

Description

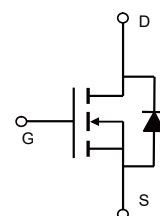
The series of devices uses **Super Trench II** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency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

Application

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

General Features

- $V_{DS}=85V, I_D=240A$
 $R_{DS(ON)}=2.2m\Omega$, typical (TO-220)@ $V_{GS}=10V$
 $R_{DS(ON)}=2.0m\Omega$, 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



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST08N020	VST08N020-T3	TO-263	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	85	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	240	A
Drain Current-Continuous($T_c=100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	170	A
Pulsed Drain Current	I_{DM}	960	A
Maximum Power Dissipation	P_D	270	W
Derating factor		1.8	W/°C
Single pulse avalanche energy (Note 1)	E_{AS}	2400	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.56	°C/W
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Electrical Characteristics (T_c=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Off Characteristics							
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	85		-	V	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=85V, V_{GS}=0V$	-	-	1	μA	
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA	
On Characteristics							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	V	
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	TO-220	-	2.2	2.6	m Ω
			TO-263		2.0	2.6	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=100A$		145	-	S	
Dynamic Characteristics							
Input Capacitance	C_{iss}	$V_{DS}=40V, V_{GS}=0V,$ $F=1.0MHz$	-	13400	-	PF	
Output Capacitance	C_{oss}		-	1850	-	PF	
Reverse Transfer Capacitance	C_{rss}		-	35	-	PF	
Switching Characteristics (Note 2)							
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=40V, I_D=20A$ $V_{GS}=10V, R_G=1.6\Omega$	-	33	-	nS	
Turn-on Rise Time	t_r		-	32	-	nS	
Turn-Off Delay Time	$t_{d(off)}$		-	83	-	nS	
Turn-Off Fall Time	t_f		-	28	-	nS	
Total Gate Charge	Q_g	$V_{DS}=40V, I_D=20A,$ $V_{GS}=10V$	-	172	-	nC	
Gate-Source Charge	Q_{gs}		-	55.5		nC	
Gate-Drain Charge	Q_{gd}		-	41.5		nC	
Drain-Source Diode Characteristics							
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=20A$	-		1.2	V	
Diode Forward Current	I_S		-	-	240	A	
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}C, I_F = 20A$	-	95	-	nS	
Reverse Recovery Charge	Q_{rr}	$di/dt = 100A/\mu s$	-	250	-	nC	

Notes:

- EAS condition : T_J=25°C, V_{DD}=40V, V_G=10V, L=0.5mH, R_G=25Ω
- Guaranteed by design, not subject to production
- These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=175°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

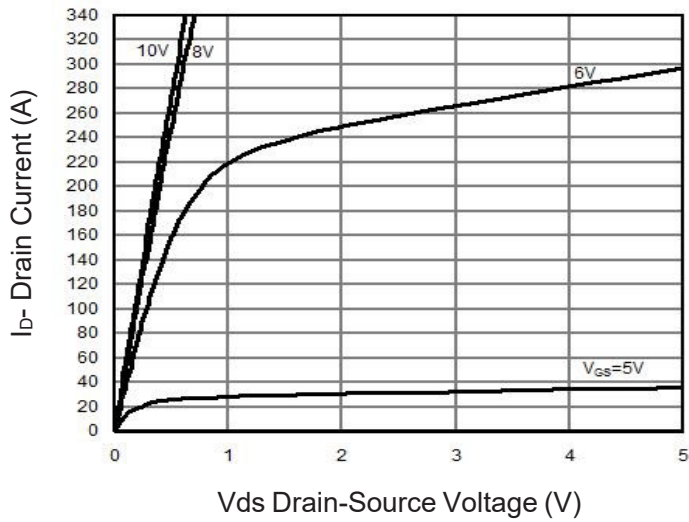


Figure 1 Output Characteristics

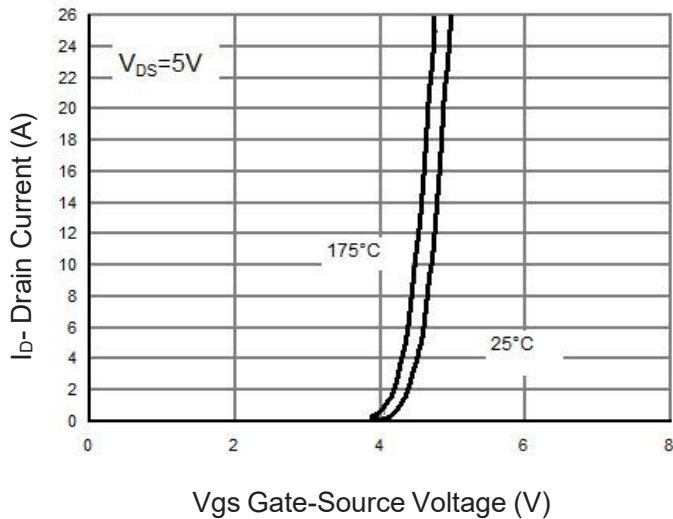


Figure 2 Transfer Characteristics

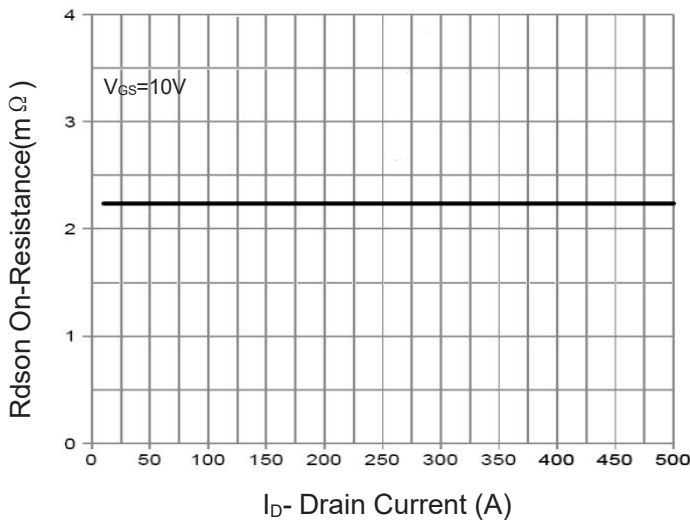


Figure 3 Rdson- Drain Current

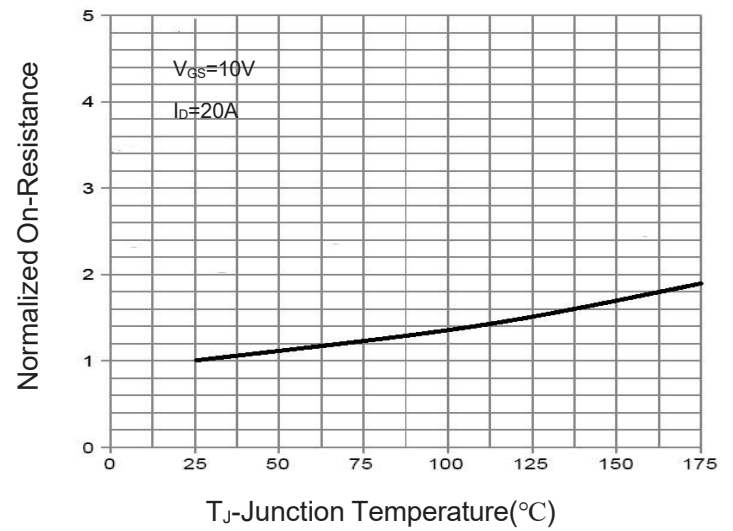


Figure 4 Rdson-Junction Temperature

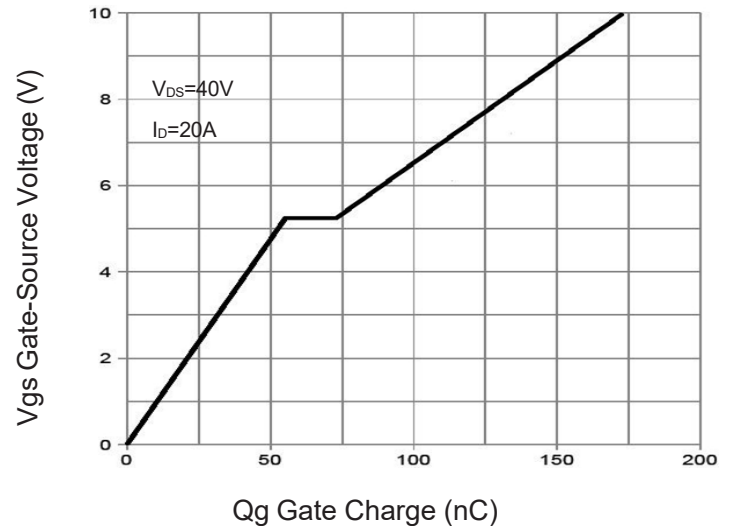


Figure 5 Gate Charge

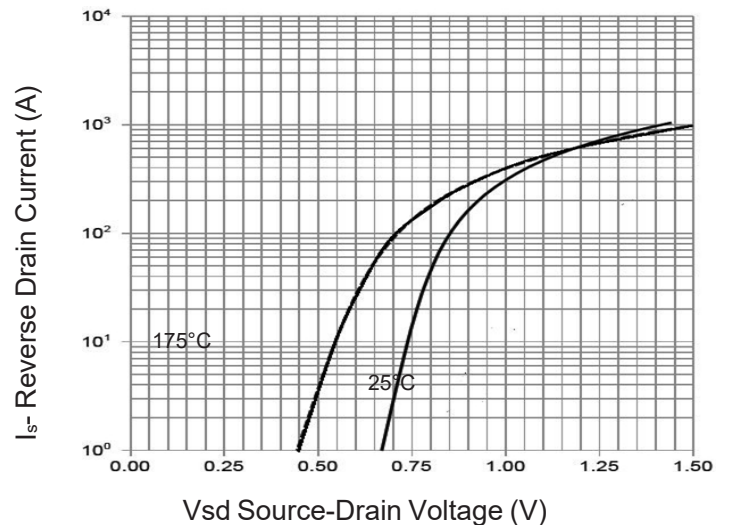
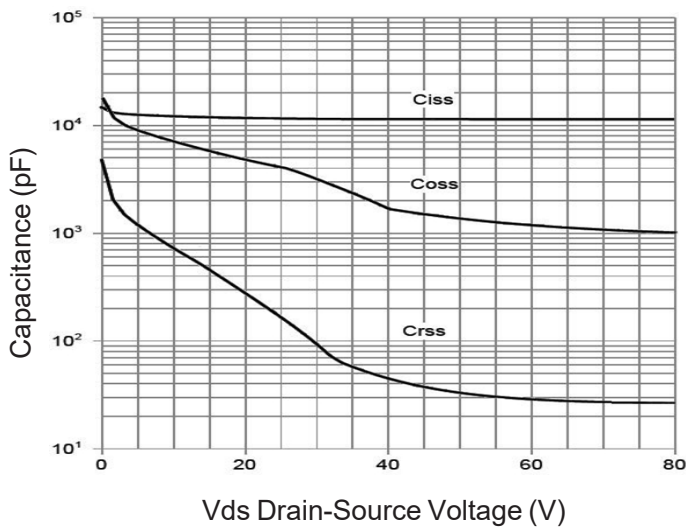
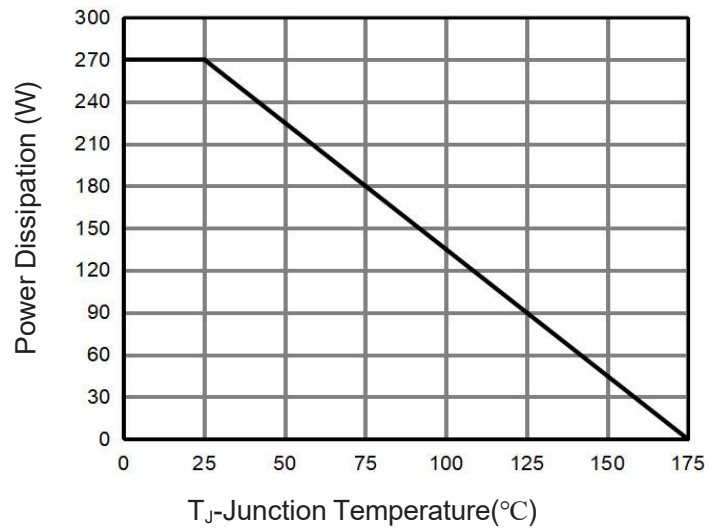
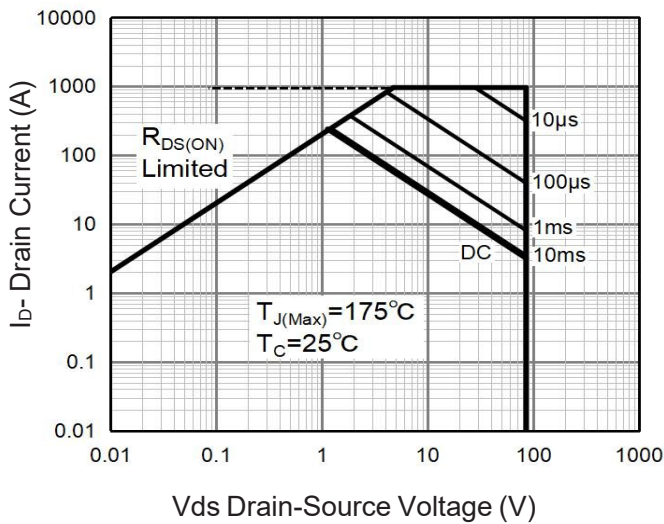
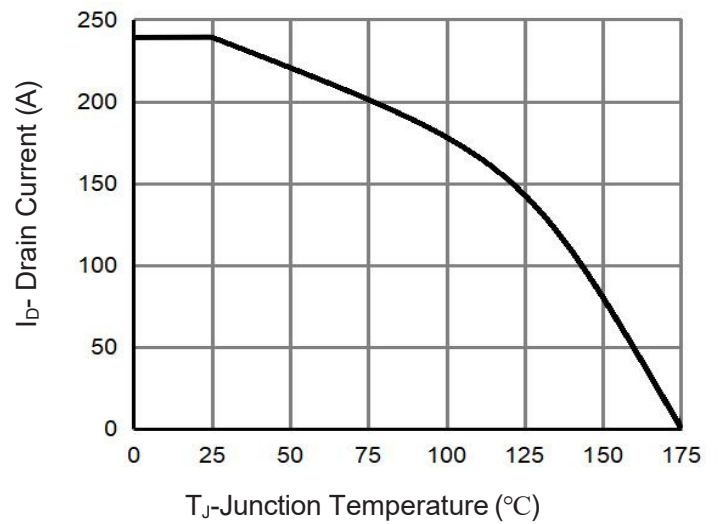
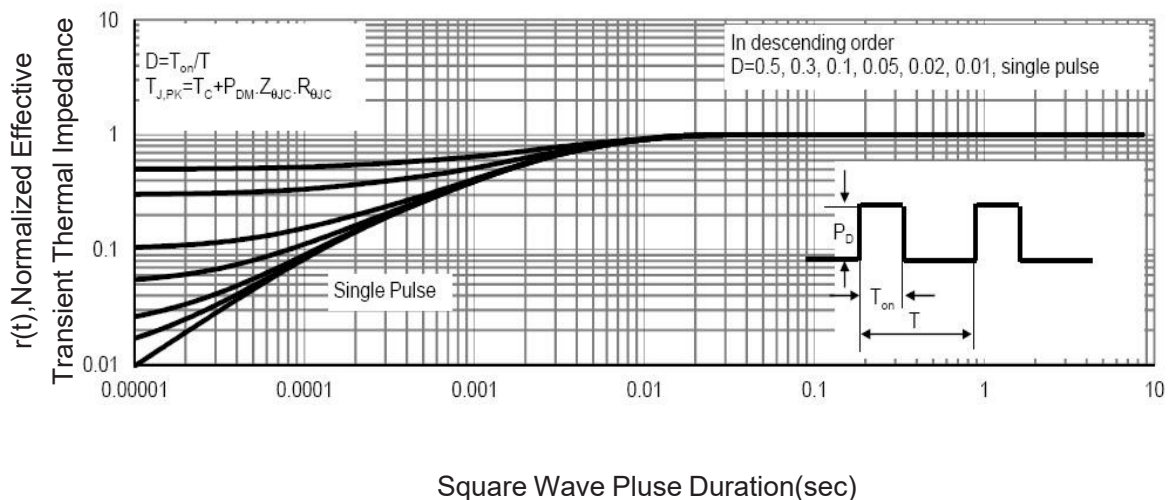


Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 Power De-rating

Figure 8 Safe Operation Area (Note 3)

Figure 10 Current De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance