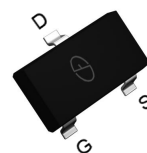


N-Channel 50V (D-S) Power MOSFET

Features

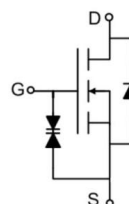
- 100% Avalanche Tested
- Halogen Free, Pb-Free
- RoHS Compliant



SOT-23

Applications

- Relay driver
- Switching circuits
- High-side load switch
- High-speed line driver



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
Drain Current, Continuous $V_{GS}=10\text{V}$	I_D	0.22	A
Drain Current, Pulsed (Note 1)	I_{DM}	0.88	A
Power Dissipation	P_D	0.43	W
Operating Junction/ Storage Temperature Range	T_J / T_{STG}	-55 to +150	$^\circ\text{C}$

Note 1: Single pulse; $t_p \leq 1\mu\text{s}$.

Thermal Characteristics

Parameter	Symbol	Max	Unit
Thermal Resistance Junction to Ambient (Note 2)	R_{thJA}	350	$^\circ\text{C/W}$

Note 2: Device mounted on 1 square inch FR4 PCB board, with 2oz single-sided copper, in a 25°C still air environment.

Electrical Characteristics (T_A =25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	50	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =50V, V _{GS} =0V	--	--	1	uA
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250uA	0.5	--	1.6	V
Gate Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	--	--	±10	uA
Drain-Source On-state Resistance (Note 3)	R _{DS(on)}	V _{GS} =10V, I _D =0.22A	--	--	3.5	Ω
		V _{GS} =4.5V, I _D =0.22A	--	--	6	
Total Gate Charge	Q _g	V _{GS(off)} =0V, V _{GS(on)} =10V, V _{DS} =25V, I _D =0.22A	--	1.7	--	nC
Gate-Source Charge	Q _{gs}		--	0.1	--	
Gate-Drain Charge	Q _{gd}		--	0.4	--	
Turn-on Delay Time	t _{d(on)}	V _{GS} =10V, V _{DD} =30V, R _G =6Ω, I _D =0.22A	--	2.6	--	ns
Turn-on Rise Time	t _r		--	9	--	
Turn-off Delay Time	t _{d(off)}		--	20	--	
Turn-off Fall Time	t _f		--	6	--	
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1MHz	--	30	--	pF
Output Capacitance	C _{oss}		--	15	--	
Reverse Transfer Capacitance	C _{rss}		--	6	--	

Reverse Diode Characteristics (T_A =25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Current, Continuous	I _{SD}	T _C =25°C	--	--	0.22	A
Diode Forward Voltage (Note 3)	V _{SD}	I _F =0.44A, V _{GS} =0V	--	--	1.4	V

Note 3: Pulse test; pulse width ≤ 380μs, duty cycle ≤ 1%.

Typical Characteristics Curves ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Fig.1 - Output Characteristics

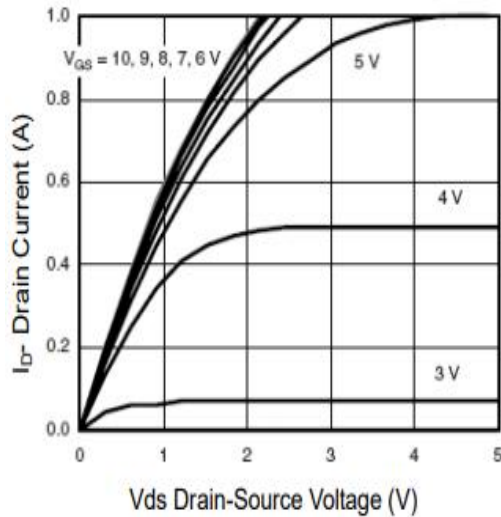


Fig.2 - Transfer Characteristics

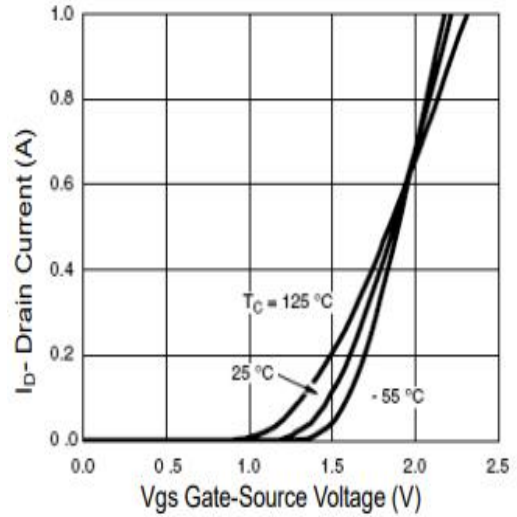


Fig.3 - Drain Current vs. On-Resistance

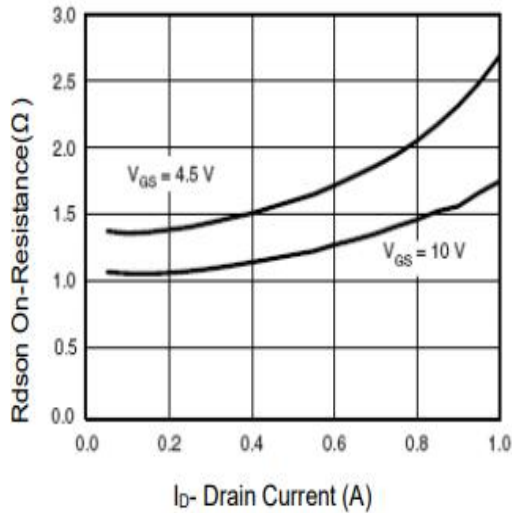


Fig.4 - Normalized On-Resistance

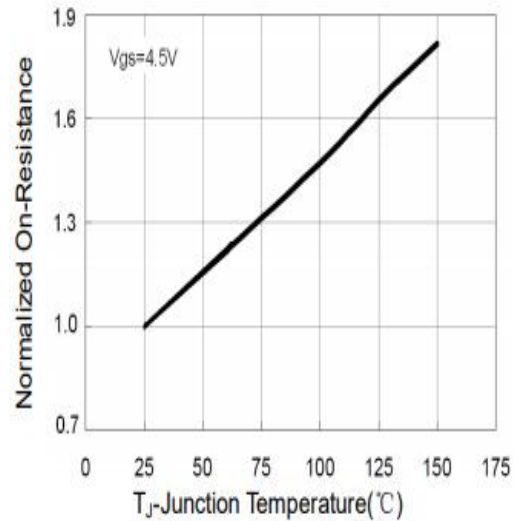


Fig.5 - Capacitance

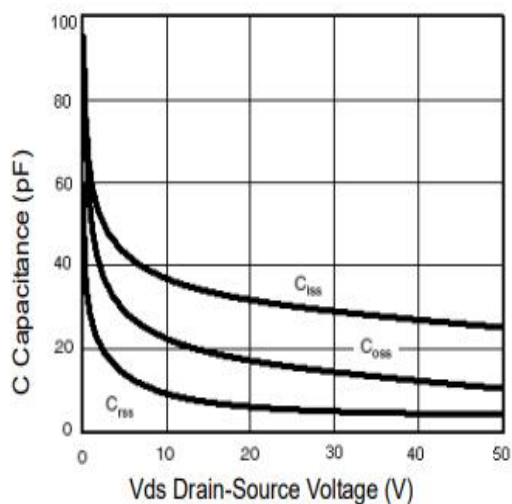
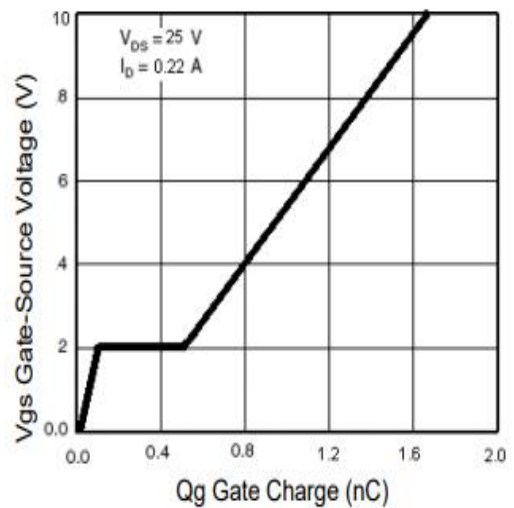
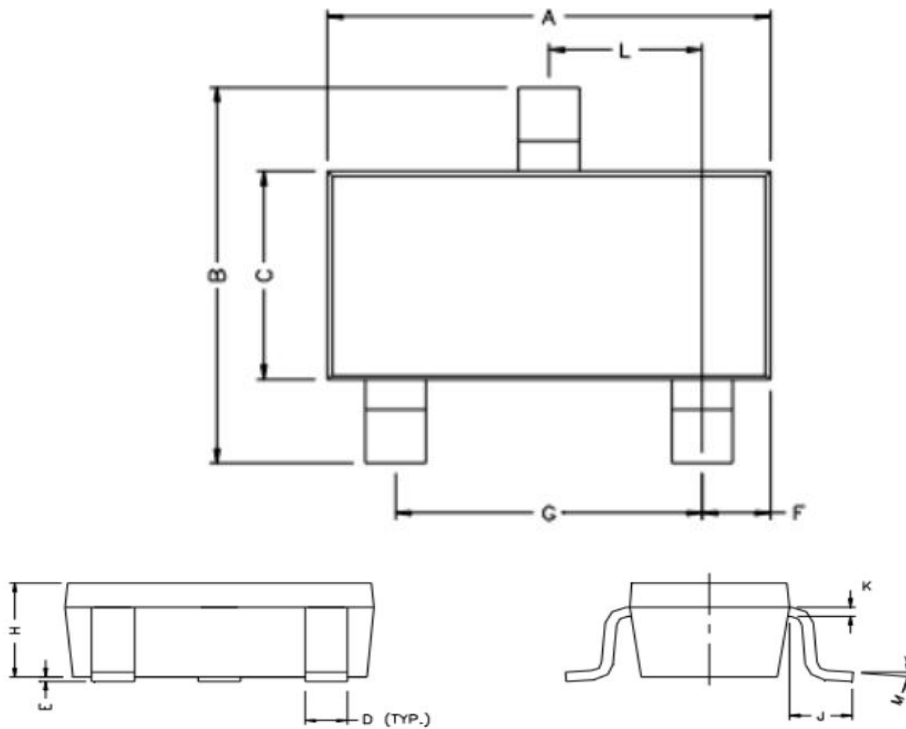


Fig.6 - Gate charge



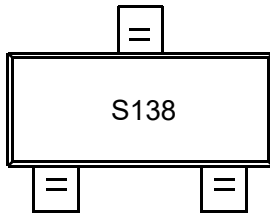
Package Outline Dimensions (Unit: millimeters)

SOT-23



REF.	Millimeter		REF.	Millimete	
	Min.	Max.		Min.	Max.
A	2.80	3.00	G	1.80	2.00
B	2.30	2.50	H	0.90	1.1
C	1.20	1.40	K	0.10	0.20
D	0.30	0.50	J	0.35	0.70
E	0	0.10	L	0.92	0.98
F	0.45	0.55	M	0°	10°

Marking Outline



Part Name: BSS138

1. P/N Mark: S138

Revision History

Version	Date	Major Changes
Rev.A	2025.08.04	Official Release

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