

• Product Summary

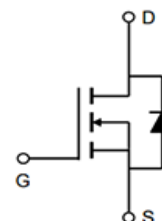
Part #	V_{DS}	$R_{DS(on).typ}$ (@ $V_{GS}=10V$)	$R_{DS(on).typ}$ (@ $V_{GS}=4.5V$)	I_D
BSS138W	50V	0.88Ω	1.5Ω	0.22A

• Features

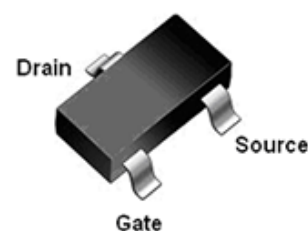
- High density cell design for extremely low $R_{DS(on)}$
- Rugged and Reliable

• Application

- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers; Display,
- Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays



N-Channel MOSFET



SOT-323



HF

• Ordering Information:

Part NO.	BSS138W
Marking	SS
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

• Absolute Maximum Ratings ($T_C=25^{\circ}C$)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	50	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	0.22	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	0.88	A
Maximum Power Dissipation	P_D	0.3	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$

• Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	417	$^{\circ}C/W$
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• Static Electrical Characteristics @ $T_J = 25^{\circ}\text{C}$ (unless otherwise stated)

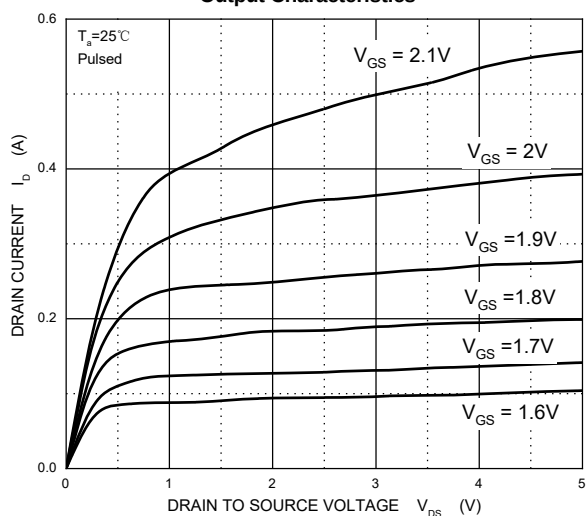
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250uA	50	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =50V V _{GS} =0V	--	--	0.5	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V V _{DS} =0V	--	--	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} I _D =1mA	0.8	--	1.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V I _D =0.22A	--	0.88	3.5	Ω
		V _{GS} =4.5V I _D =0.22A	--	1.5	6	Ω
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{ISS}	V _{DS} =25V V _{GS} =0V F=1.0MHz	--	27	--	PF
Output Capacitance	C _{OSS}		--	13	--	PF
Reverse Transfer Capacitance	C _{rss}		--	6	--	PF
Forward Transconductance	g _{FS}	V _{DS} = 10V, I _D =0.22A	0.12	--	--	mS
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V I _D =0.29A V _{GS} =5V R _G =6Ω,	--	--	5	nS
Turn-on Rise Time	t _r		--	--	18	nS
Turn-Off Delay Time	t _{d(off)}		--	--	36	nS
Turn-Off Fall Time	t _f		--	--	14	nS
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V I _S =0.44A	--	--	1.4	V

Notes:

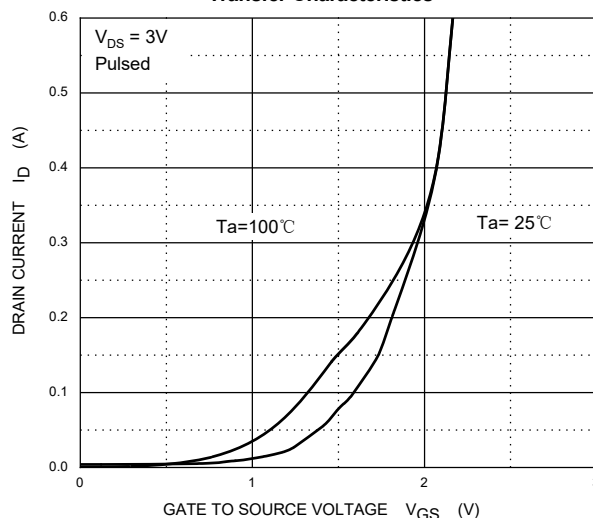
- ① Pulse width limited by maximum allowable junction temperature
 ② Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

• Typical Characteristics

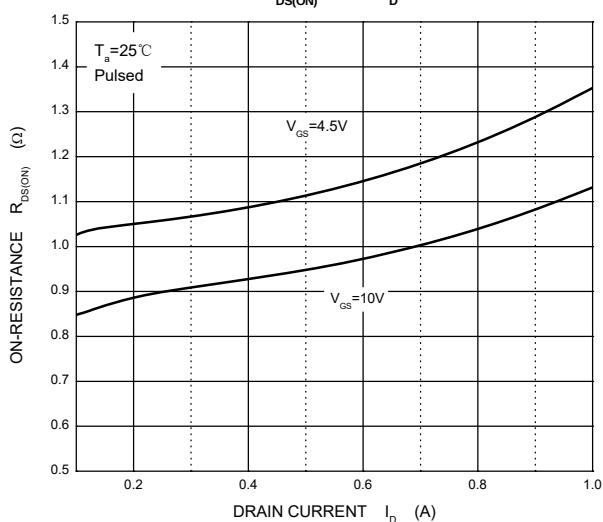
Output Characteristics



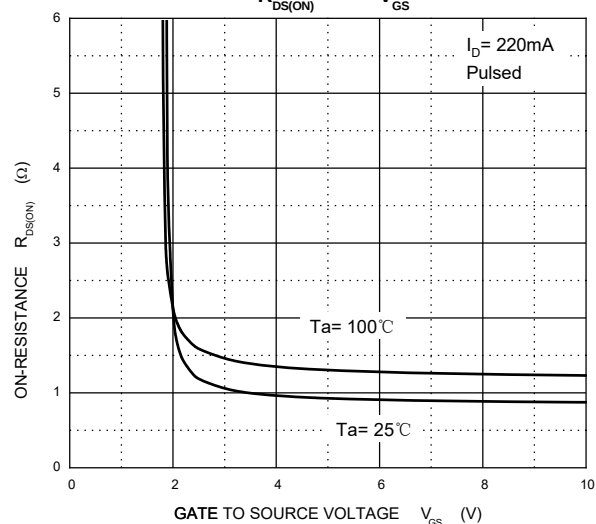
Transfer Characteristics



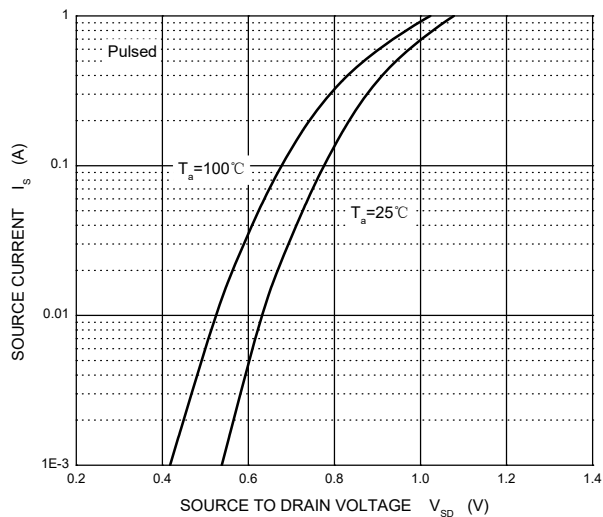
$R_{DS(ON)}$ — I_D



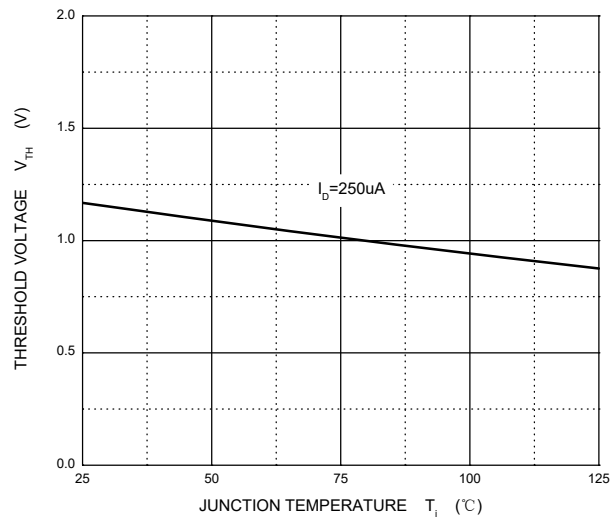
$R_{DS(ON)}$ — V_{GS}



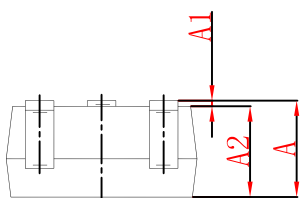
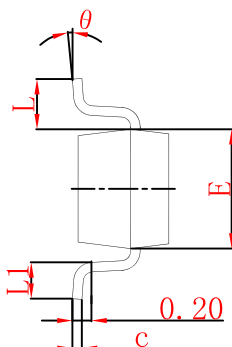
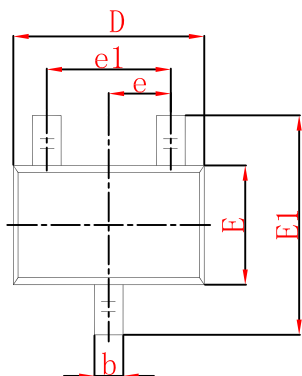
I_S — V_{SD}



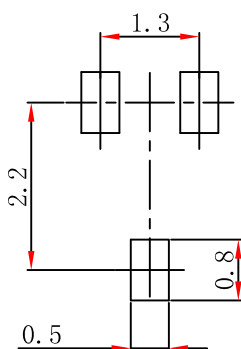
Threshold Voltage



SOT-323 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.200	0.400	0.008	0.016
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°



Note:

1. Controlling dimension: in millimeters.

2. General tolerance: $\pm 0.05\text{mm}$.

3. The pad layout is for reference purposes only.