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.

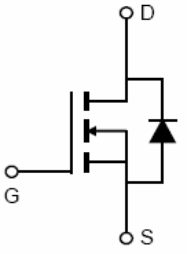
Application

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

General Features

- V_{DS} =100V,I_D =78A
  $R_{DS(ON)}$=6.8mΩ , typical (TO-220)@ V_{GS}=10V
  $R_{DS(ON)}$=8.2mΩ , typical (TO-220)@ V_{GS}=4.5V
- 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



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST10N068-TC	VST10N068	TO-220C	-	-	-

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	78	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	55	A
Pulsed Drain Current	I_{DM}	312	A
Maximum Power Dissipation	P_D	120	W
Derating factor		0.8	W/℃
Single pulse avalanche energy (Note 4)	E_{AS}	420	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.25	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	100		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=39A	-	6.8	8.0	mΩ
		V_{GS}=4.5V, I_D=39A	-	8.2	9.4	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=37.5A		60	-	S
Dynamic Characteristics (Note3)						
Input Capacitance	C_{lss}	V_{DS}=50V,V_{GS}=0V, F=1.0MHz	-	3650	-	pF
Output Capacitance	C_{oss}		-	315	-	pF
Reverse Transfer Capacitance	C_{rss}		-	22	-	pF
Switching Characteristics (Note 3)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V,I_D=39A V_{GS}=10V,R_G=1.6Ω	-	15	-	nS
Turn-on Rise Time	t_r		-	10	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	34	-	nS
Turn-Off Fall Time	t_f		-	8	-	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=39A, V_{GS}=10V	-	70	-	nC
Gate-Source Charge	Q_{gs}		-	14.5	-	nC
Gate-Drain Charge	Q_{gd}		-	16.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 2)	V_{SD}	V_{GS}=0V,I_S=39A	-	-	1.2	V
Diode Forward Current	I_S		-	-	78	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 39A di/dt = 100A/μs (Note3)	-	60	-	nS
Reverse Recovery Charge	Qrr		-	106	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Guaranteed by design, not subject to production
4. EAS condition : Tj=25℃,V_{DD}=50V,V_G=10V,L=0.25mH,Rg=25Ω

Typical Electrical and Thermal Characteristics

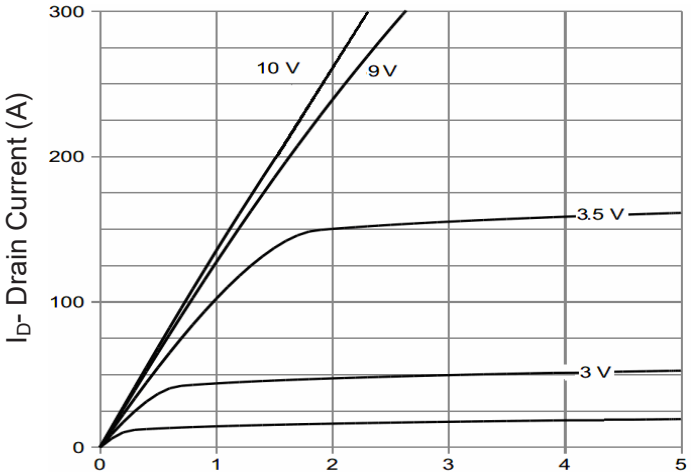


Figure 1 Output Characteristics

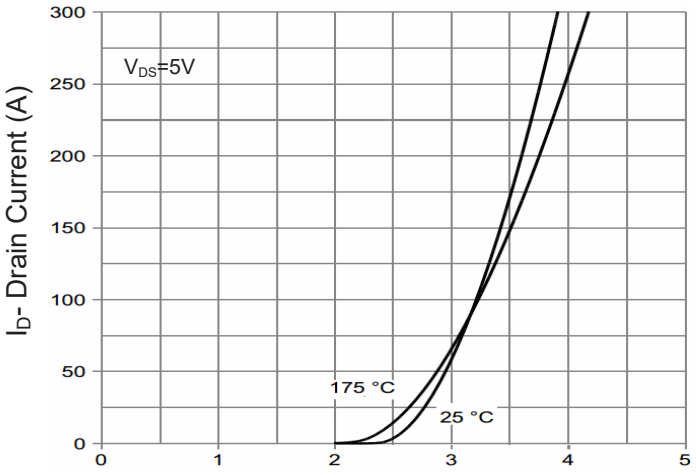


Figure 2 Transfer Characteristics

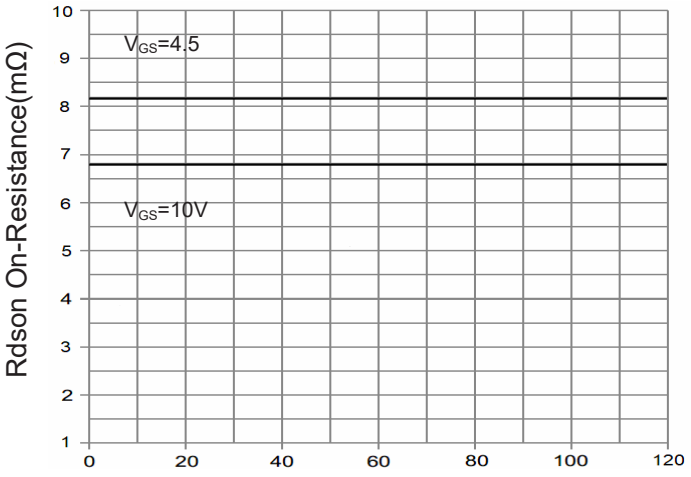


Figure 3 Rdson- Drain Current

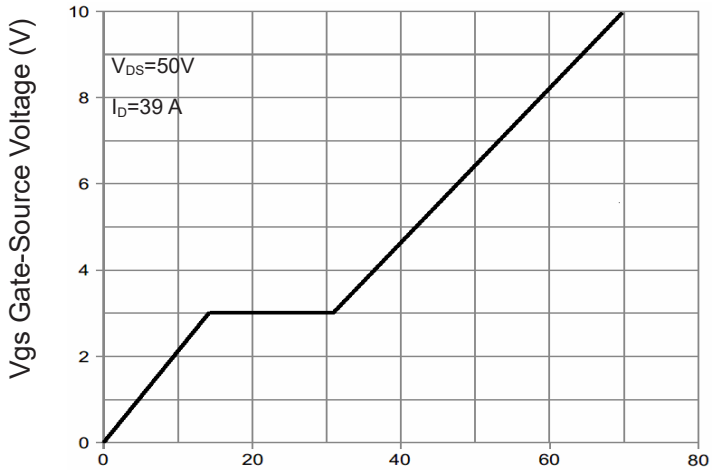


Figure 4 Gate Charge

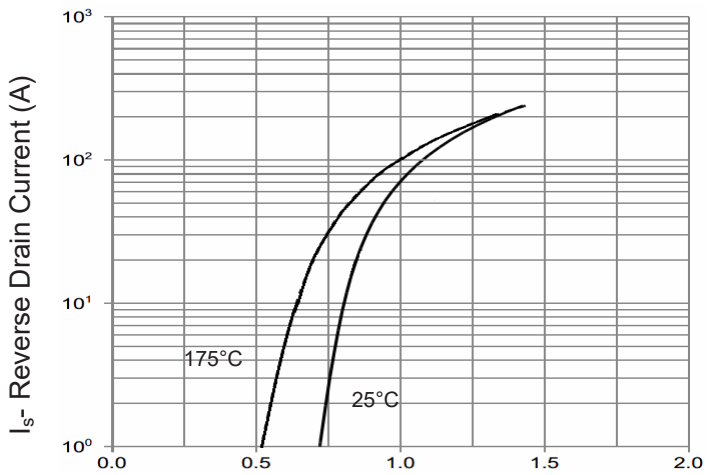


Figure 5 Source- Drain Diode Forward

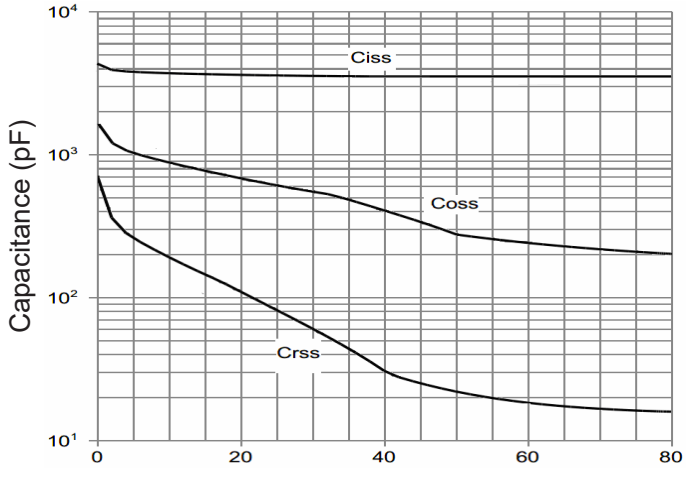
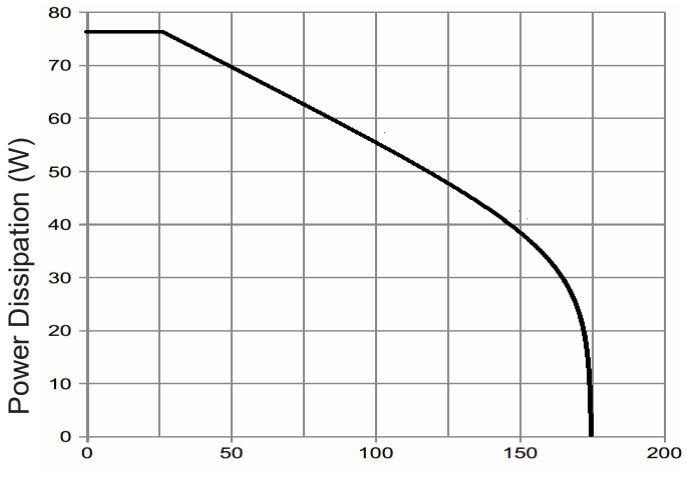
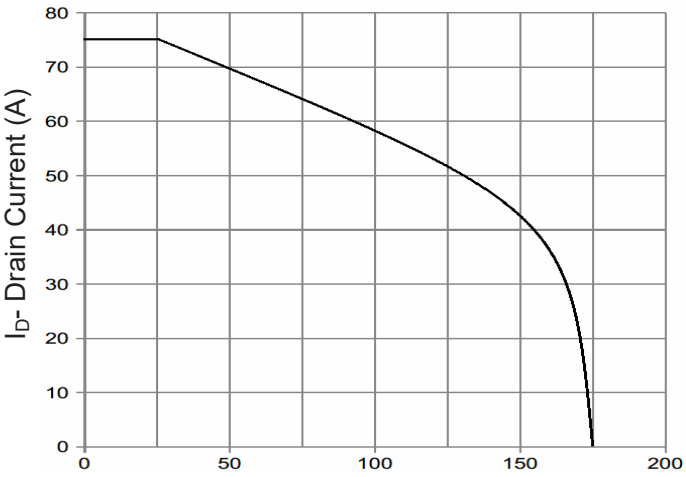


Figure 6 Capacitance vs Vds



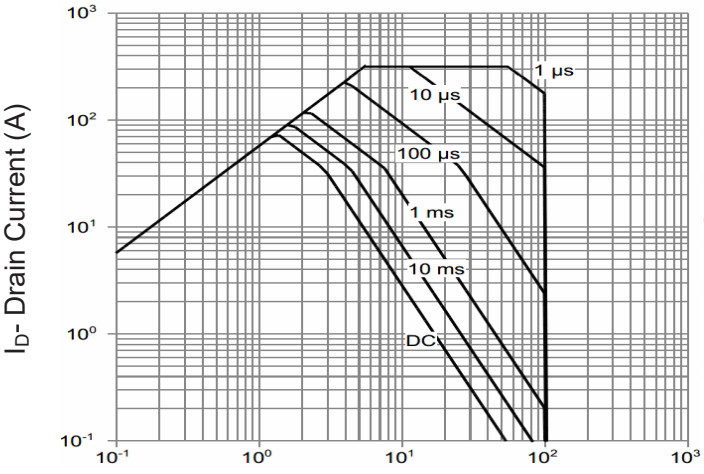
T_J-Junction Temperature(°C)

Figure 7 Power De-rating



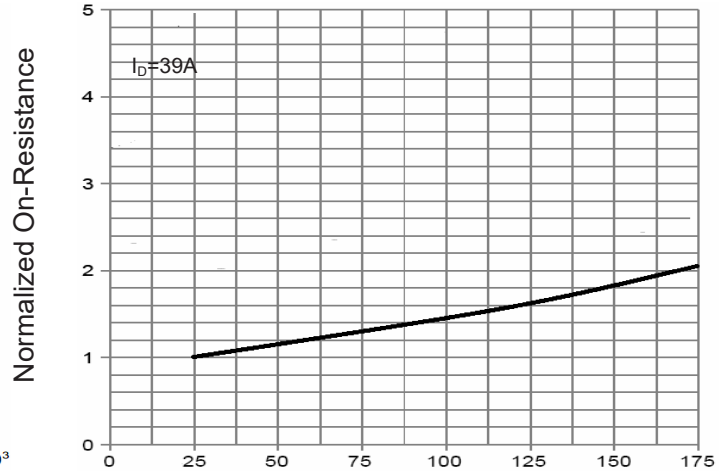
T_J-Junction Temperature (°C)

Figure 9 Current De-rating



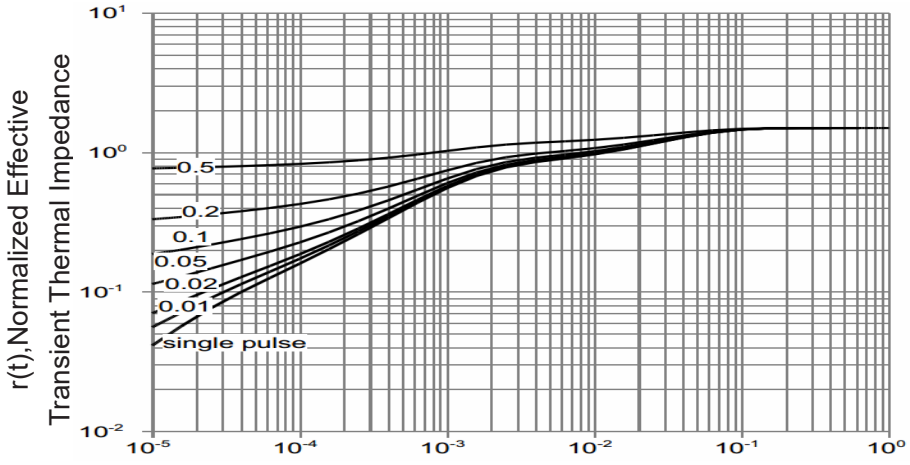
Vds Drain-Source Voltage (V)

Figure 8 Safe Operation Area



T_J-Junction Temperature(℃)

Figure 10 Rdson-Junction Temperature



Square Wave Pluse Duration(sec)

Figure 11 Normalized Maximum Transient Thermal Impedance