



# THE DATASHEET OF BSS138W-TP



**Features**

- Trench LV MOSFET Technology
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device<sup>(Note1)</sup>
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

**Maximum Ratings**

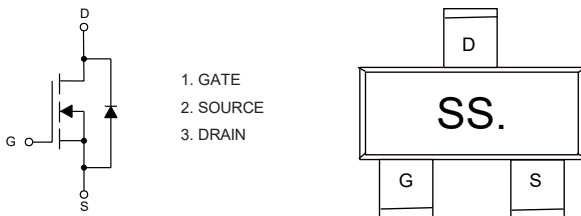
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature: -55°C to +150°C
- Thermal Resistance: 395°C/W Junction to Ambient<sup>(Note2)</sup>

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V <sub>DS</sub>	50	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub>	T <sub>A</sub> =25°C	0.22
		T <sub>A</sub> =100°C	0.14
Pulsed Drain Current <sup>(Note3)</sup>	I <sub>DM</sub>	0.88	A
Total Power Dissipation <sup>(Note4)</sup>	P <sub>D</sub>	316	mW

Note:

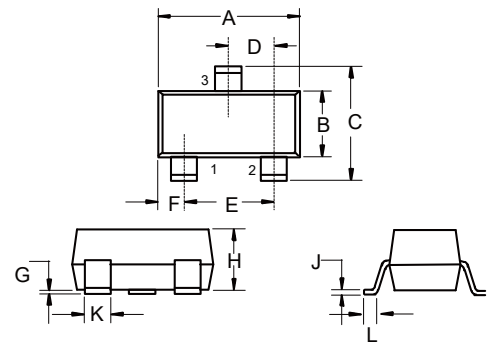
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. P<sub>D</sub> is based on max. junction temperature, using junction-ambient thermal resistance.

**Internal Structure and Marking code**



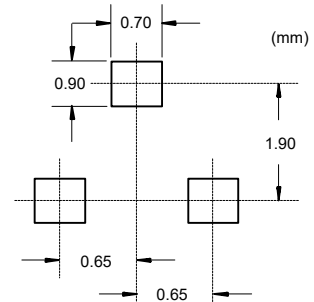
**N-Channel MOSFET**

**SOT-323**



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.071	0.087	1.80	2.20	
B	0.045	0.053	1.15	1.35	
C	0.083	0.096	2.10	2.45	
D	0.026		0.65		TYP.
E	0.047	0.055	1.20	1.40	
F	0.012	0.016	0.30	0.40	
G	0.000	0.004	0.00	0.10	
H	0.035	0.044	0.90	1.10	
J	0.002	0.010	0.05	0.25	
K	0.006	0.016	0.15	0.40	
L	0.010	0.018	0.26	0.46	

**Suggested Solder Pad Layout**

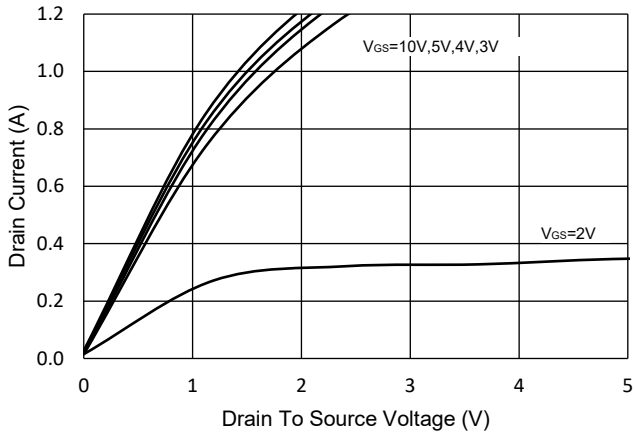


**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

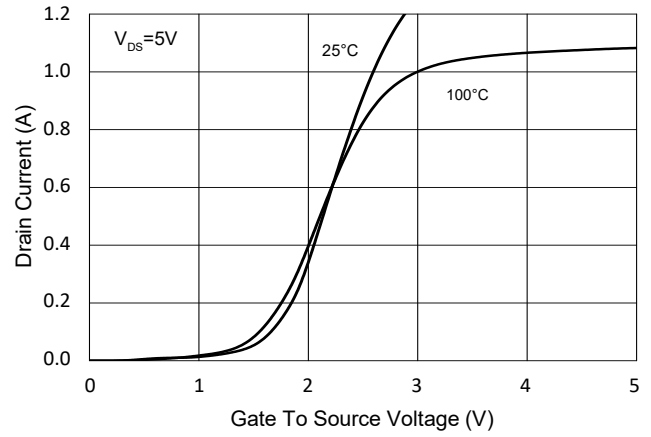
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	50			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=50V, V_{GS}=0V$			0.5	$\mu A$
		$V_{DS}=50V, V_{GS}=0V, T_J=125^\circ C$			5	
		$V_{DS}=30V, V_{GS}=0V$			0.1	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=1mA$	0.8	1	1.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=0.22A$		1.2	3.5	$\Omega$
		$V_{GS}=4.5V, I_D=0.22A$		1.3	6	
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=0.22A$		650		mS
Gate Resistance	$R_G$	$f=1\text{ MHz}, \text{ Open drain}$		5		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				0.22	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=0.22A$			1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=0.22A, dI_F/dt=100A/\mu s$		10		ns
Reverse Recovery Charge	$Q_{rr}$			2.4		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, f=1MHz$		29		$\mu F$
Output Capacitance	$C_{oss}$			3.2		
Reverse Transfer Capacitance	$C_{rss}$			2		
Total Gate Charge	$Q_g$	$V_{DS}=25V, V_{GS}=10V, I_D=0.22A$		1.3		nC
Gate-Source Charge	$Q_{gs}$			0.14		
Gate-Drain Charge	$Q_{gd}$			0.25		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=30V, V_{GS}=10V, R_G=6\Omega, I_D=0.29A$		2		ns
Turn-On Rise Time	$t_r$			3		
Turn-Off Delay Time	$t_{d(off)}$			5		
Turn-Off Fall Time	$t_f$			13		

**Curve Characteristics**

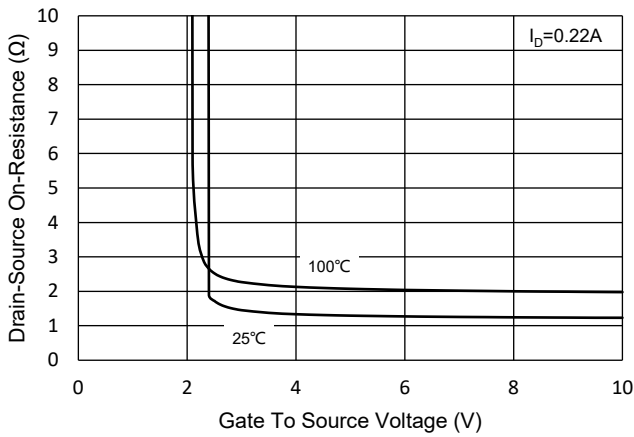
**Fig.1 - Typical Output Characteristics**



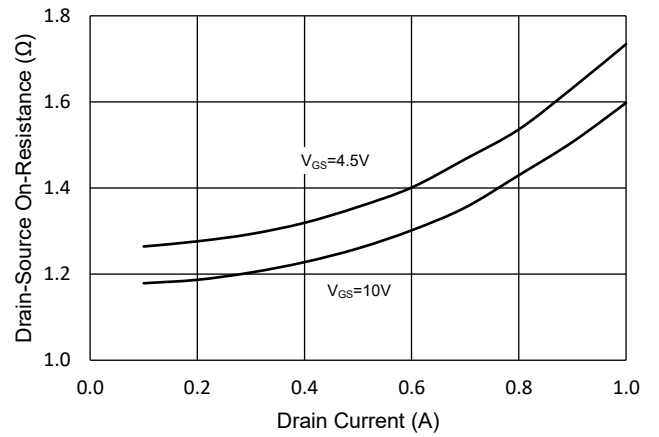
**Fig.2 - Transfer Characteristic**



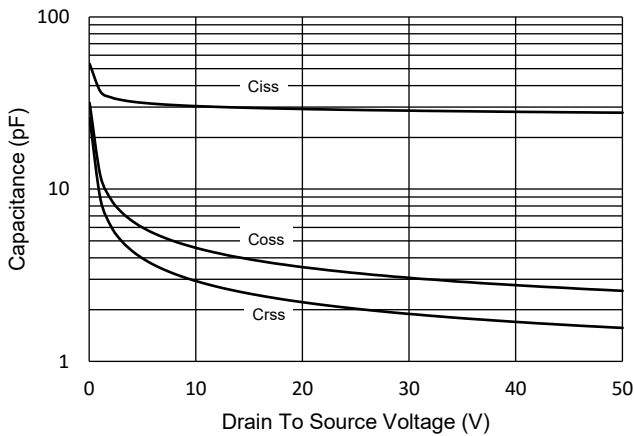
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



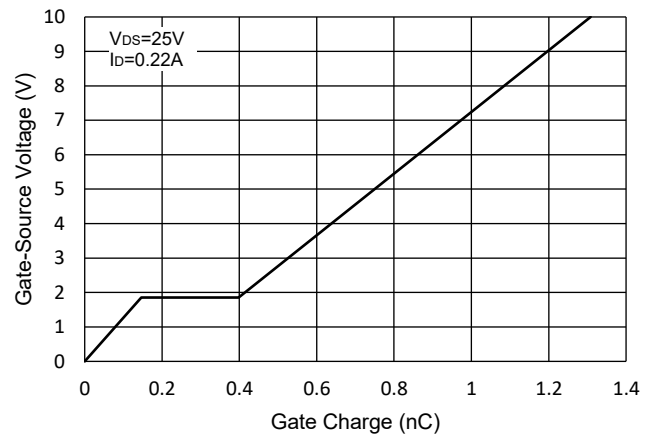
**Fig.4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig.5 - Capacitance Characteristics**

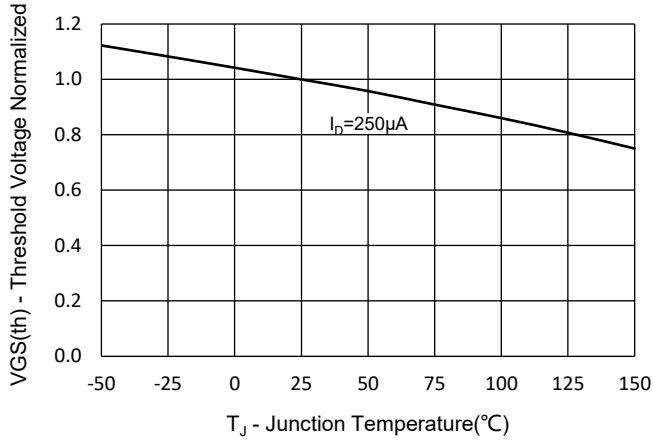


**Fig.6 - Gate Charge**

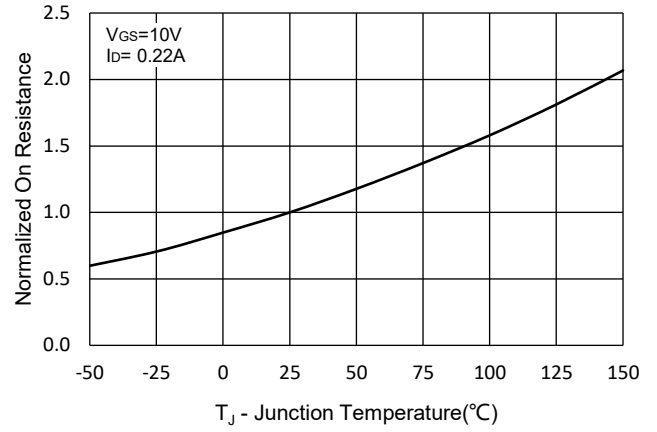


**Curve Characteristics**

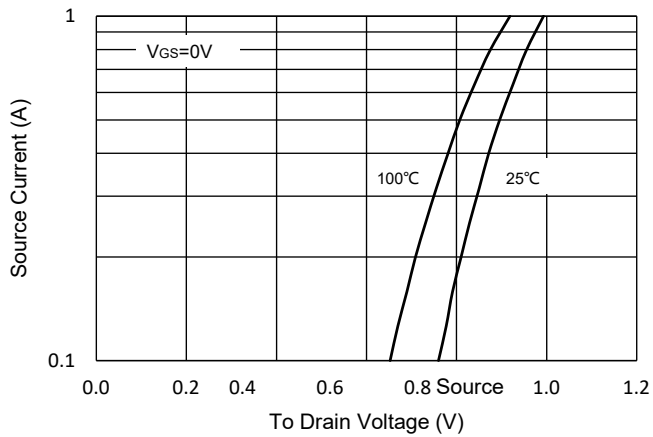
**Fig.7 - Normalized Threshold Voltage**



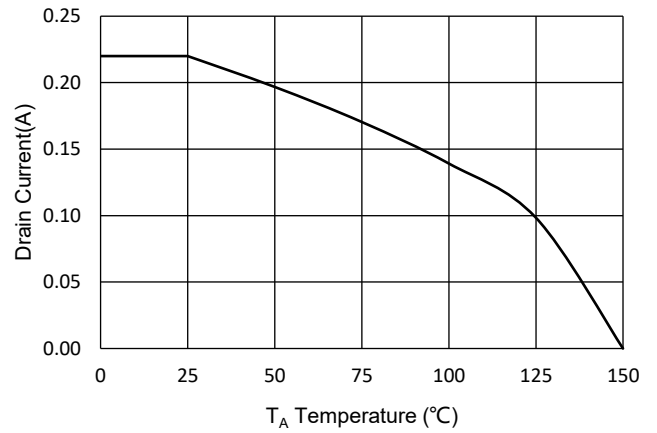
**Fig.8 - Normalized On Resistance Characteristics**



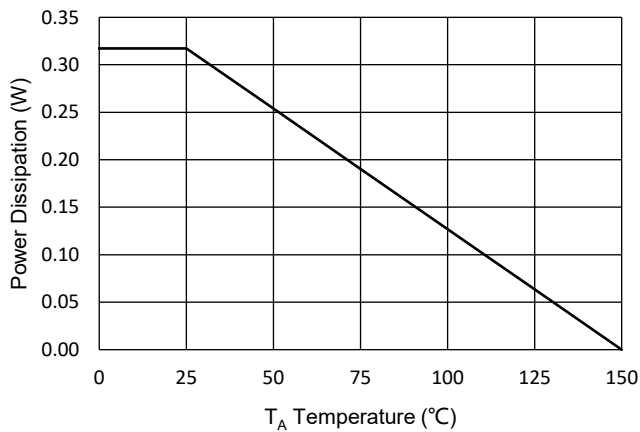
**Fig.9 - I<sub>S</sub> - V<sub>SD</sub>**



**Fig.10 - Drain Current**

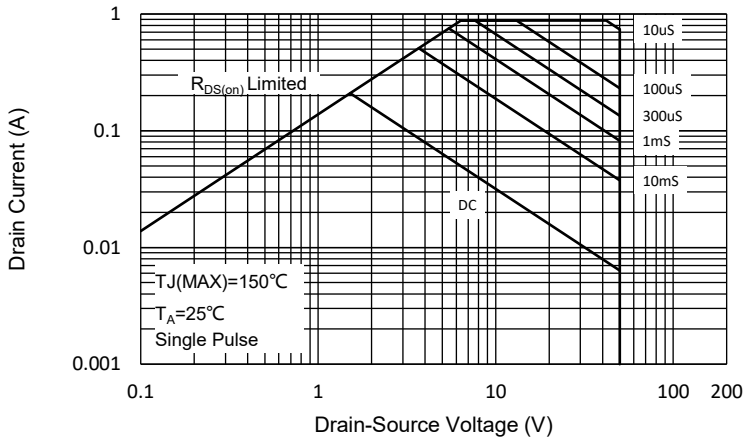


**Fig.11 - PD Dissipation**

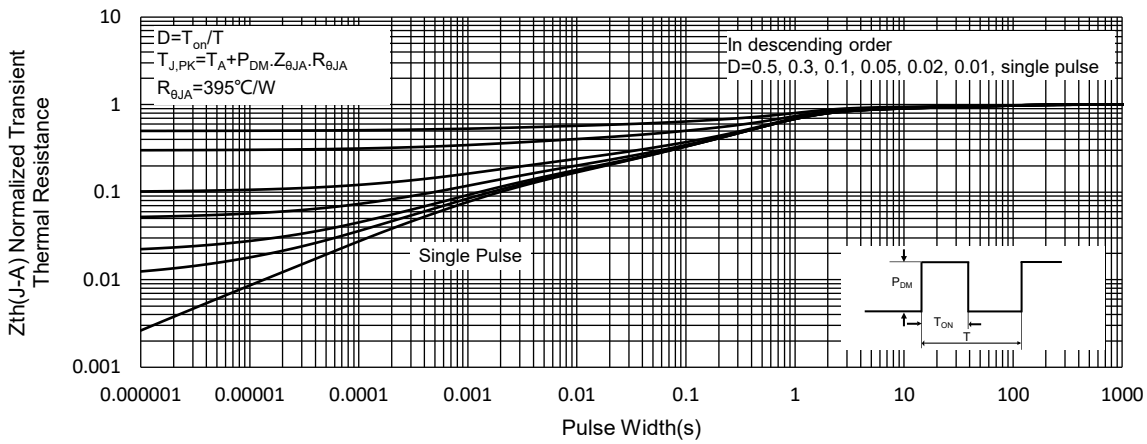


**Curve Characteristics**

**Fig.12 - Safe Operation Area**



**Fig.13 - Normalized Transient Thermal Impedance**



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel:3Kpcs/Reel

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