

## 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

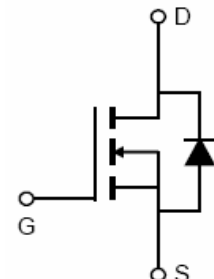
- $V_{DS} = 85V, I_D = 200A$   
 $R_{DS(ON)} = 2.55m\Omega$ , typical (TO-220)@  $V_{GS} = 10V$   
 $R_{DS(ON)} = 2.4m\Omega$ , typical (TO-263)@  $V_{GS} = 10V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating



TO-220C



TO-263



Schematic Diagram

## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST08N025-TC	VST08N025	TO-220C	-	-	-
VST08N025-T3	VST08N025	TO-263	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	85	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	200	A
Drain Current-Continuous( $T_c = 100^\circ C$ )	$I_D(100^\circ C)$	150	A
Pulsed Drain Current	$I_{DM}$	800	A
Maximum Power Dissipation	$P_D$	245	W
Derating factor		1.63	W/ $^\circ C$
Single pulse avalanche energy (Note 5)	$E_{AS}$	1767	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^\circ C$

## Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.61	$^{\circ}\text{C/W}$
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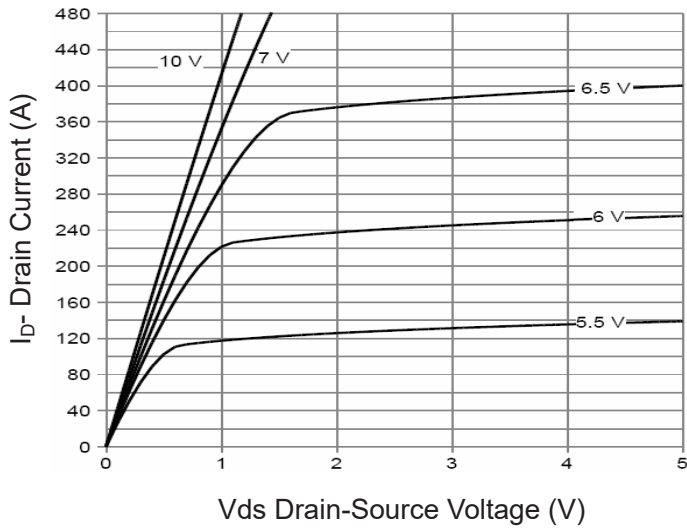
## Electrical Characteristics ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

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	85		-	V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =85V, 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 (Note 3)							
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> =100A	TO-220	-	2.55	2.8	mΩ
			TO-263		2.4	2.8	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =100A		200	-	S	
Dynamic Characteristics (Note4)							
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, F=1.0MHz	-	7680	-	PF	
Output Capacitance	C <sub>oss</sub>		-	1472	-	PF	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	60	-	PF	
Switching Characteristics (Note 4)							
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =40V, I <sub>D</sub> =100A V <sub>GS</sub> =10V, R <sub>G</sub> =1.6Ω	-	25	-	nS	
Turn-on Rise Time	t <sub>r</sub>		-	15	-	nS	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	52	-	nS	
Turn-Off Fall Time	t <sub>f</sub>		-	17	-	nS	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =40V, I <sub>D</sub> =100A, V <sub>GS</sub> =10V	-	124	-	nC	
Gate-Source Charge	Q <sub>gs</sub>		-	37		nC	
Gate-Drain Charge	Q <sub>gd</sub>		-	33		nC	
Drain-Source Diode Characteristics							
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =100A	-		1.2	V	
Diode Forward Current	I <sub>S</sub>		-	-	200	A	
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 100A di/dt = 100A/μs (Note3)	-	98	-	nS	
Reverse Recovery Charge	Q <sub>rr</sub>		-	280	-	nC	

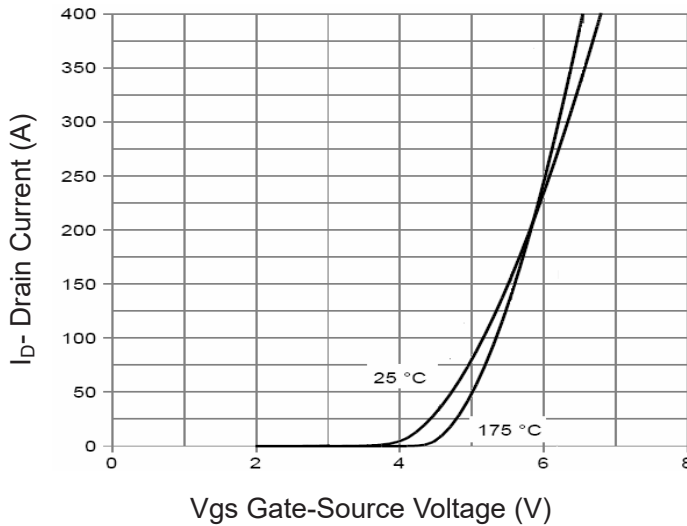
## Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition :  $T_J=25^{\circ}\text{C}, V_{DD}=40V, V_G=10V, L=0.5mH, R_g=25\Omega$

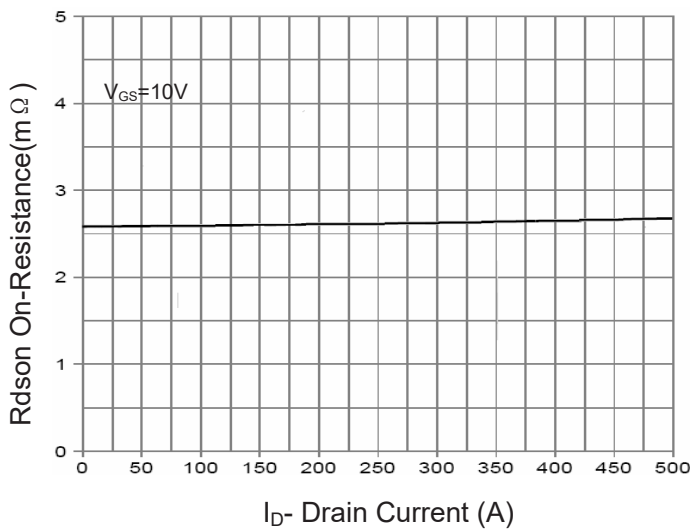
## Typical Electrical and Thermal Characteristics



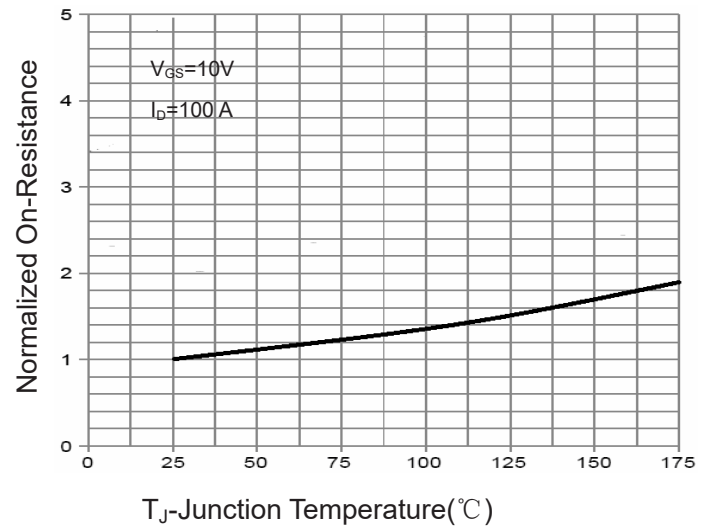
**Figure 1 Output Characteristics**



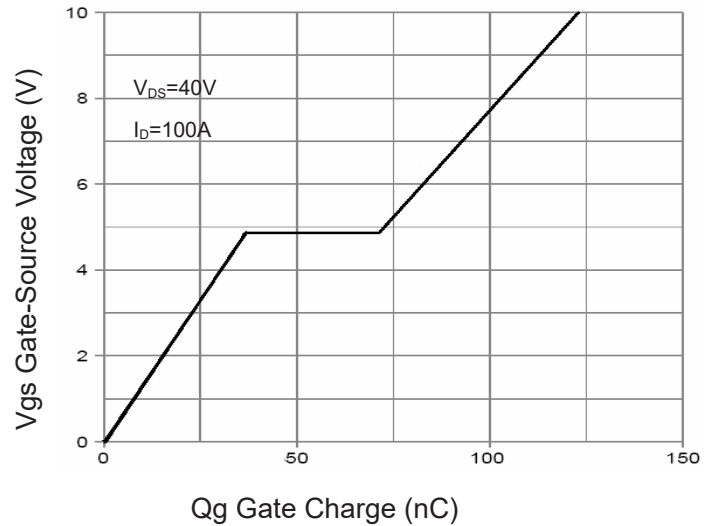
**Figure 2 Transfer Characteristics**



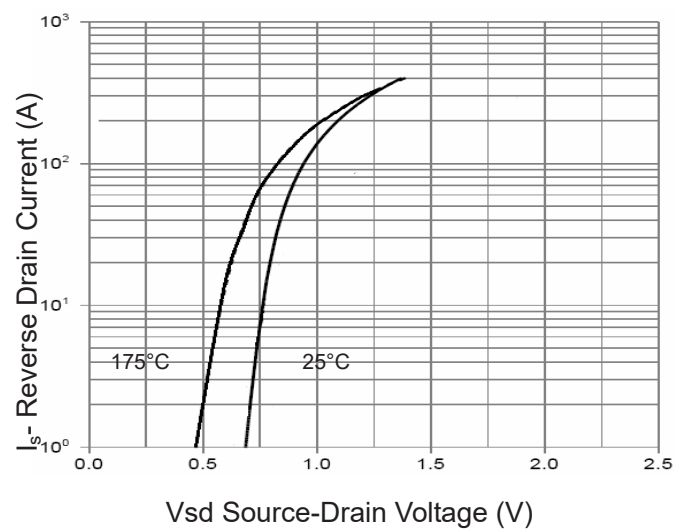
**Figure 3 Rdson- Drain Current**



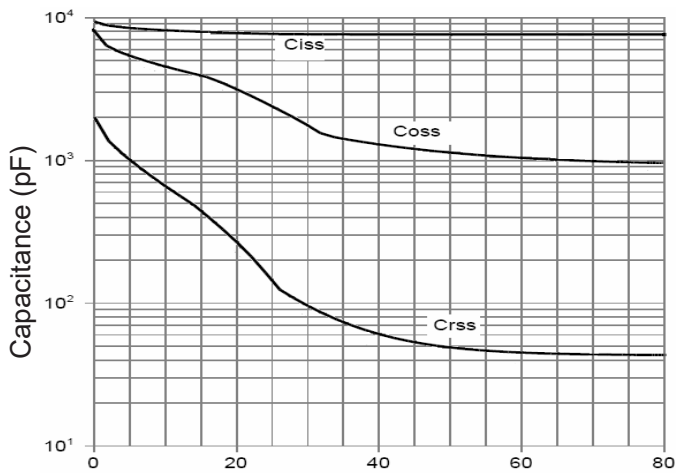
**Figure 4 Rdson-Junction Temperature**



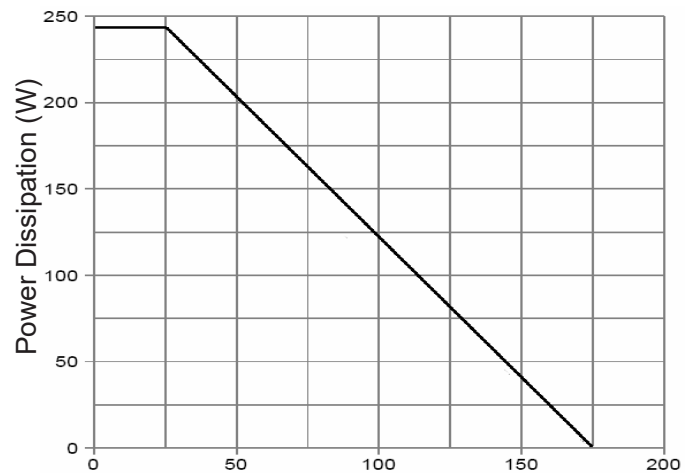
**Figure 5 Gate Charge**



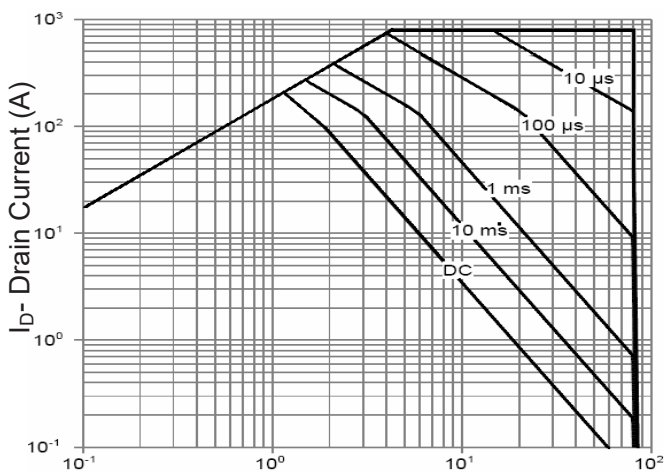
**Figure 6 Source- Drain Diode Forward**



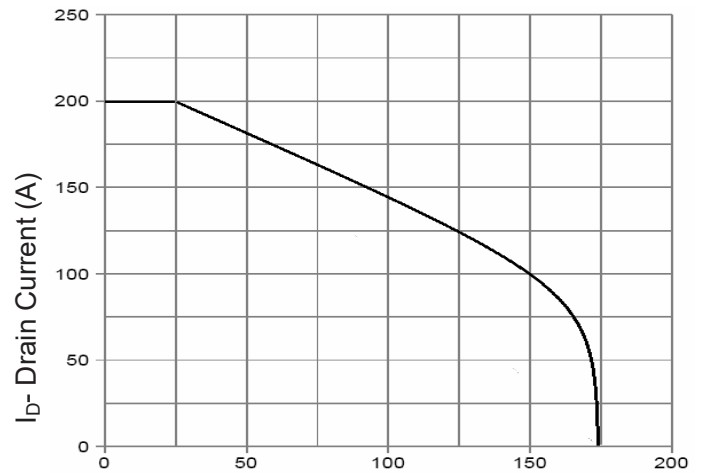
Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



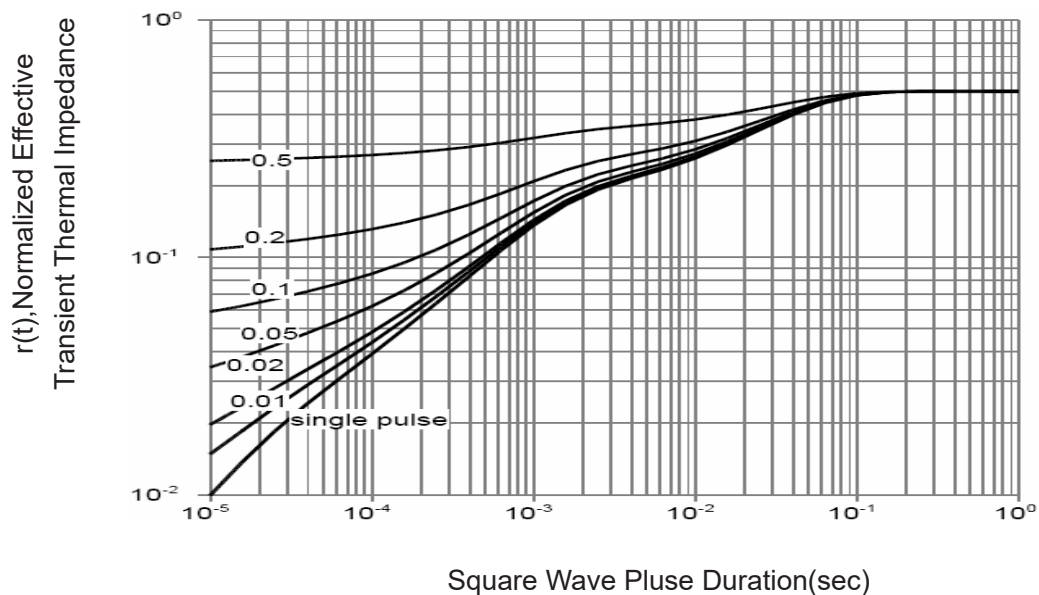
TJ-Junction Temperature(°C)  
**Figure 9 Power De-rating**



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



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



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