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.

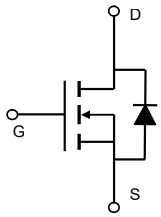
Application

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

General Features

- V_{DS} =200V,I_D =125A
  $R_{DS(ON)}$=7.7mΩ , typical (TO-220)@ V_{GS}=10V
  $R_{DS(ON)}$=7.5mΩ , 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-220



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST20N070	VST20N070-TC	TO-220	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	125	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	88	A
Pulsed Drain Current	I_{DM}	500	A
Maximum Power Dissipation	P_D	340	W
Derating factor		2.27	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	1692	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.44	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

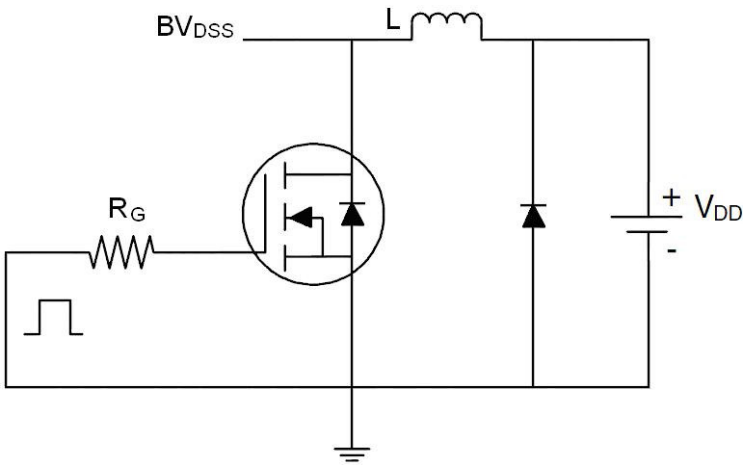
Parameter	Symbol	Condition		Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA		200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=200V,V_{GS}=0V		-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V		-	-	±100	nA
On Characteristics							
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=20A	TO-220	-	7.7	9.0	mΩ
			TO-263	-	7.5	9.0	
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=20A		70	-	-	S
Dynamic Characteristics							
Input Capacitance	C_{lss}	V_{DS}=100V,V_{GS}=0V, F=1.0MHz		-	6000	-	PF
Output Capacitance	C_{oss}			-	535	-	PF
Reverse Transfer Capacitance	C_{rss}			-	17.5	-	PF
Switching Characteristics (Note 2)							
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=100V,I_D=20A V_{GS}=10V,R_G=4.7Ω		-	54	-	nS
Turn-on Rise Time	t_r			-	38	-	nS
Turn-Off Delay Time	$t_{d(off)}$			-	65	-	nS
Turn-Off Fall Time	t_f			-	15	-	nS
Total Gate Charge	Q_g	V_{DS}=100V,I_D=20A, V_{GS}=10V		-	95		nC
Gate-Source Charge	Q_{gs}			-	30.5		nC
Gate-Drain Charge	Q_{gd}			-	24.5		nC
Drain-Source Diode Characteristics							
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=20A		-		1.2	V
Diode Forward Current	I_S			-	-	125	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 50A di/dt = 100A/μs		-	98		nS
Reverse Recovery Charge	Qrr			-	260		nC

Notes:

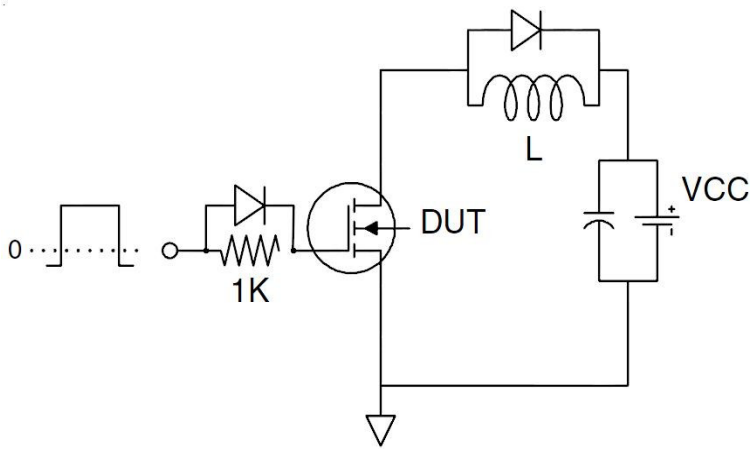
1. EAS condition : Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heat sink, assuming a maximum junction temperature of TJ(MAX)=175° C. The SOA curve provides a single pulse rating.

Test Circuit

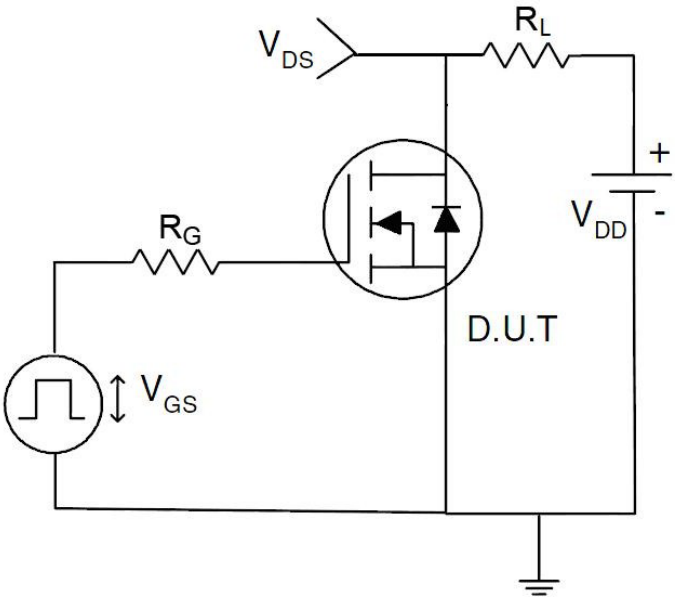
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

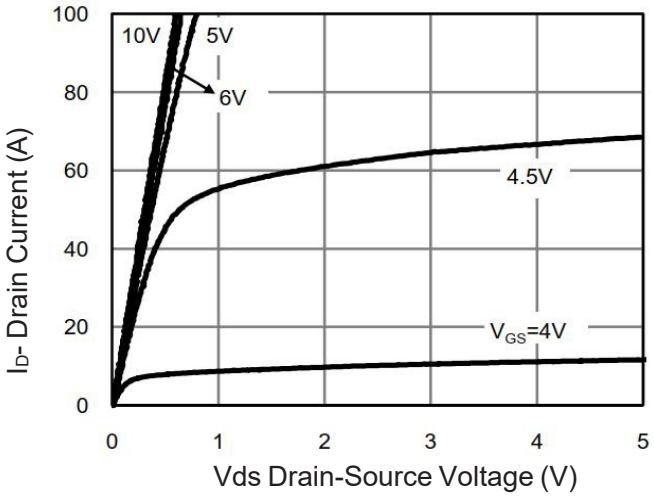


Figure 1 Output Characteristics

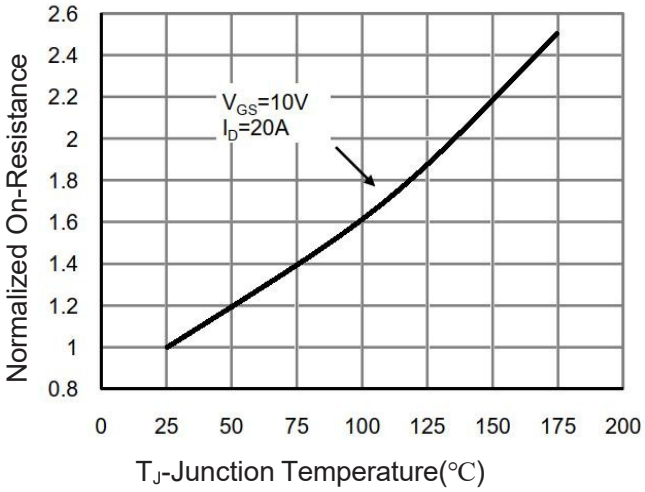


Figure 4 Rdson-JunctionTemperature

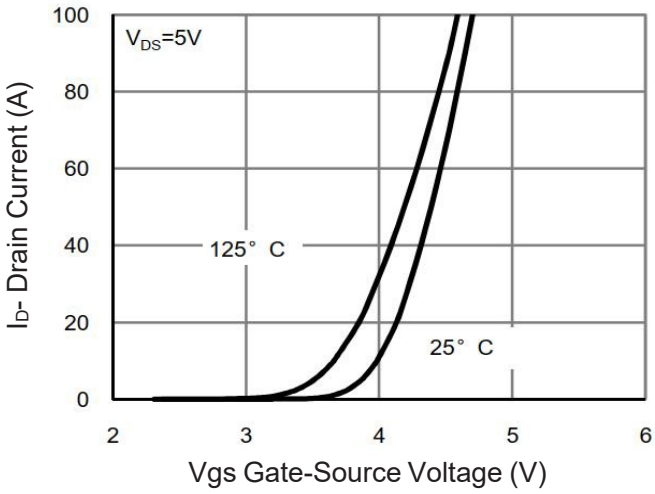


Figure 2 Transfer Characteristics

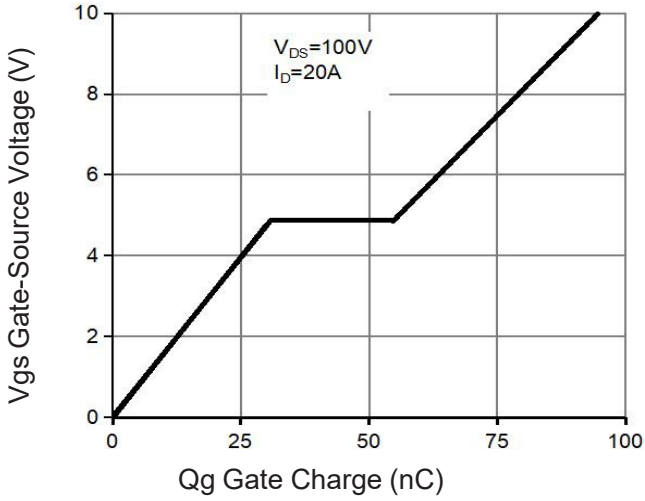


Figure 5 Gate Charge

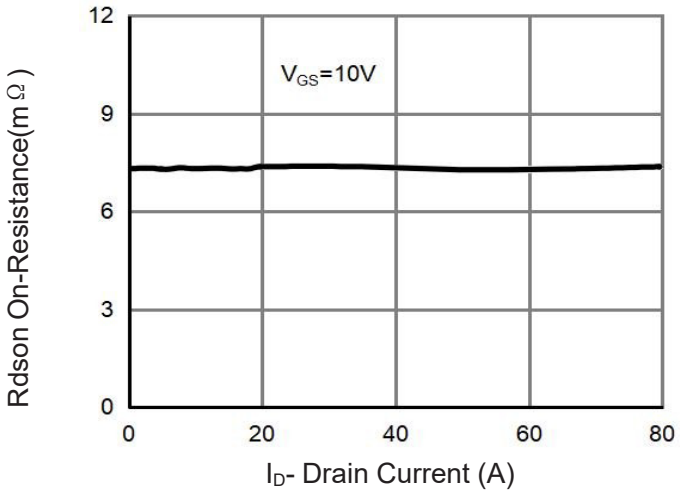


Figure 3 Rdson- Drain Current

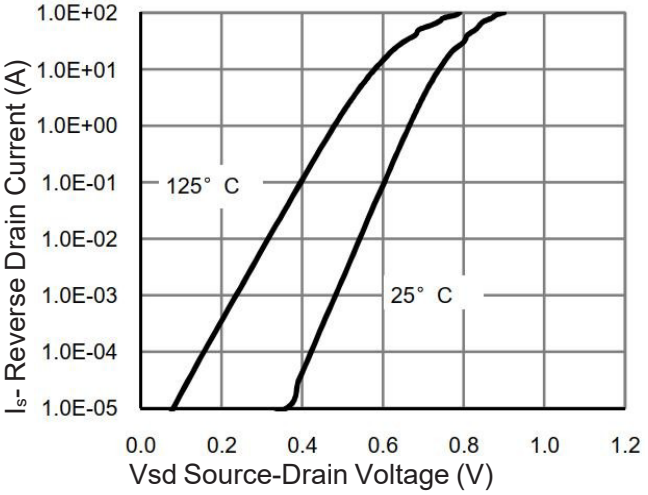


Figure 6 Source- Drain Diode Forward

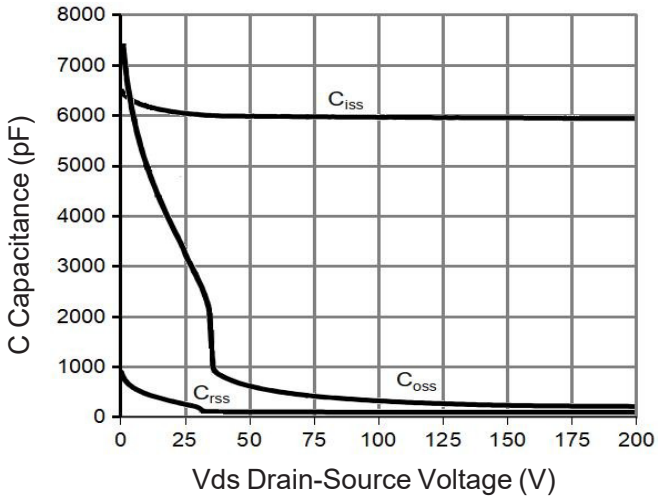


Figure 7 Capacitance vs Vds

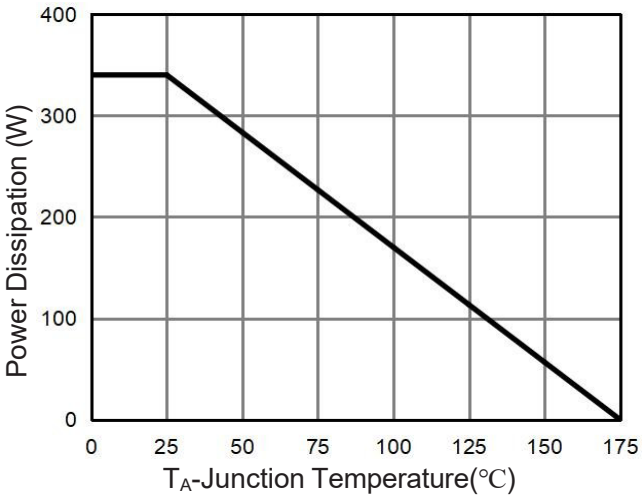


Figure 9 Power De-rating

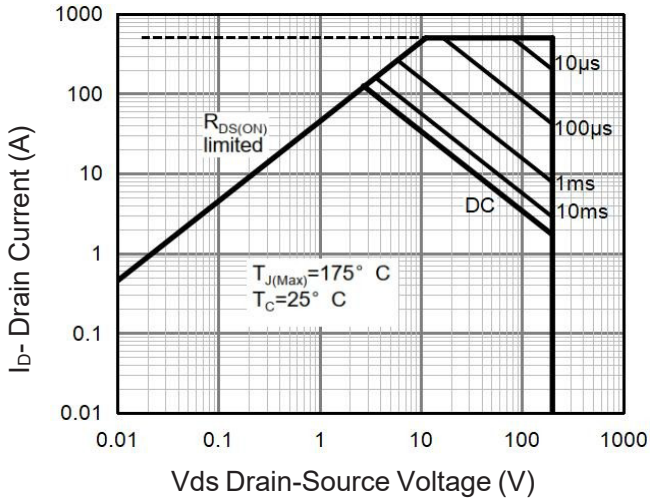


Figure 8 Safe Operation Area (Note3)

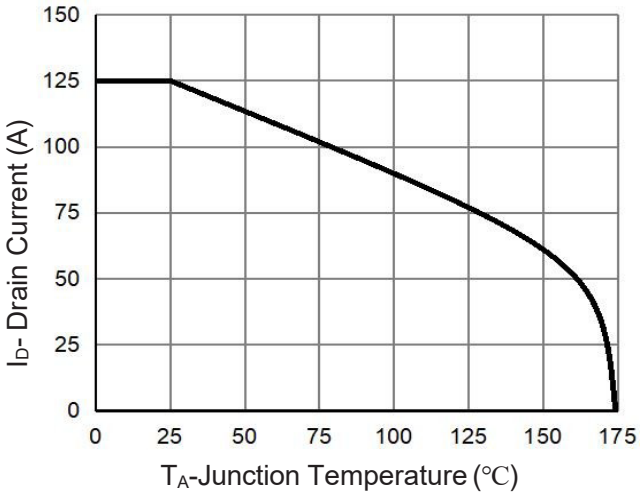


Figure 10 Current De-ratin

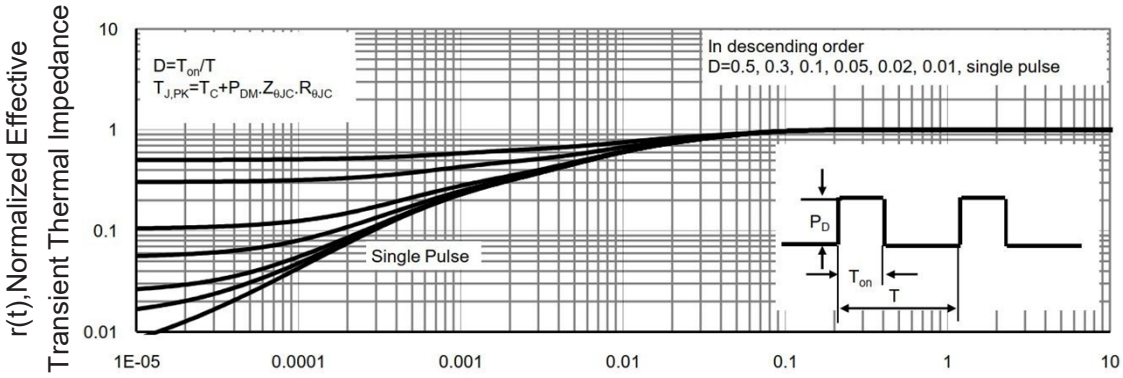


Figure 11 Normalized Maximum Transient Thermal Impedance