

General Description

The WSTBSS138A is the highest performance trench N-Channel MOSFET with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The WST1831 meet the RoHS and Green Product requirement, 100% Final Tested guaranteed with full function reliability approved.

Features

- 100% Final Tested.
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

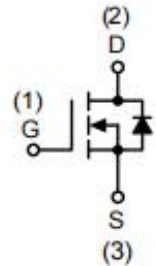
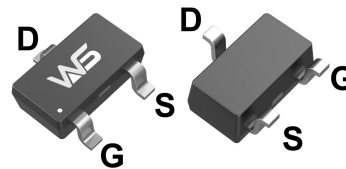
Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D
50V	1.1 Ω	0.22A

Applications

- Load switch
- Battery protection

SOT-23L Pin Configuration



Absolute Maximum Ratings ($T_A=25^\circ\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Rating	Units	
V_{DS}	Drain-Source Voltage	50	V	
V_{GS}	Gate-Source Voltage	± 20		
I_D ⁷	Continuous Drain Current	$T_C=25^\circ\text{C}$	0.22	A
		$T_C=100^\circ\text{C}$	0.14	
I_{DM} ³	Pulse Drain Current	0.88		
P_D ²	Power Dissipation	$T_C=25^\circ\text{C}$	0.35	W
T_{STG}	Storage Temperature Range	-55 to 150		$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150		
$R_{\theta JA}$ ^{1,4}	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	35	$^\circ\text{C/W}$
		Steady State	350	

Electrical Characteristics ($T_J=25^\circ\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	50	65	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10.0V, I_D=0.22A$	---	1.1	2.0	Ω
		$V_{GS}=4.5V, I_D=0.22A$	---	1.3	3.0	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.3	1.3	2.0	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=50V, V_{GS}=0V$ $T_J=55^\circ\text{C}$	---	---	10	μA
			---	---	50	
I_{GSS}	Gate-Source Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	---	---	± 1	μA
g_{fs}	Forward Transconductance	$V_{DS}=5V, I_D=0.22A$	---	10	---	S
R_G	Gate Resistance	$f=1.0\text{MHz}$	1.0	2.0	3.1	Ω
Q_g	Total Gate Charge (4.5V)	$V_{DS}=10V, V_{GS}=4.5V, I_D=0.22A$	---	0.6	---	nC
Q_{gs}	Gate-Source Charge		---	0.2	---	
Q_{gd}	Gate-Drain Charge		---	0.2	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DS}=10V, V_{GS}=4.5V, I_D=0.22A$ $R_L=1\Omega, R_{GEN}=3\Omega$	---	3.9	---	ns
T_r	Rise Time		---	1.8	---	
$T_{d(off)}$	Turn-Off Delay Time		---	19	---	
T_f	Fall Time		---	14.5	---	
C_{iss}	Input Capacitance	$V_{DS}=30V, V_{GS}=0V, f=1.0\text{MHz}$	---	20	---	pF
C_{oss}	Output Capacitance		---	5.0	---	
C_{rss}	Reverse Transfer Capacitance		---	2.0	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S^7	Continuous Source Current		---	---	0.22	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=1.5A$	---	---	1.5	V

Note:

- The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA} \leq 10s$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design.
- The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
- Single pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$.
- The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
- The static characteristics in Figures 1 to 6 are obtained using $<300\mu s$ pulses, duty cycle 0.5% max.
- These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=150^\circ\text{C}$. The SOA curve provides a single pulse rating.
- The maximum current rating is package limited.
- These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.
- The maximum current rating is silicon limited

Typical Characteristics

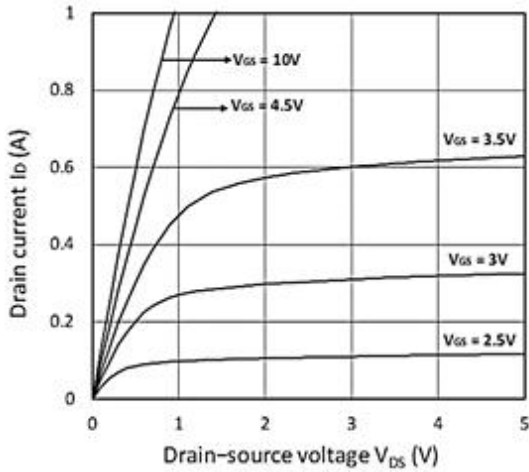


Figure 1. Output Characteristics

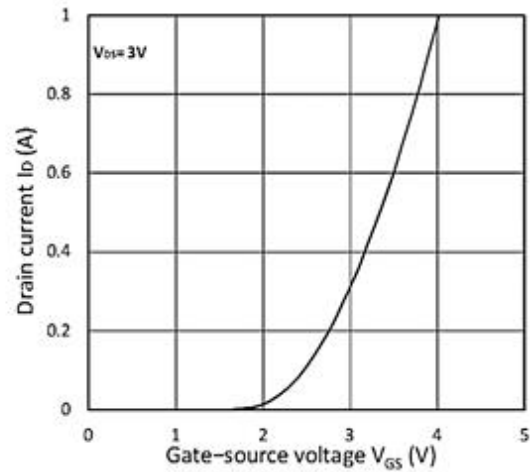


Figure 2. Transfer Characteristics

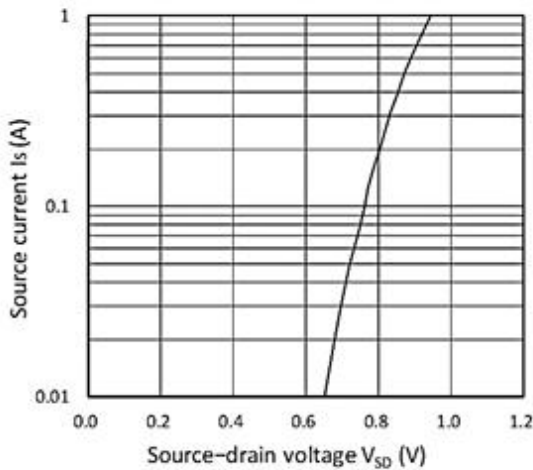


Figure 3. Forward Characteristics of Reverse

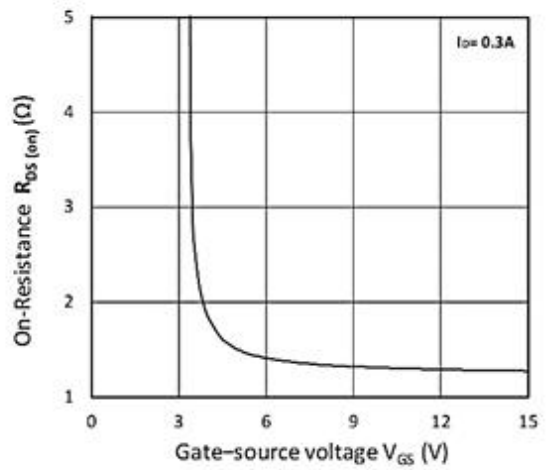


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

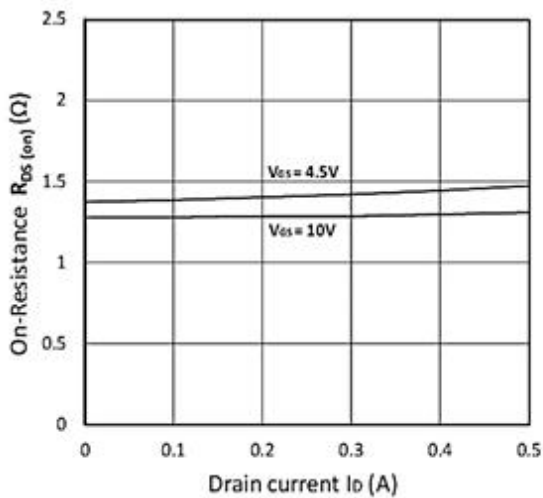


Figure 5. $R_{DS(ON)}$ vs. I_D

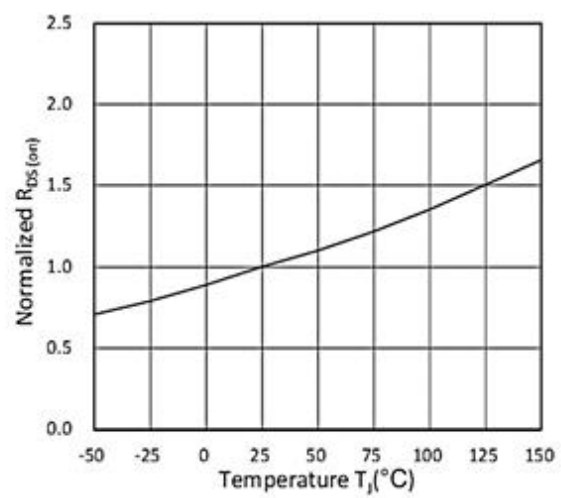


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

Typical Characteristics (Cont.)

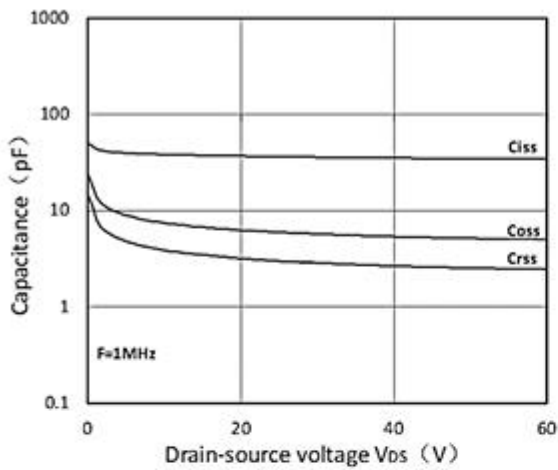


Figure 7. Capacitance Characteristics

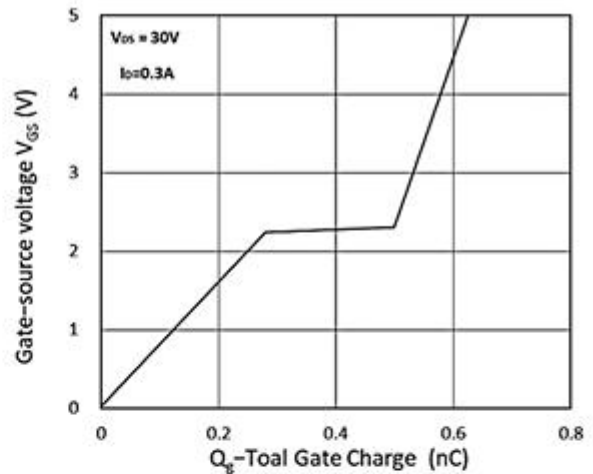


Figure 8. Gate Charge Characteristics

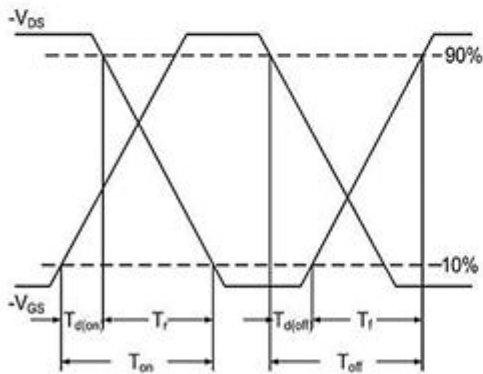


Figure.9 Switching Time Waveform

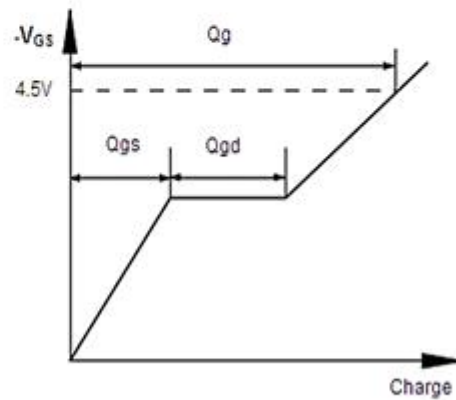
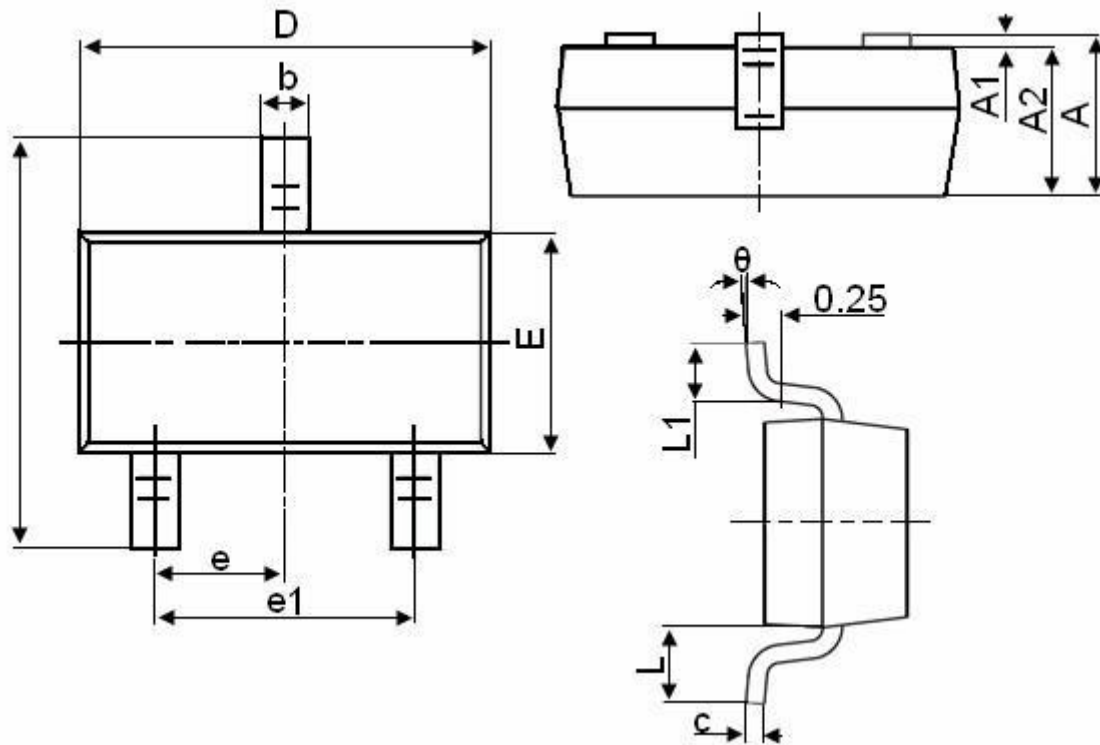


Figure.10 Gate Charge Waveform

Packaging information


Symbol	Dimensions in Millimeters	
	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	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

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