



General Description

This MOSFET has been designed to minimize the Drain-source on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

Features

- Low $R_{DS(ON)}$ & FOM
- Low Input Capacitance
- Extremely low switching loss
- Excellent reliability and uniformity
- Fast switching and soft recovery
- ESD Protected up to 2kV



Applications

- Motor Control
- Power management
- Backlighting

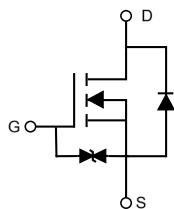
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	50	V
$R_{DS(ON), max} @ V_{GS}=10V$	1.4	Ω

Marking Information

Product Name	Package	Marking
BSS138K	SOT-23	138K

Package & Pin information



Absolute Maximum Ratings at $T_j=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	50	V
Gate-source voltage	V_{GS}	± 15	V
Continuous Drain Current	I_D	560	mA
Pulsed Drain Current ¹⁾	$I_{D,pulse}$	2.24	A
Power Dissipation	P_D	830	mW
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-ambient ²⁾	$R_{\theta JA}$	150	$^{\circ}\text{C/W}$

Electrical Characteristics at $T_j=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	50			V	$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	1.0		2.5	V	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$		1.0	1.4	Ω	$V_{GS}=10\text{ V}, I_D=220\text{ mA}$
			1.2	1.7	Ω	$V_{GS}=4.5\text{ V}, I_D=220\text{ mA}$
Gate-source leakage current	I_{GSS}			10	μA	$V_{GS}=15\text{ V}$
				-10		$V_{GS}=-15\text{ V}$
Drain-source leakage current	I_{DSS}			1	μA	$V_{DS}=50\text{ V}, V_{GS}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		25		pF	$V_{GS}=0\text{ V}$, $V_{DS}=30\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}		7		pF	
Reverse transfer capacitance	C_{rss}		3		pF	
Turn-on Delay Time	$t_{d(on)}$		4		ns	$V_{GS}=10\text{ V}$, $V_{DS}=30\text{ V}$, $R_G=2.3\ \Omega$, $I_D=1\text{ A}$
Turn-on Rise Time	t_r		19		ns	
Turn-Off Delay Time	$t_{d(off)}$		9		ns	
Turn-Off Fall Time	t_f		25		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total Gate Charge	Q_g		1.4		nC	$V_{GS}=10\text{ V}$, $V_{DS}=30\text{ V}$, $I_D=1\text{ A}$
Gate-Source Charge	Q_{gs}		0.5		nC	
Gate-Drain Charge	Q_{gd}		0.2		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Source drain current (Body Diode)	I_{SD}			560	mA	$T_A=25^\circ\text{C}$
Diode forward voltage ²⁾	V_{SD}			1.3	V	$I_S=220\text{ mA}$, $V_{GS}=0\text{ V}$

Note: 1) Pulse width limited by maximum allowable junction temperature.

2) Repetitive Rating: Pulse width limited by maximum junction temperature.

Electrical Characteristics Diagrams

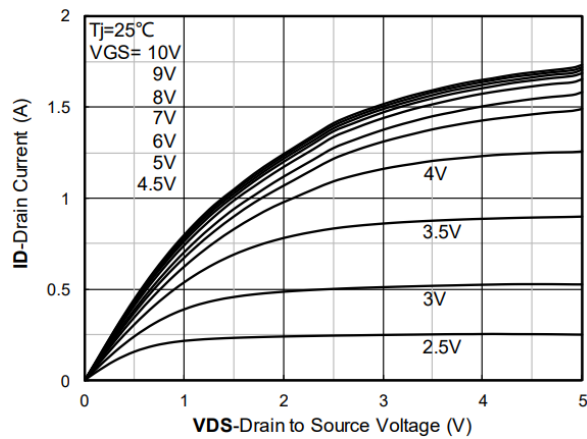


Figure 1. Output characteristics

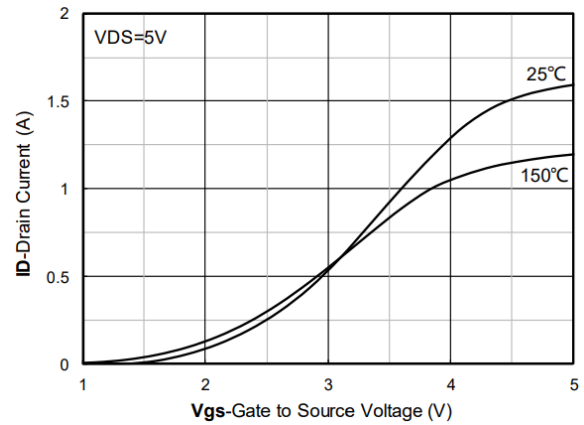


Figure 2. Transfer characteristics

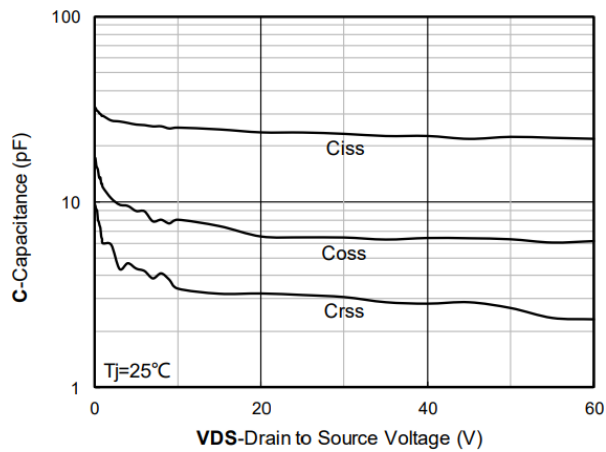


Figure 3. Capacitances

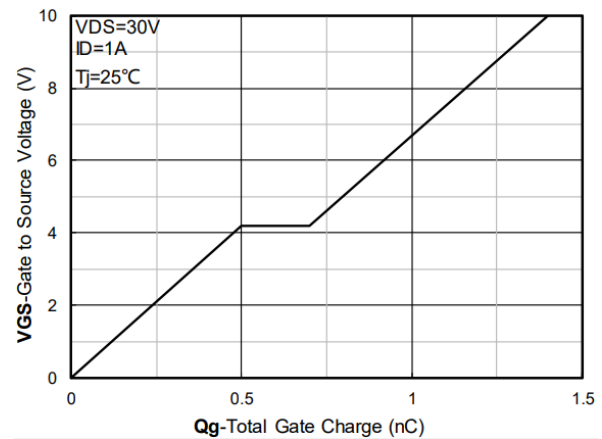


Figure 4. Gate charge

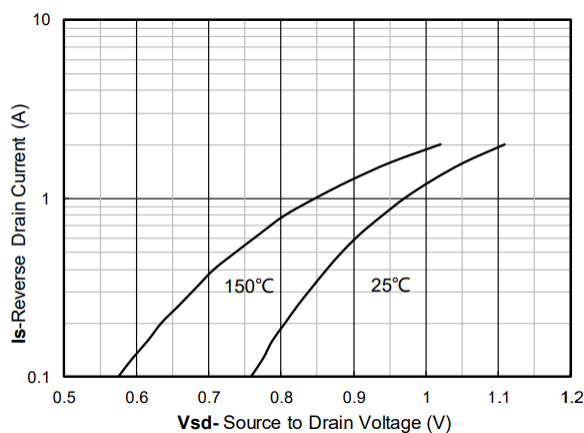


Figure 5. Body-diode characteristics

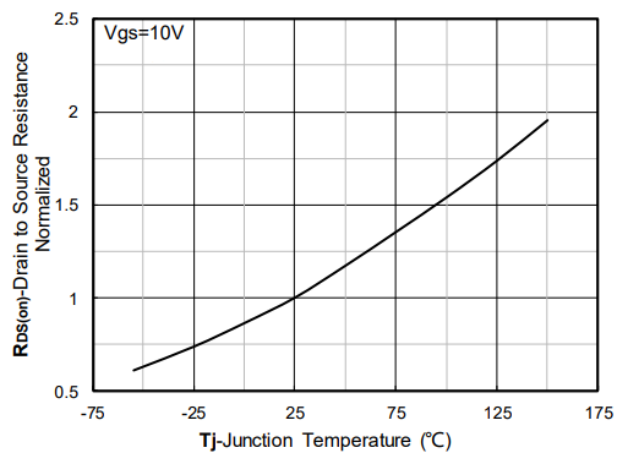
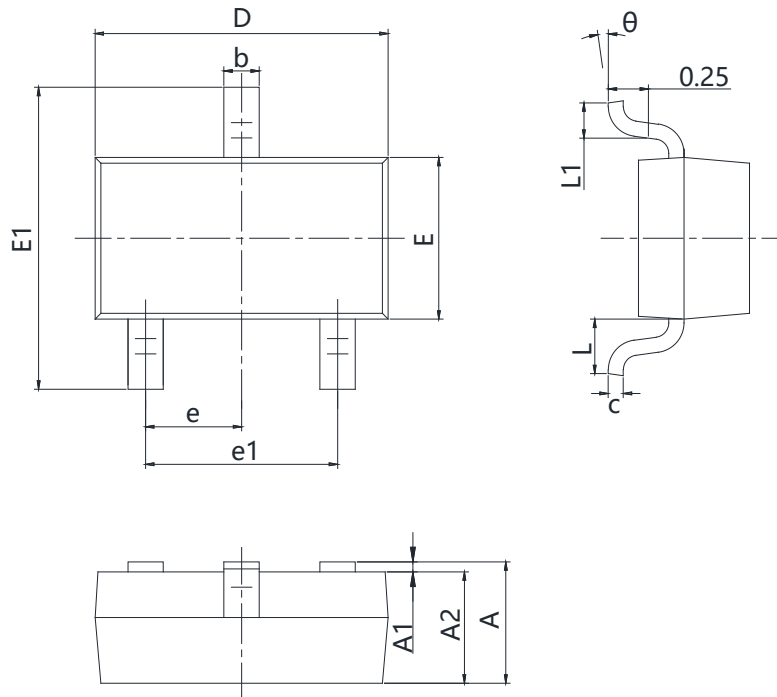


Figure 6. RDS(ON) vs junction temperature

Package Information



Symbol	mm	
	Min	Max
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	0.280	3.000
E	1.200	1.400
e	0.950 TYP	
e1	1.800	2.000
L	0.550 REF	
L1	0.300	0.500
θ	0°	8°

Version: SOT-23-V package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
SOT-23-V	3000	15	45000	4	180000

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