

## Description

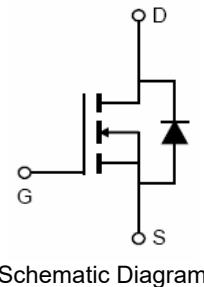
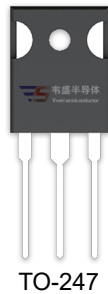
The series of devices uses **Super Trench II** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of  $R_{DS(on)}$  and  $Q_g$ . This device is ideal for high-frequency switching and synchronous rectification.

## Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

## General Features

- $V_{DS} = 100V, I_D = 280A$   
 $R_{DS(on)} = 1.85m\Omega$ , typical@  $V_{GS} = 10V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating



## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST10N018-T7	VST10N018	TO-247	-	-	-

## Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	280	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	200	A
Pulsed Drain Current	$I_{DM}$	980	A
Maximum Power Dissipation	$P_D$	365	W
Derating factor		2.43	W/ $^\circ C$
Single pulse avalanche energy <sup>(Note 4)</sup>	$E_{AS}$	2784	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^\circ C$

## Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.41	$^\circ C/W$
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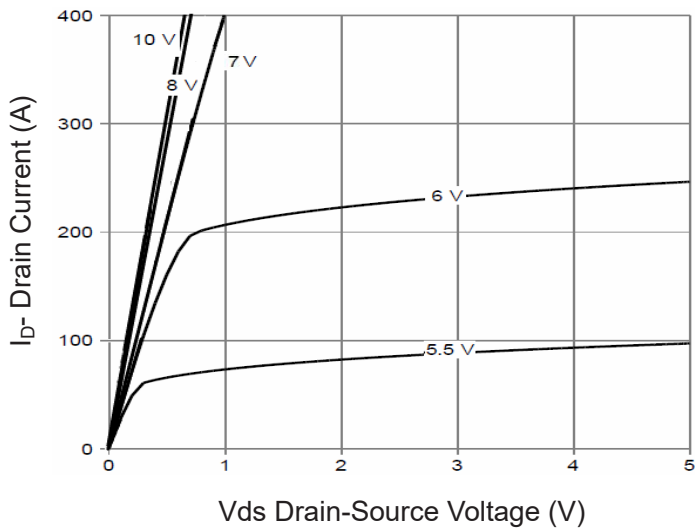
**Electrical Characteristics ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	100		-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V,V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V,V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics <sup>(Note 2)</sup>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA	2.0	3.0	4.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =140A	-	1.85	2.3	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V,I <sub>D</sub> =140A		200	-	S
Dynamic Characteristics <sup>(Note3)</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V,V <sub>GS</sub> =0V, F=1.0MHz	-	17000	-	PF
Output Capacitance	C <sub>oss</sub>		-	1500	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	77	-	PF
Switching Characteristics <sup>(Note 3)</sup>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =50V,I <sub>D</sub> =140A V <sub>GS</sub> =10V,R <sub>G</sub> =1.6Ω	-	37	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	29	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	82	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	34	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V,I <sub>D</sub> =140A, V <sub>GS</sub> =10V	-	252	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	72		nC
Gate-Drain Charge	Q <sub>gd</sub>		-	63		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V,I <sub>S</sub> =140A	-		1.2	V
Diode Forward Current <sup>(Note 2)</sup>	I <sub>S</sub>		-	-	280	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 140A di/dt = 100A/μs <sup>(Note2)</sup>	-	105	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	290	-	nC

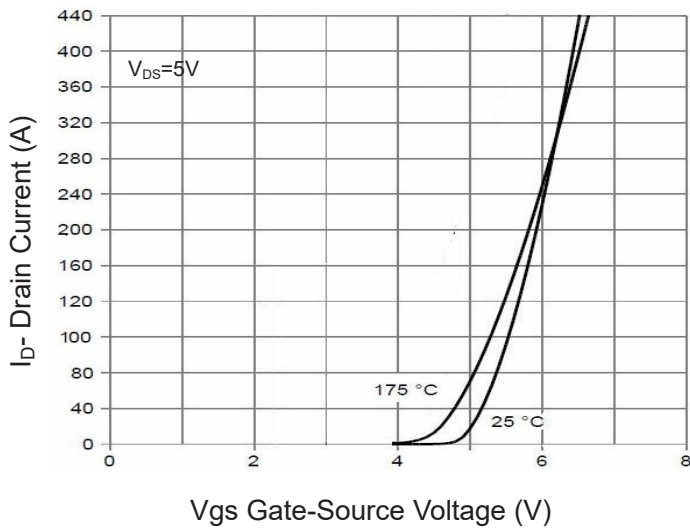
**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
3. Guaranteed by design, not subject to production
4. EAS condition :  $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

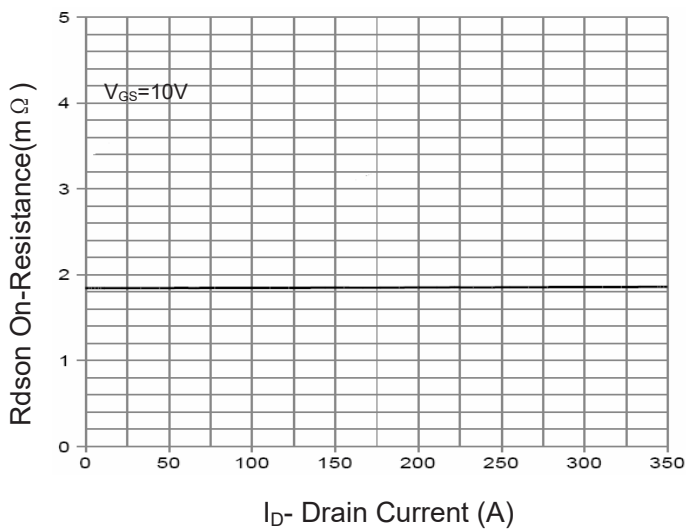
## Typical Electrical and Thermal Characteristics



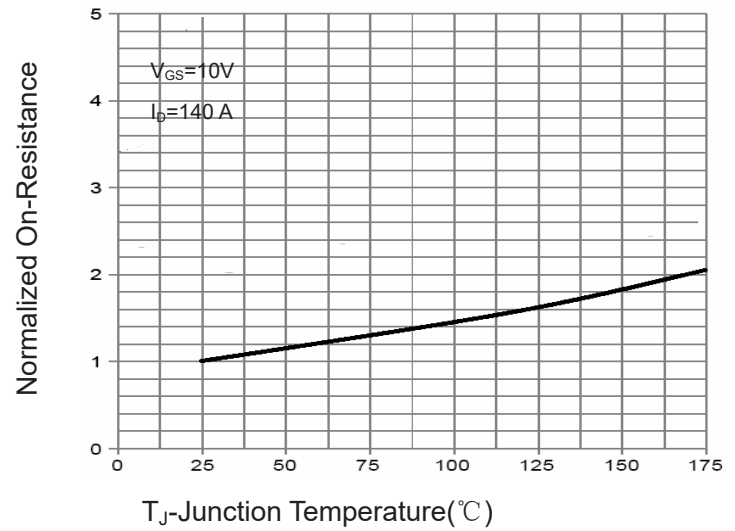
**Figure 1 Output Characteristics**



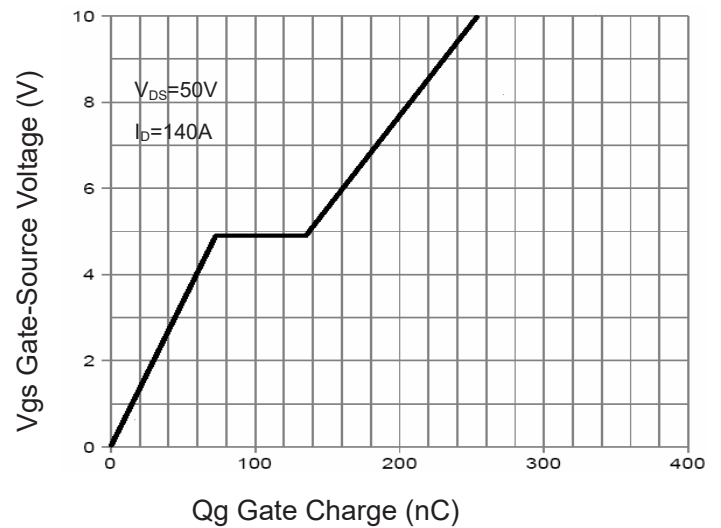
**Figure 2 Transfer Characteristics**



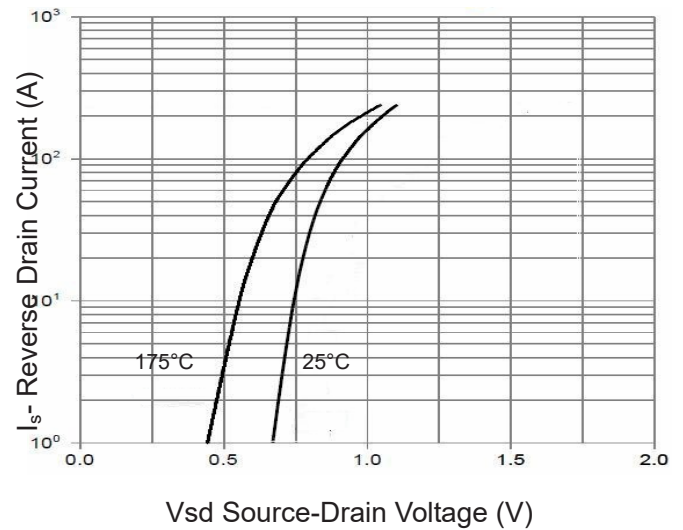
**Figure 3 Rdson- Drain Current**



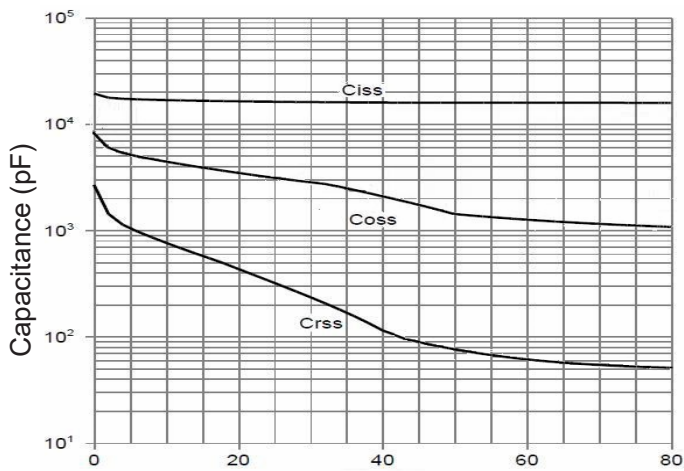
**Figure 4 Rdson-Junction Temperature**



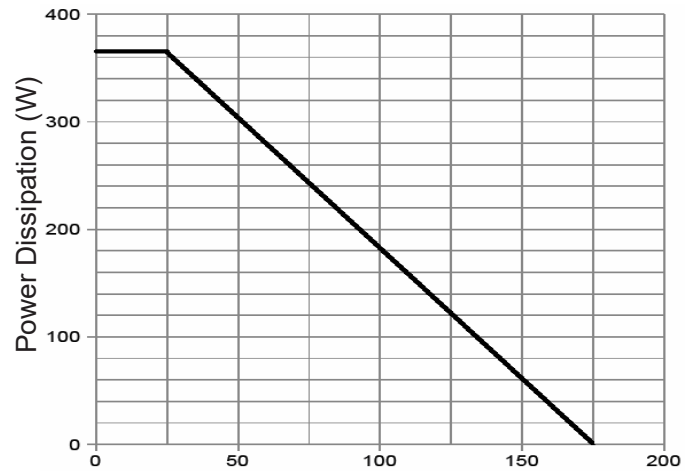
**Figure 5 Gate Charge**



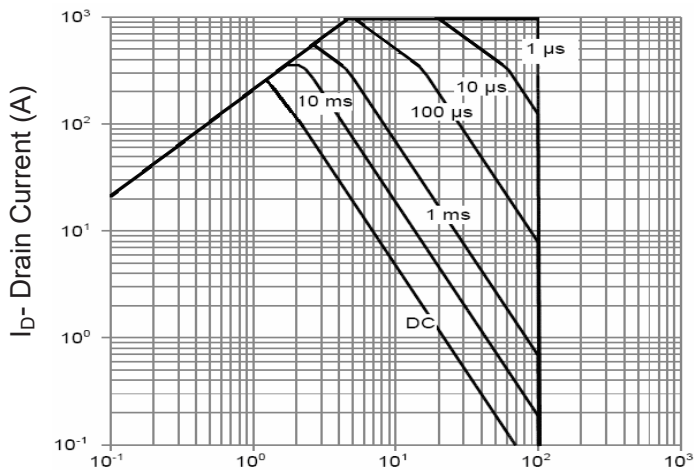
**Figure 6 Source- Drain Diode Forward**



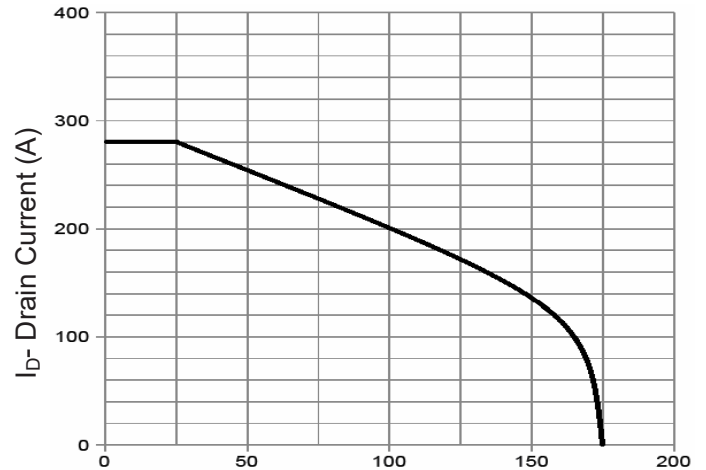
Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



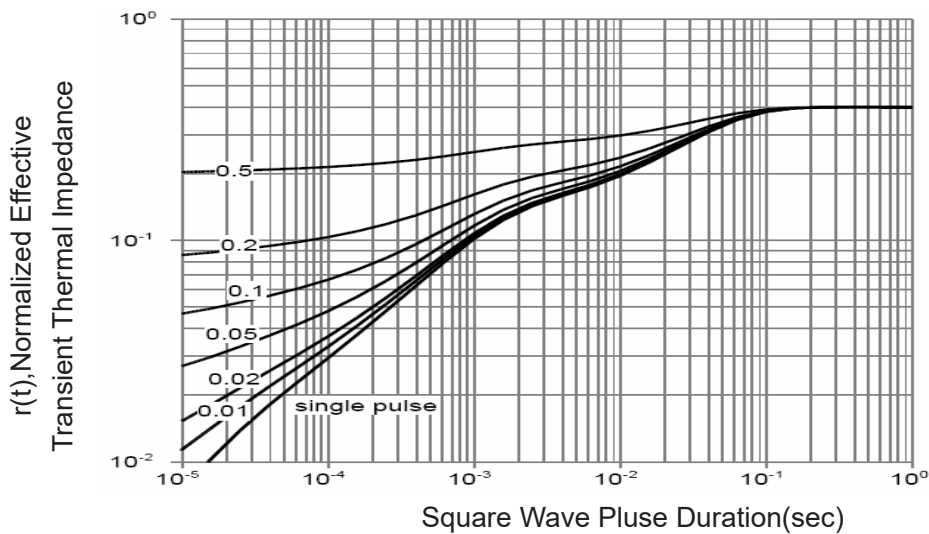
TJ-Junction Temperature(°C)  
**Figure 9 Power De-rating**



Vds Drain-Source Voltage (V)  
**Figure 8 Safe Operation Area**



TJ-Junction Temperature (°C)  
**Figure 10 Current De-rating**



Square Wave Pluse Duration(sec)  
**Figure 11 Normalized Maximum Transient Thermal Impedance**