

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

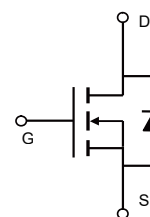
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- $V_{DS} = 120V, I_D = 90A$
 $R_{DS(ON)} = 7.7m\Omega$, typical (TO-220) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 7.5m\Omega$, 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-263



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST12N070	VST12N070-T3	TO-263	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	120	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	90	A
Drain Current-Continuous($T_C = 100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	64	A
Pulsed Drain Current ^(Note 1)	I_{DM}	360	A
Maximum Power Dissipation	P_D	140	W
Derating factor		0.93	W/°C
Single pulse avalanche energy ^(Note 4)	E_{AS}	352	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.07	°C/W
--------------------------------------	-----------------	------	------

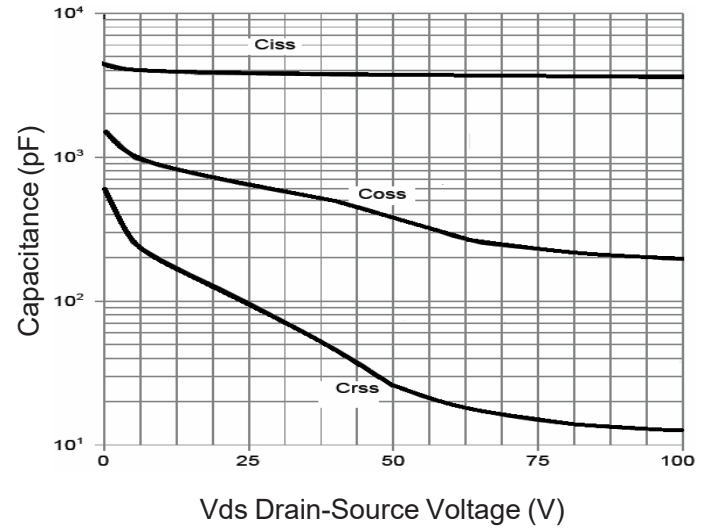
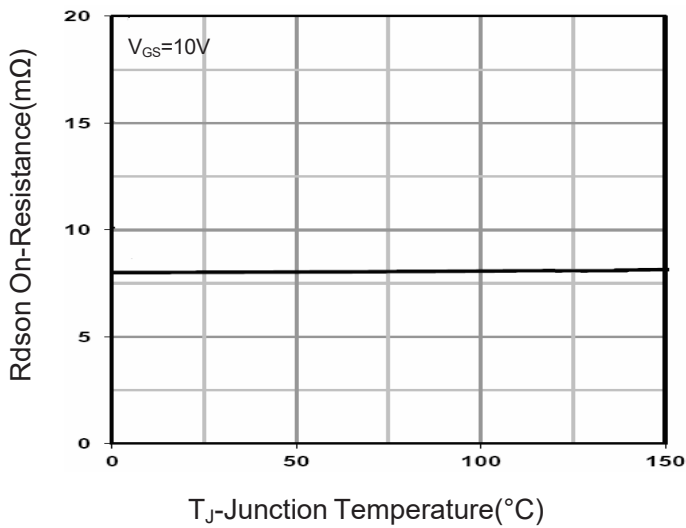
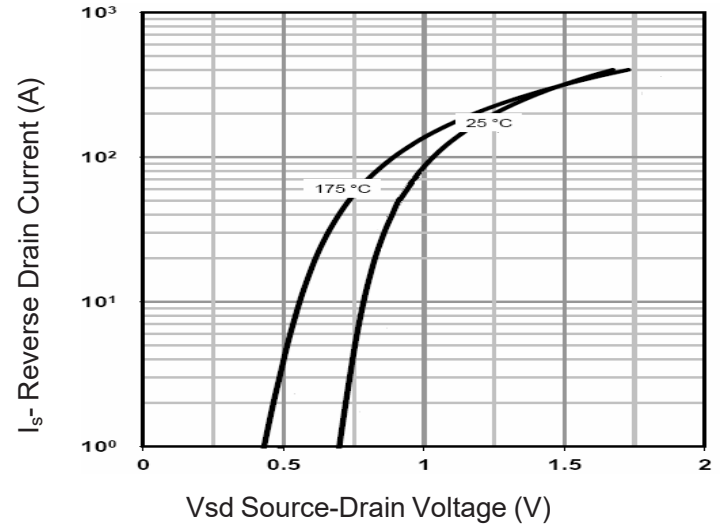
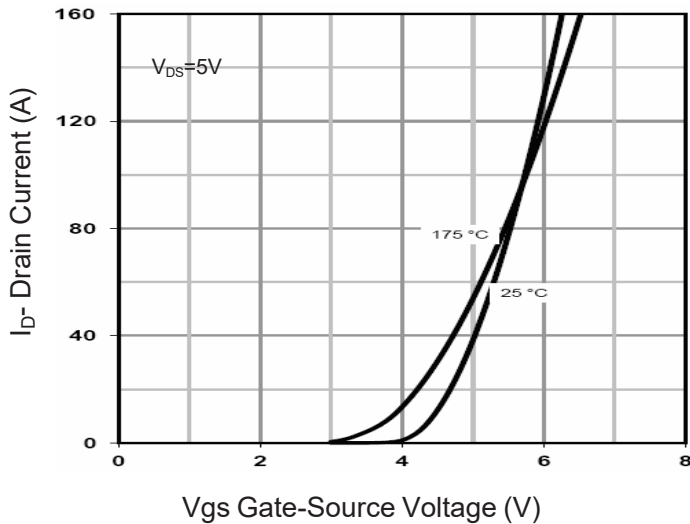
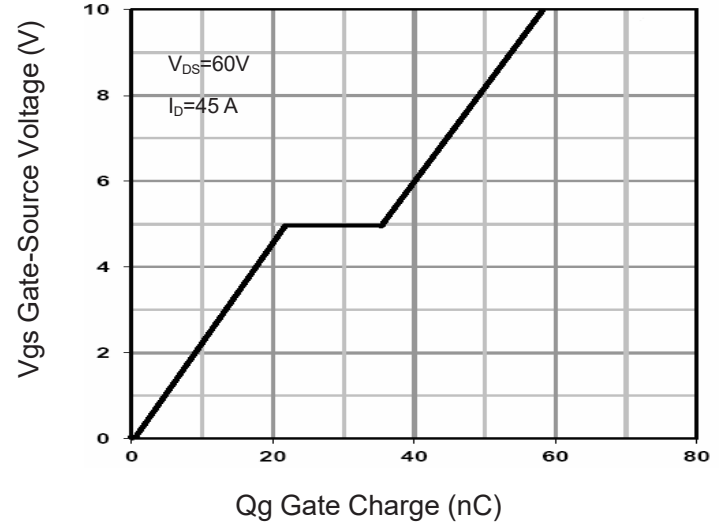
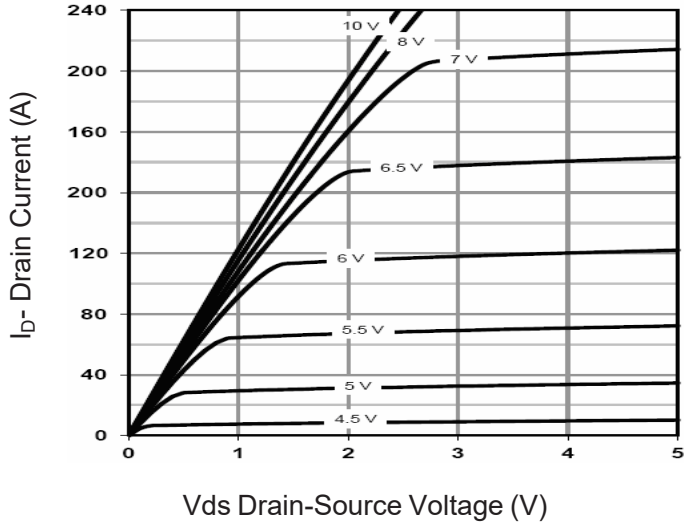
Electrical Characteristics (T_C=25°C unless otherwise noted)

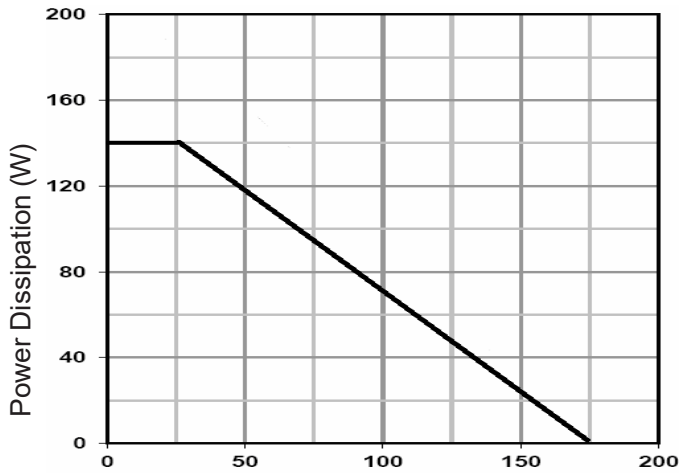
Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Off Characteristics							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	120		-	V	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =120V,V _{GS} =0V	-	-	1	μA	
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA	
On Characteristics (Note 3)							
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.0	3.0	4.0	V	
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =45A	TO-220	-	7.7	8.0	mΩ
			TO-263		7.5	8.0	
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =45A		55	-	S	
Dynamic Characteristics (Note3)							
Input Capacitance	C _{iss}	V _{DS} =60V,V _{GS} =0V, F=1.0MHz	-	3715	-	pF	
Output Capacitance	C _{oss}		-	275	-	pF	
Reverse Transfer Capacitance	C _{rss}		-	18	-	pF	
Switching Characteristics (Note 3)							
Turn-on Delay Time	t _{d(on)}	V _{DD} =60V,I _D =45A V _{GS} =10V,R _G =1.6Ω	-	20	-	nS	
Turn-on Rise Time	t _r		-	16	-	nS	
Turn-Off Delay Time	t _{d(off)}		-	45	-	nS	
Turn-Off Fall Time	t _f		-	12	-	nS	
Total Gate Charge	Q _g	V _{DS} =60V,I _D =45A, V _{GS} =10V	-	58	-	nC	
Gate-Source Charge	Q _{gs}		-	21	-	nC	
Gate-Drain Charge	Q _{gd}		-	14.5	-	nC	
Drain-Source Diode Characteristics							
Diode Forward Voltage (Note 2)	V _{SD}	V _{GS} =0V,I _S =45A	-	-	1.2	V	
Diode Forward Current	I _S		-	-	90	A	
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 90A di/dt = 100A/μs ^(Note3)	-	65	-	nS	
Reverse Recovery Charge	Q _{rr}		-	105	-	nC	

Notes:

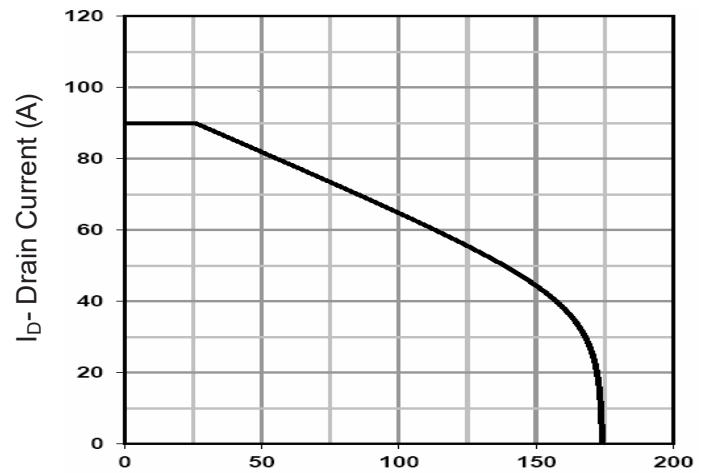
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Guaranteed by design, not subject to production
4. EAS condition : T_J=25°C, V_{DD}=50V, V_G=10V, L=0.25mH, R_G=25Ω

Typical Electrical and Thermal Characteristics

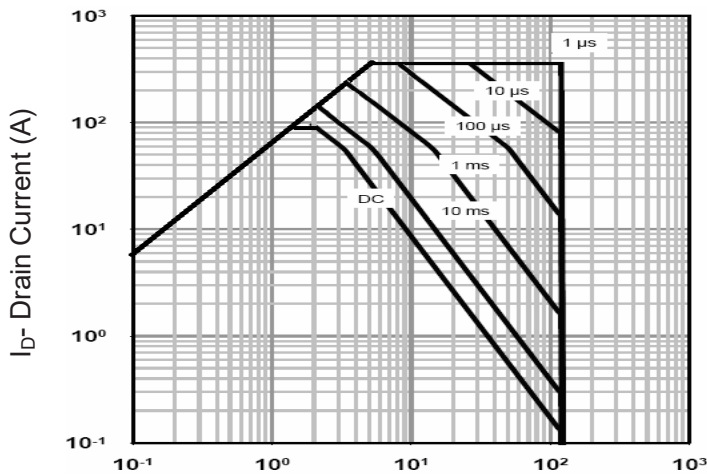




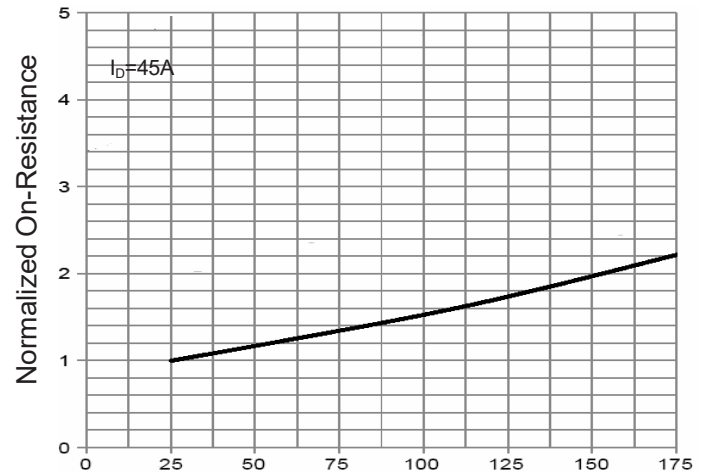
T_J -Junction Temperature(°C)
Figure 7 Power De-rating



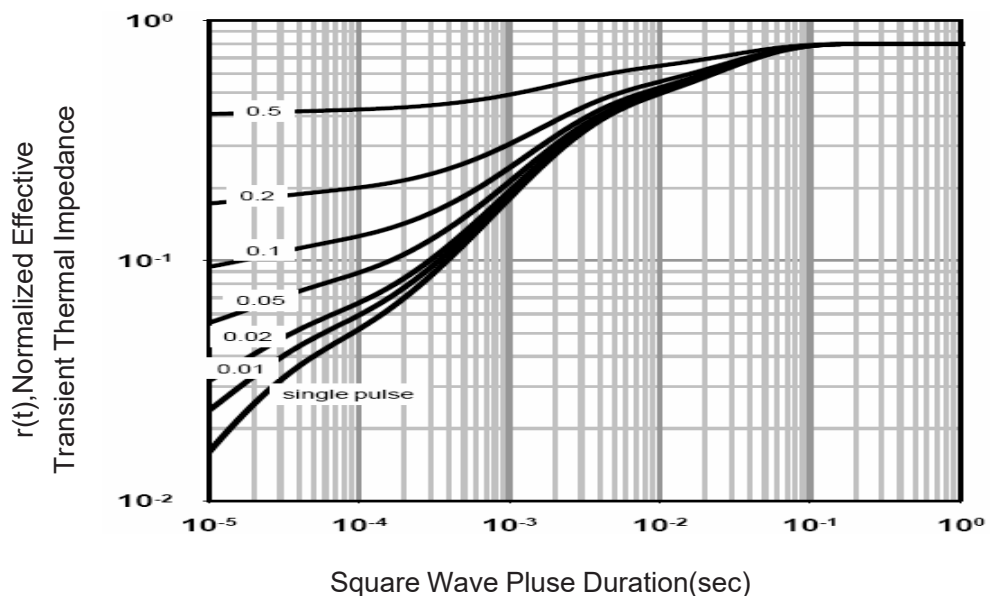
T_J -Junction Temperature (°C)
Figure 9 Current De-rating



V_{DS} Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J -Junction Temperature(°C)
Figure 10 Rdson-Junction Temperature



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