

## General Description

The WST3013 is the highest performance trench P-Ch MOSFET with extreme high cell density , which provide excellent  $R_{DS(on)}$  and gate charge for most of the synchronous buck converter applications .

The WST3013 meet the RoHS and Green Product requirement , with full function reliability approved.

## Features

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

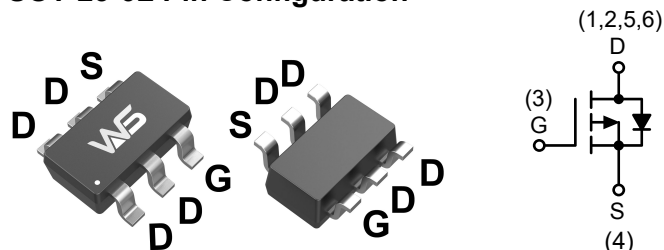
## Product Summery

$BV_{DSS}$	$R_{DS(on)}$	$I_D$
-12V	38mΩ	-4.4A

## Applications

- Portable Equipment and Battery Powered Systems.
- Power Management in Notebook Computer

## SOT-23-6L Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-12	V
$V_{GS}$	Gate-Source Voltage	$\pm 8$	V
$I_D@T_A=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-4.4	A
$I_D@T_A=70^{\circ}C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-3.5	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-17.7	A
$P_D@T_A=25^{\circ}C$	Total Power Dissipation <sup>3</sup>	2.1	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^{\circ}C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$

## Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	100	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	80	$^{\circ}C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-12	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1mA$	---	-0.014	---	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-4.5V, I_D=-4.4A$	---	38	60	$m\Omega$
		$V_{GS}=-2.5V, I_D=-3.5A$	---	47	90	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.5	-0.7	-1.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3.95	---	mV/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-8V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu A$
		$V_{DS}=-8V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	-5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 8V, V_{DS}=0V$	---	---	$\pm 100$	nA
$g_{fs}$	Forward Transconductance	$V_{DS}=-5V, I_D=-3A$	---	8	---	S
$Q_g$	Total Gate Charge (-4.5V)	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-4.4A$	---	5.2	---	nC
$Q_{gs}$	Gate-Source Charge		---	0.7	---	
$Q_{gd}$	Gate-Drain Charge		---	1.8	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-10V, V_{GEN}=-4.5V, R_G=6\Omega, I_D=-1A, R_L=10\Omega.$	---	5.6	---	ns
$T_r$	Rise Time		---	13.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	4.5	---	
$T_f$	Fall Time		---	21	---	
$C_{iss}$	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$	---	357	---	pF
$C_{oss}$	Output Capacitance		---	72	---	
$C_{rss}$	Reverse Transfer Capacitance		---	61	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,4</sup>	$V_G=V_D=0V$ , Force Current	---	---	-1	A
$I_{SM}$	Pulsed Source Current <sup>2,4</sup>		---	---	-17.7	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V
$t_{rr}$	Reverse Recovery Time	$I_F=-4.4A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	12	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	6.6	---	nC

Note :

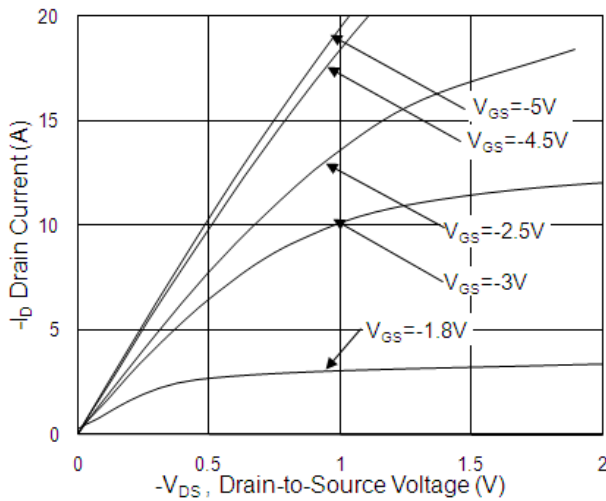
1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.

2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$

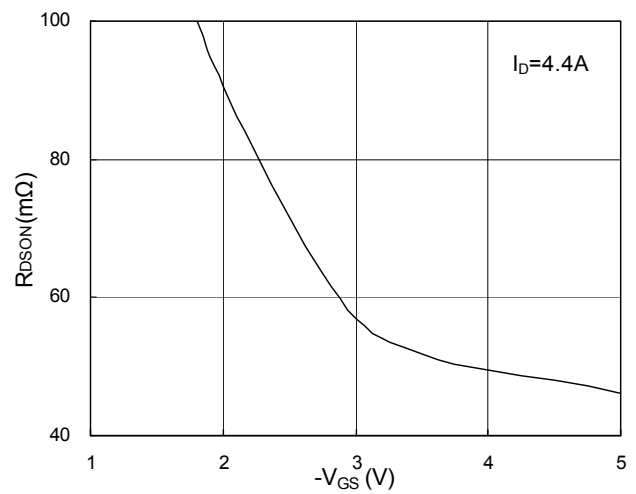
3.The power dissipation is limited by  $150^\circ\text{C}$  junction temperature

4.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

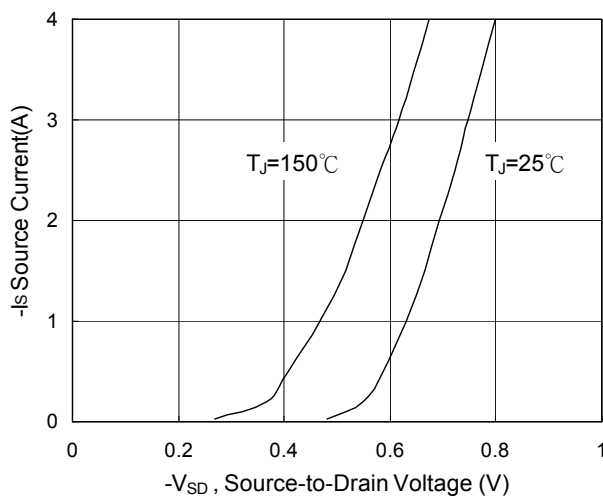
## Typical Characteristics



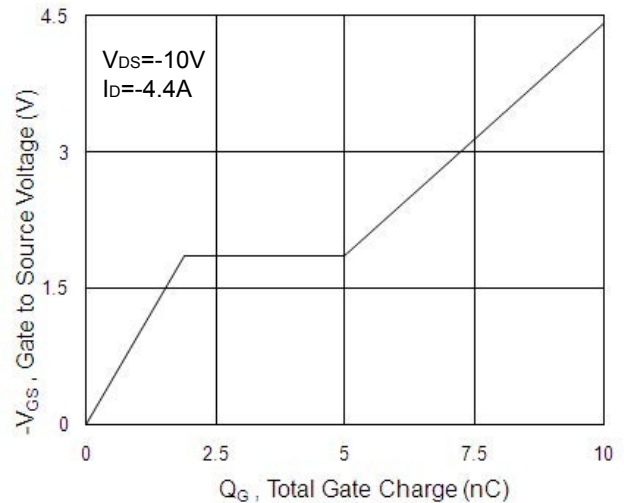
**Fig.1 Typical Output Characteristics**



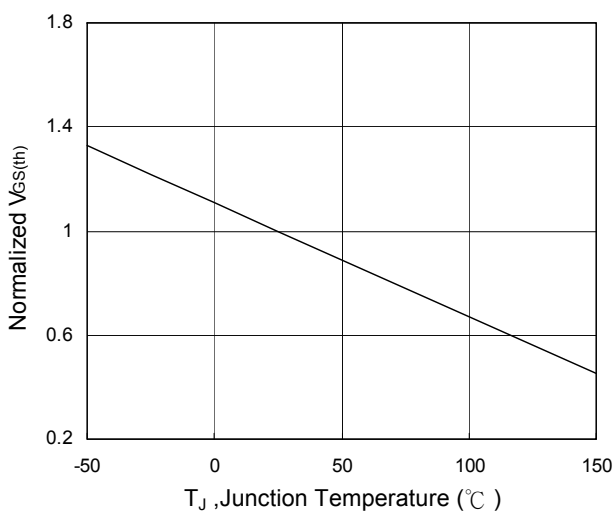
**Fig.2 On-Resistance vs. G-S Voltage**



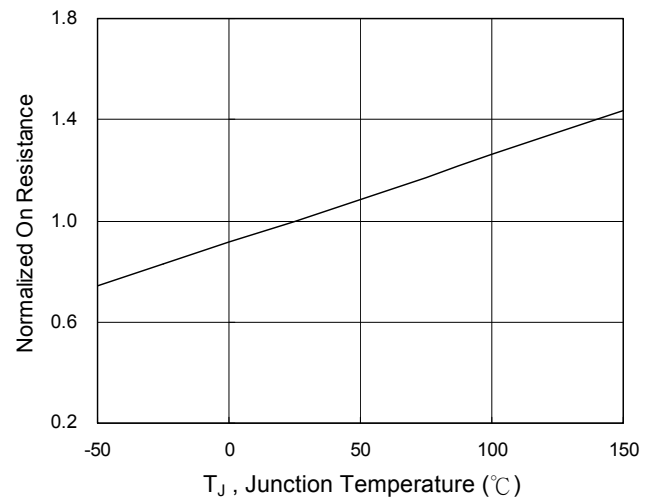
**Fig.3 Forward Characteristics of Reverse**



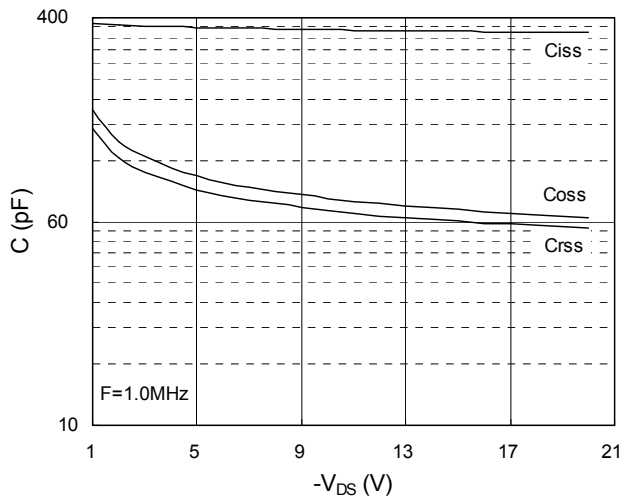
**Fig.4 Gate-charge Characteristics**



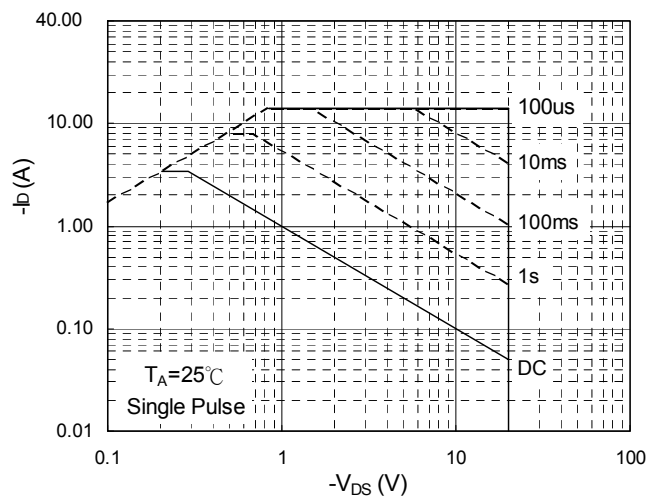
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



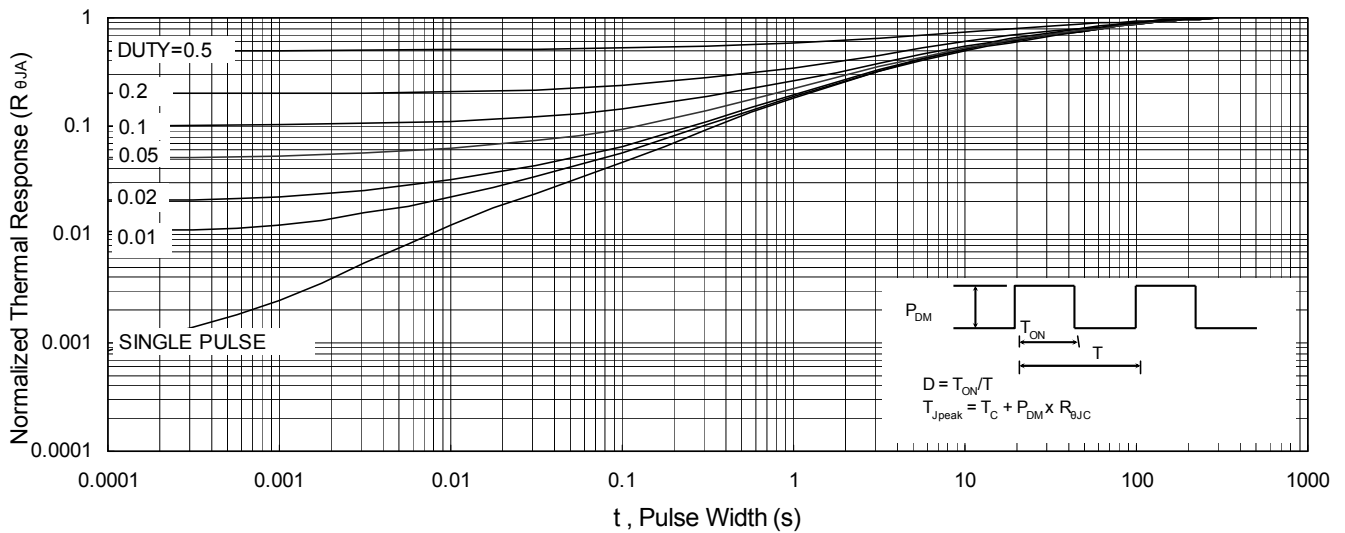
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



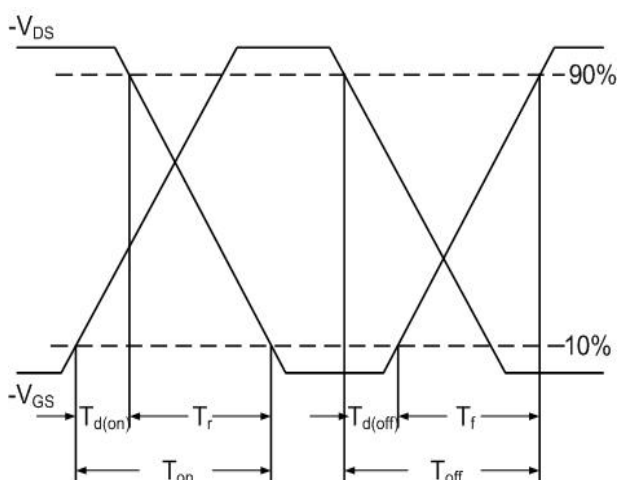
**Fig.7 Capacitance**



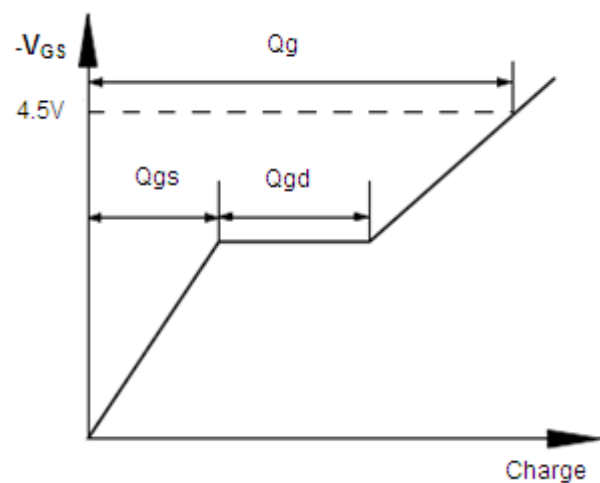
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

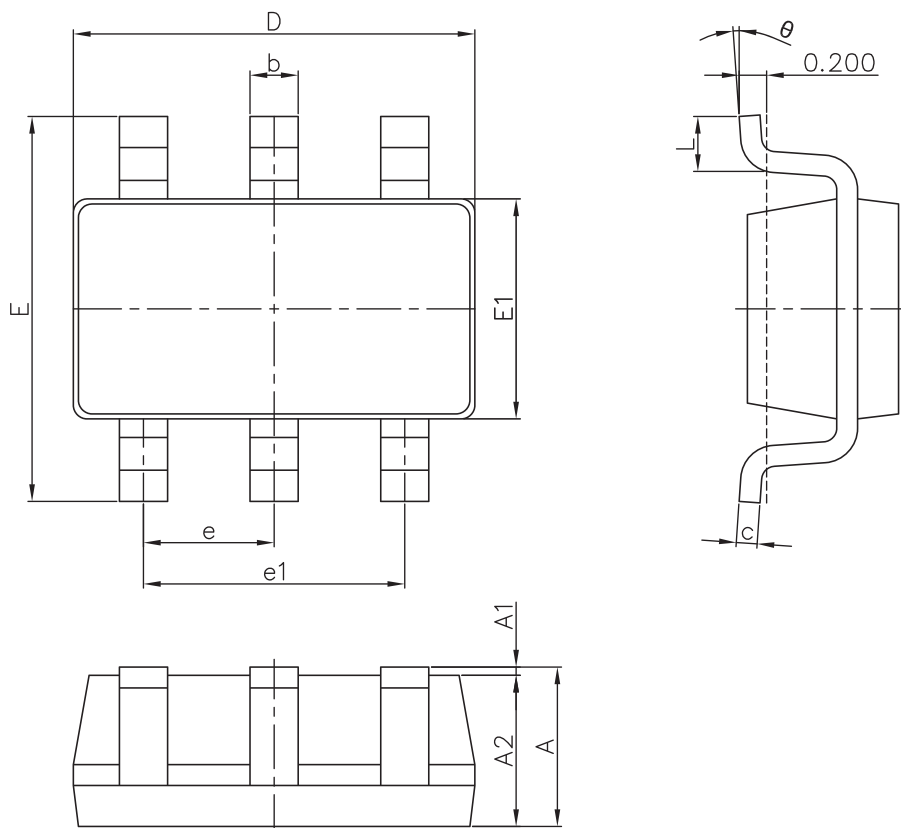


**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**

## 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
$\theta$	0°	8°	0°	8°

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