

General Description

The WST3416 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.1V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available

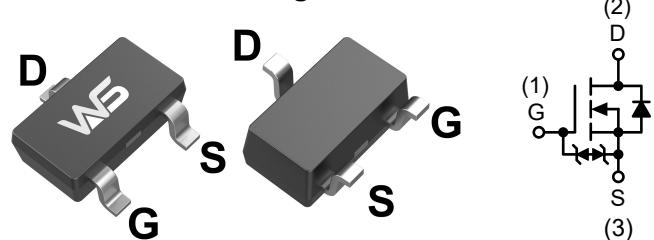
Product Summary

BV_{DSS}	$R_{DS(on)}$	I_D
20V	18mΩ	6.5A

Applications

- High Frequency Point-of-Load Synchronous Small power switching for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

SOT-23-3L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 8	V
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	6.5	A
$I_D @ T_c = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	5.2	A
I_{DM}	Pulsed Drain Current ²	30	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ³	1.4	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	125	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	80	°C/W

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{\text{GS}}=0\text{V}$, $I_D=250\mu\text{A}$	20	---	---	V
$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.018	---	$\text{V}/^\circ\text{C}$
$R_{\text{DS}(\text{ON})}$	Static Drain-Source On-Resistance ²	$V_{\text{GS}}=4.5\text{V}$, $I_D=6.5\text{A}$	---	18	24	$\text{m}\Omega$
		$V_{\text{GS}}=2.5\text{V}$, $I_D=5.5\text{A}$	---	22	28	
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	$V_{\text{GS}}=V_{\text{DS}}$, $I_D=250\mu\text{A}$	0.4	0.7	1.1	V
$\Delta V_{\text{GS}(\text{th})}$	$V_{\text{GS}(\text{th})}$ Temperature Coefficient		---	-3.1	---	$\text{mV}/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{\text{DS}}=16\text{V}$, $V_{\text{GS}}=0\text{V}$, $T_J=25^\circ\text{C}$	---	---	1	uA
		$V_{\text{DS}}=16\text{V}$, $V_{\text{GS}}=0\text{V}$, $T_J=55^\circ\text{C}$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{\text{GS}}=\pm 12\text{V}$, $V_{\text{DS}}=0\text{V}$	---	---	± 10	uA
g_{fs}	Forward Transconductance	$V_{\text{DS}}=5\text{V}$, $I_D=6.5\text{A}$	---	50	---	S
R_g	Gate Resistance	$V_{\text{DS}}=0\text{V}$, $V_{\text{GS}}=0\text{V}$, $f=1\text{MHz}$	---	1.8	3	Ω
Q_g	Total Gate Charge (4.5V)	$V_{\text{DS}}=15\text{V}$, $V_{\text{GS}}=4.5\text{V}$, $I_D=6.5\text{A}$	---	10	15.0	nC
Q_{gs}	Gate-Source Charge		---	4.2	8.9	
Q_{gd}	Gate-Drain Charge		---	2.6	5.2	
$T_{\text{d}(\text{on})}$	Turn-On Delay Time	$V_{\text{DS}}=10\text{V}$, $V_{\text{GS}}=4.5\text{V}$, $R_G=3\Omega$	---	280	---	ns
T_r	Rise Time		---	328	---	
$T_{\text{d}(\text{off})}$	Turn-Off Delay Time		---	2.24	---	us
T_f	Fall Time		---	3.76	---	
C_{iss}	Input Capacitance	$V_{\text{DS}}=10\text{V}$, $V_{\text{GS}}=0\text{V}$, $f=1\text{MHz}$	---	1295	---	pF
C_{oss}	Output Capacitance		---	160	---	
C_{rss}	Reverse Transfer Capacitance		---	87	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_s	Continuous Source Current ^{1,4}	$V_G=V_D=0\text{V}$, Force Current	---	---	2.0	A
I_{SM}	Pulsed Source Current ^{2,4}		---	---	10	A
V_{SD}	Diode Forward Voltage ²	$V_{\text{GS}}=0\text{V}$, $I_s=1\text{A}$, $T_J=25^\circ\text{C}$	---	---	1.1	V
t_{rr}	Reverse Recovery Time	$I_F=6.5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $T_J=25^\circ\text{C}$	---	31	41	nS
Q_{rr}	Reverse Recovery Charge		---	6.8	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper,t<=10sec.
- 2.The data tested by pulsed , pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

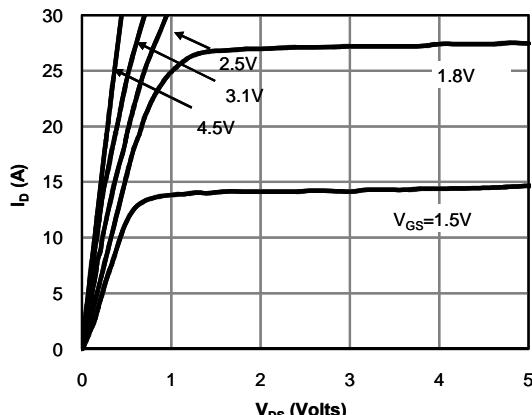


Fig 1: On-Region Characteristics (Note E)

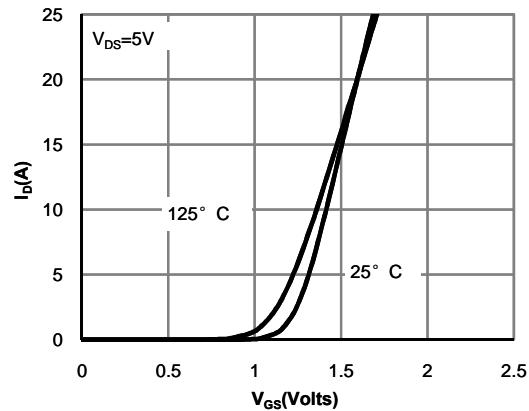


Figure 2: Transfer Characteristics (Note E)

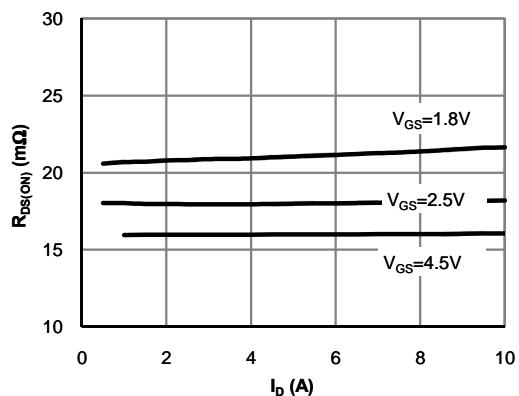


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

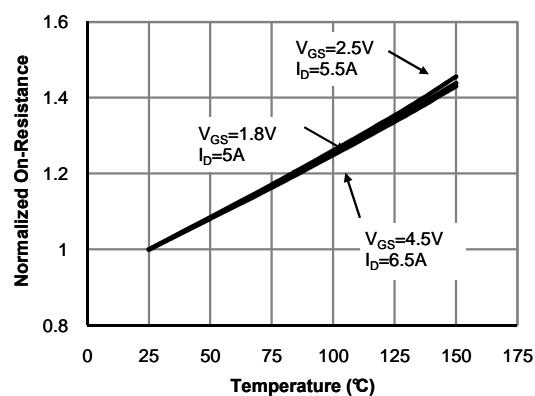


Figure 4: On-Resistance vs. Junction Temperature (Note E)

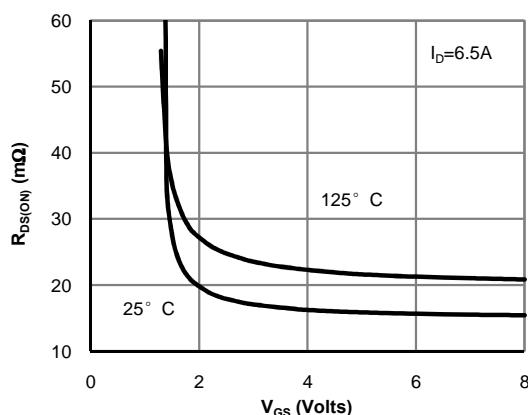


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

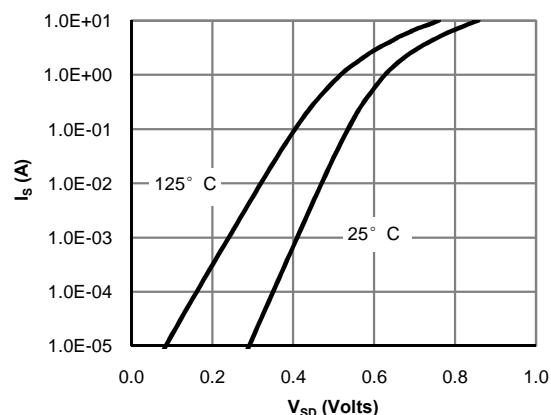


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

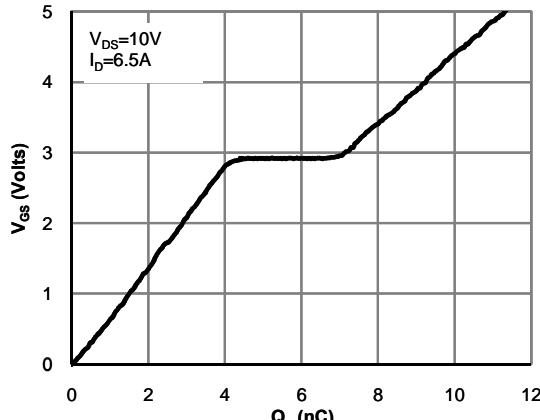


Figure 7: Gate-Charge Characteristics

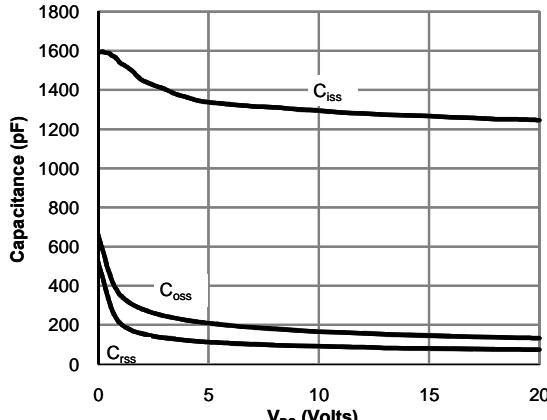


Figure 8: Capacitance Characteristics

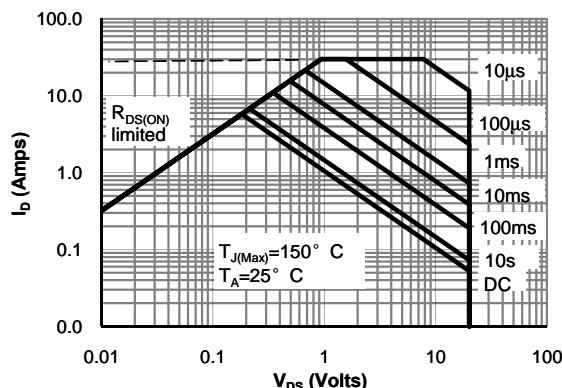


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

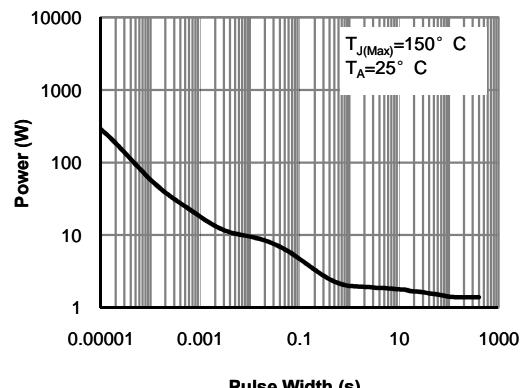


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

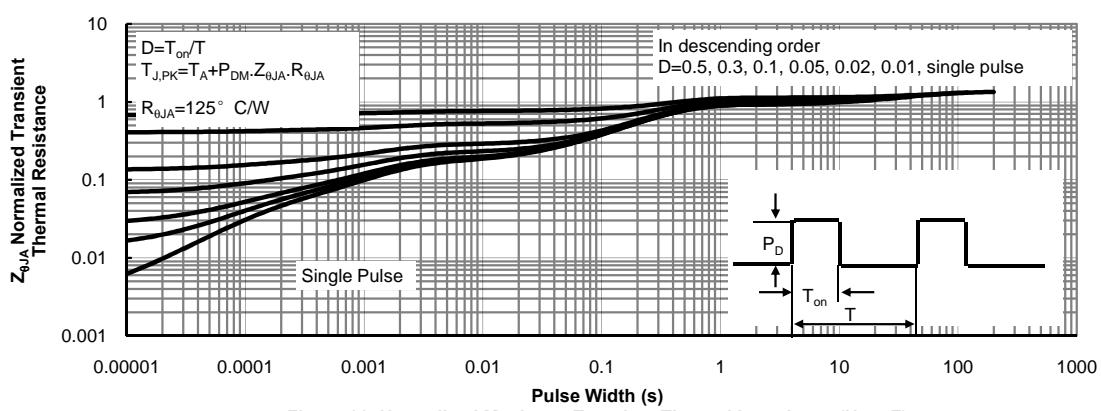
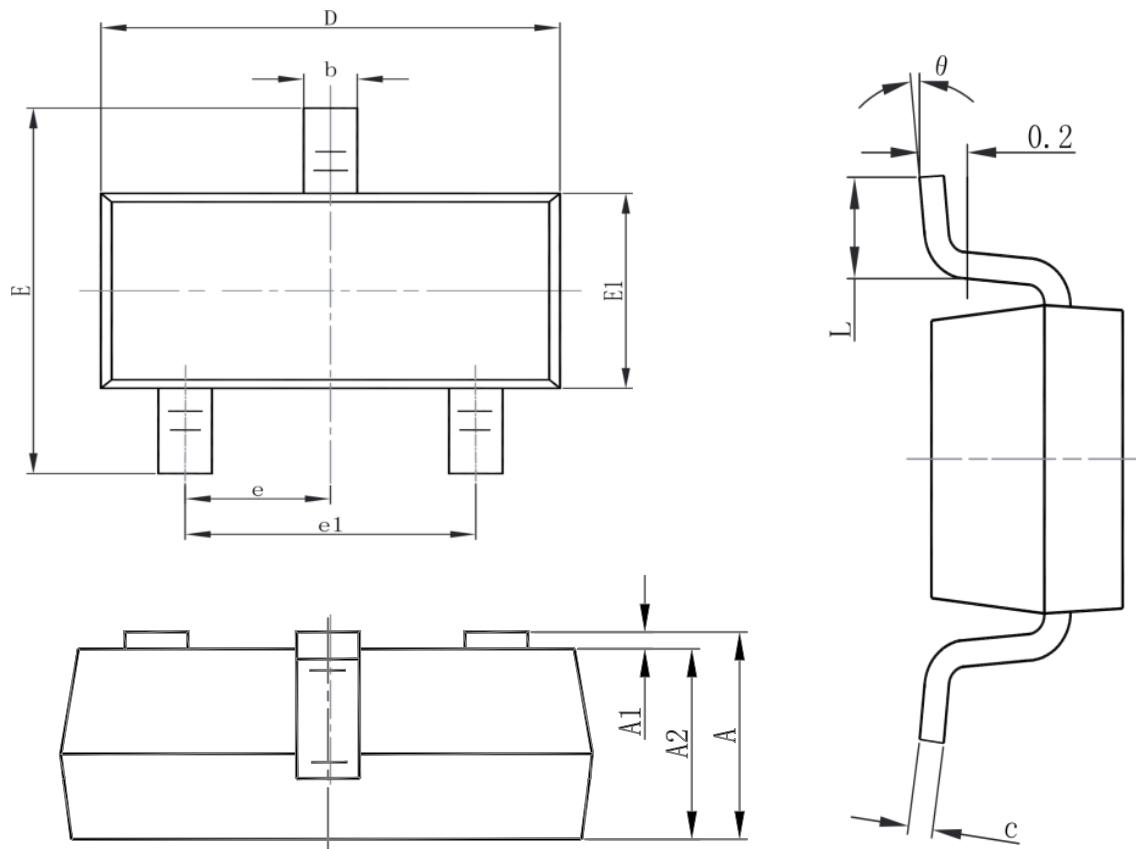


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Packaging information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



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