by maximum allowable junction temperature

2.Surface Mounted on FR-4 Board

5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
1	G	Gate			BK	SOT-323
2	S	Source				
3	D	Drain				

6. $T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter		Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		$V_{GS}=0V, I_D=250\mu A$	60	—	—	V
I_{SS}	Gate-Source Leakage Current	Forward	$V_{GS}=20V$	—	—	10	μA
		Reverse	$V_{GS}=-20V$	—	—	-10	μA
I_{DSS}	Drain-Source Leakage Current		$V_{DS}=60V, V_{GS}=0V$	—	—	1	μA
$V_{GS(TH)}$	Gate Threshold Voltage		$V_{DS}=V_{GS}, I_D=250\mu A$	0.7	1.0	1.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance		$V_{GS}=10V, I_D=0.3A$	—	1.8	2.2	Ω
			$V_{GS}=4.5V, I_D=0.2A$	—	2.0	3.0	Ω

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=30V$ $f=1.0MHz$	—	25	—	pF
C_{oss}	Output Capacitance		—	7	—	pF
C_{rss}	Reverse Transfer Capacitance		—	3	—	pF
Q_g	Total Gate Charge	$V_{GS}=4.5V$ $V_{DS}=30V$ $I_D=0.3A$	—	1.8	—	nC
Q_{gs}	Gate Source Charge		—	0.5	—	nC
Q_{gd}	Gate Drain Charge		—	0.3	—	nC

8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	$V_{GS}=10V$ $V_{DS}=30V$ $I_D=0.3A$ $R_G=2.3\Omega$	—	4	—	ns
t_r	Turn on Rise Time		—	16	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	7	—	ns
t_f	Turn Off Fall Time		—	23	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$I_S=0.3A, V_{GS}=0V$	—	0.8	1.2	V
I_{SD}	Source drain current(Body Diode)	$T_A=25^{\circ}\text{C}$	—	—	0.3	A

10. Test Circuits And Waveforms

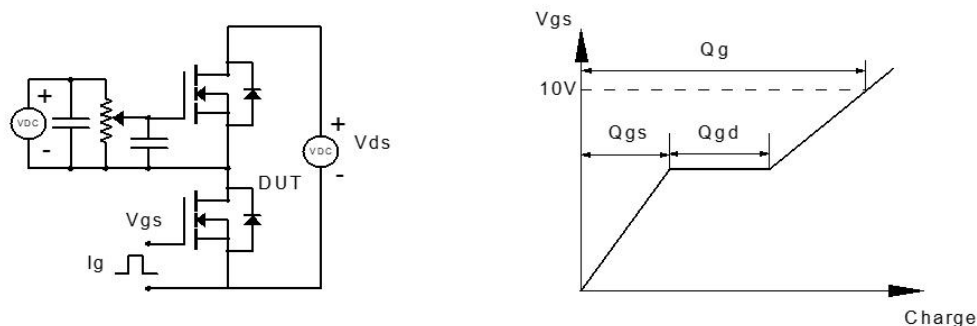


Figure 1. Gate Charge test Circuit

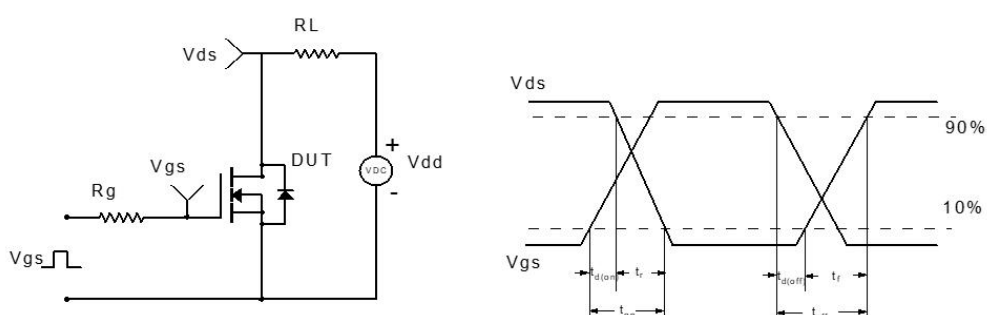


Figure 2. Switching time test circuit & waveforms

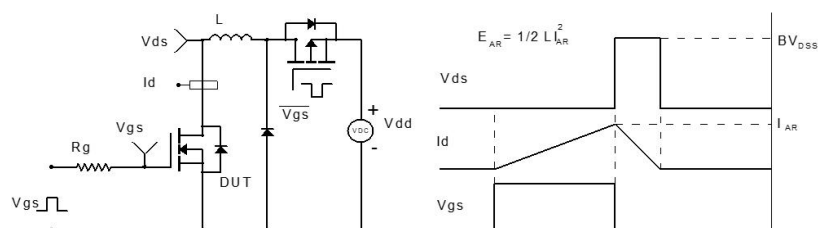


Figure 3. Unclamped Inductive Switching Test Circuit & Waveform

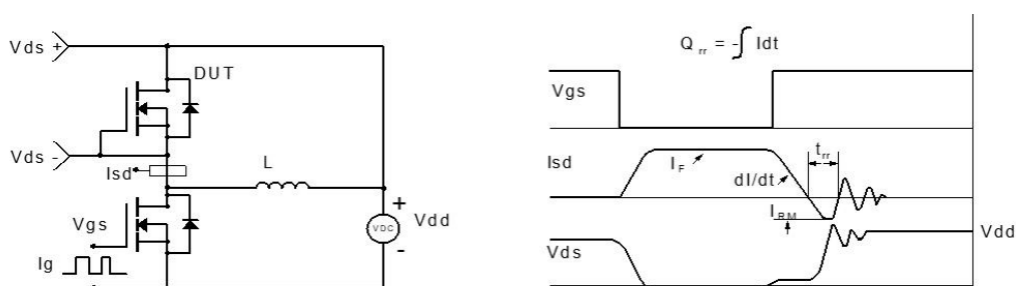


Figure 4 : Diode Recovery Test Circuit & Waveform

The curve above is for reference only.

11. Electrical Characteristics Diagrams

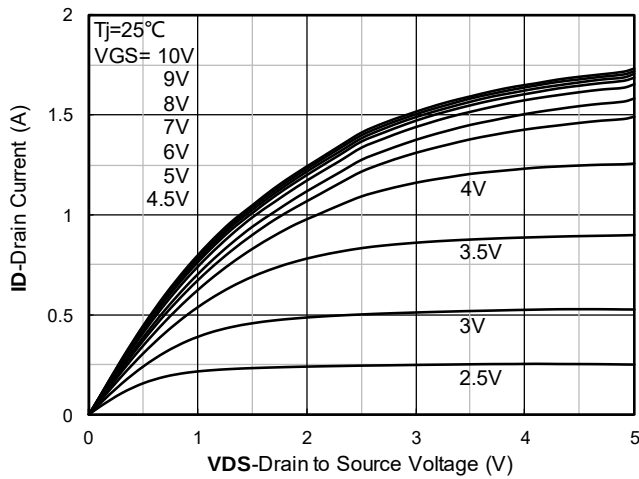


Figure 1. Output Characteristics

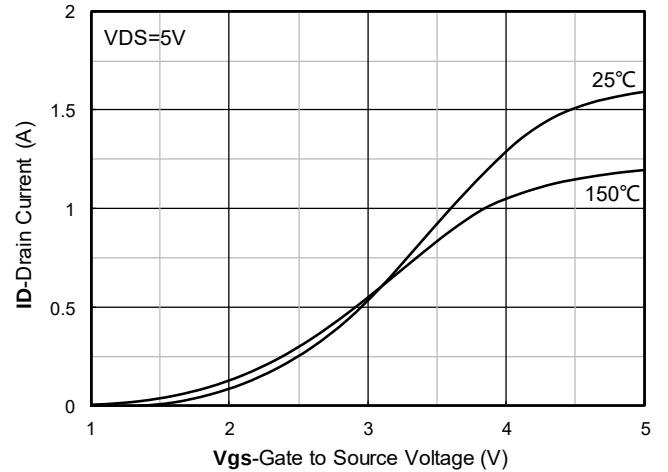


Figure 2. Transfer Characteristics

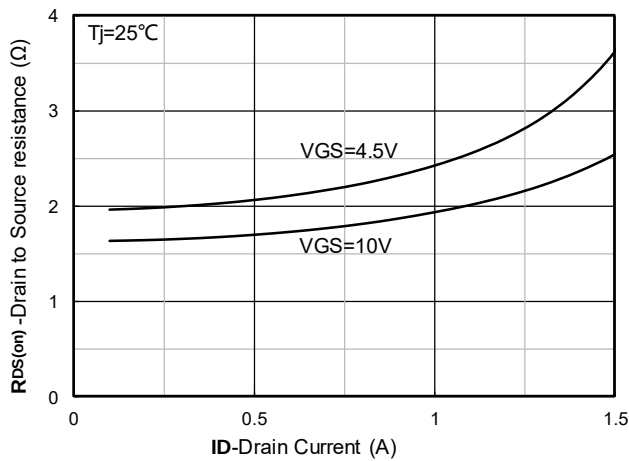


Figure 3. RDS(on) VS Drain Current

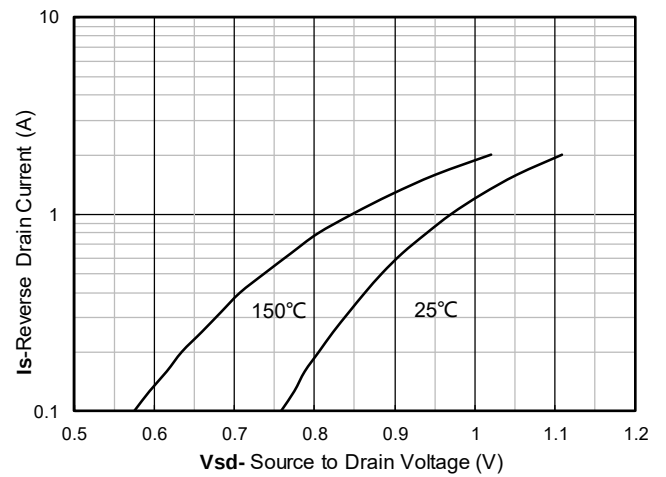


Figure 4. Forward characteristics of reverse diode

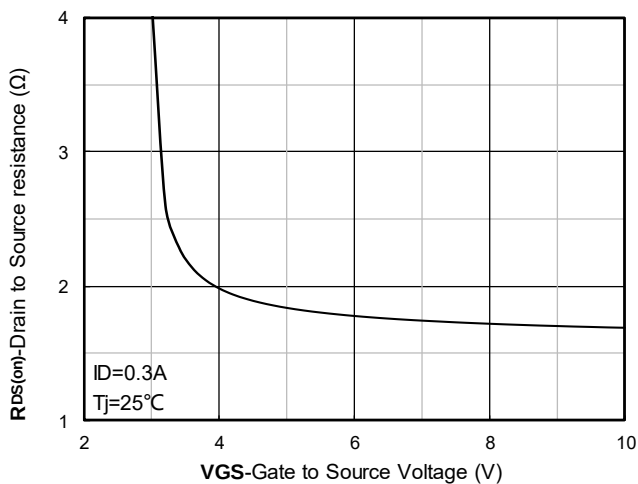


Figure 5. On-Resistance vs Gate to Source Voltage

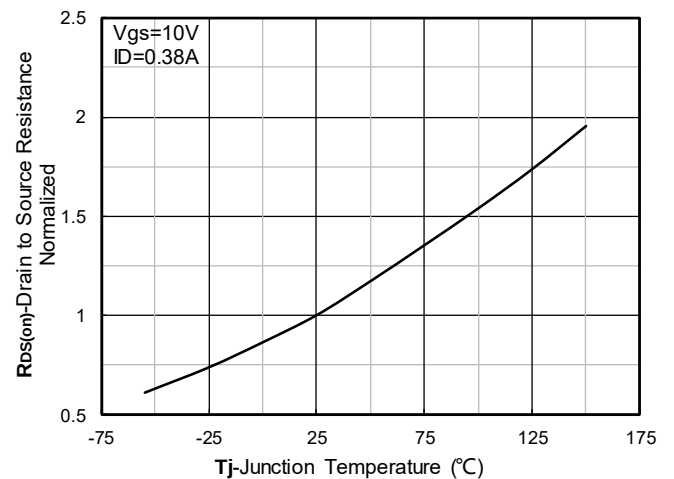
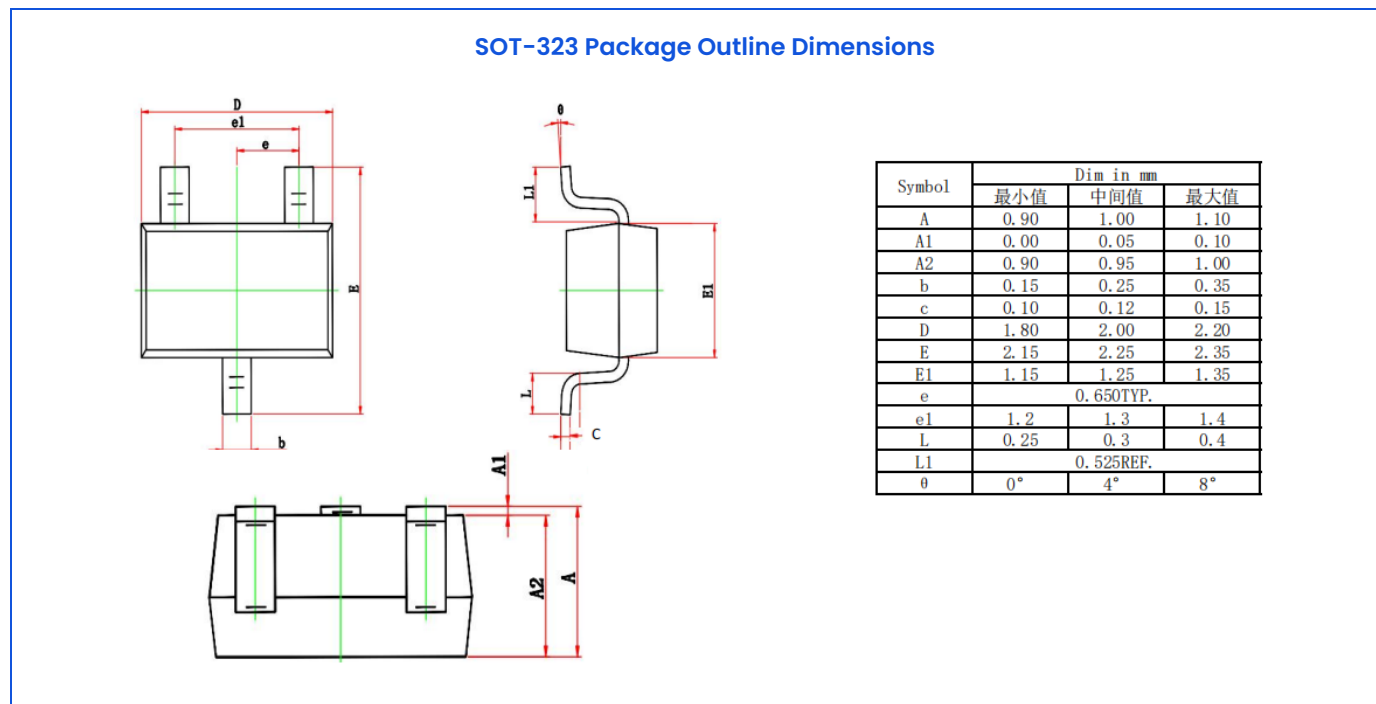


Figure 6. Normalized On-Resistance

12. Outline Drawing



13. Important Notice and Disclaimer

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