Description

The VST23N130 uses **Super Trench** technology that is uniformly 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.
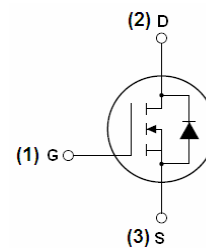
General Features

● V_{DS} =230V, I_D =90A

　$R_{DS(ON)}$ <15.5mΩ @ V_{GS}=10V

● Excellent gate charge x $R_{DS(on)}$ product

● Very low on-resistance $R_{DS(on)}$

● 175 °C operating temperature

● Pb-free lead plating

● 100% UIS tested

Application

● DC/DC Converter

● Ideal for high-frequency switching and synchronous rectification

TO-263

Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST23N130-T3	VST23N130	TO-263	-	-	-

Absolute Maximum Ratings (T$_C$=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	230	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	90	A
Drain Current-Continuous(T$_C$=100℃)	I_D (100℃)	63.6	A
Pulsed Drain Current	I_{DM}	360	A
Maximum Power Dissipation	P_D	300	W
Derating factor		2	W/℃
Single pulse avalanche energy [Note 5]	E_{AS}	1216	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case(Note 2)	$R_{\theta JC}$	0.5	℃/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	230		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=230V,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	2.5		4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=45A	-	13	15.5	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=45A	70	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{Iss}	V_{DS}=100V,V_{GS}=0V, F=1.0MHz	-	4200	-	PF
Output Capacitance	C_{oss}		-	333.1	-	PF
Reverse Transfer Capacitance	C_{rss}		-	8.8	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=100V,I_D=45A V_{GS}=10V,R_G=4.7Ω	-	18	-	nS
Turn-on Rise Time	t_r		-	26	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	41	-	nS
Turn-Off Fall Time	t_f		-	11	-	nS
Total Gate Charge	Q_g	V_{DS}=100V,I_D=45A, V_{GS}=10V	-	63.2	-	nC
Gate-Source Charge	Q_{gs}		-	24	-	nC
Gate-Drain Charge	Q_{gd}		-	16.4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=90A	-		1.2	V
Diode Forward Current (Note 2)	I_S		-	-	90	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 45 di/dt = 100A/µs(Note3)	-	140		nS
Reverse Recovery Charge	Qrr		-	600		nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω

Test Circuit

1) E$_{AS}$ test Circuit
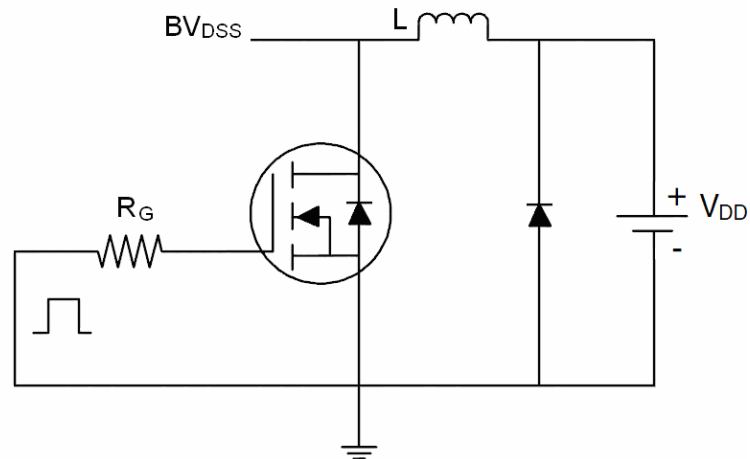
2) Gate charge test Circuit
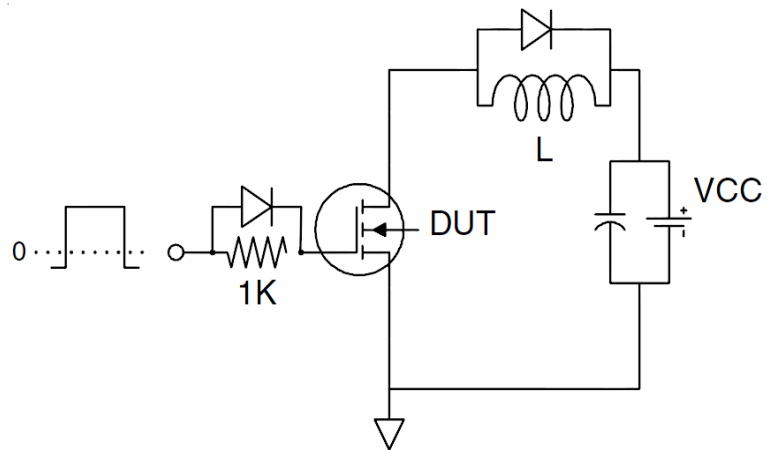
3) Switch Time Test Circuit
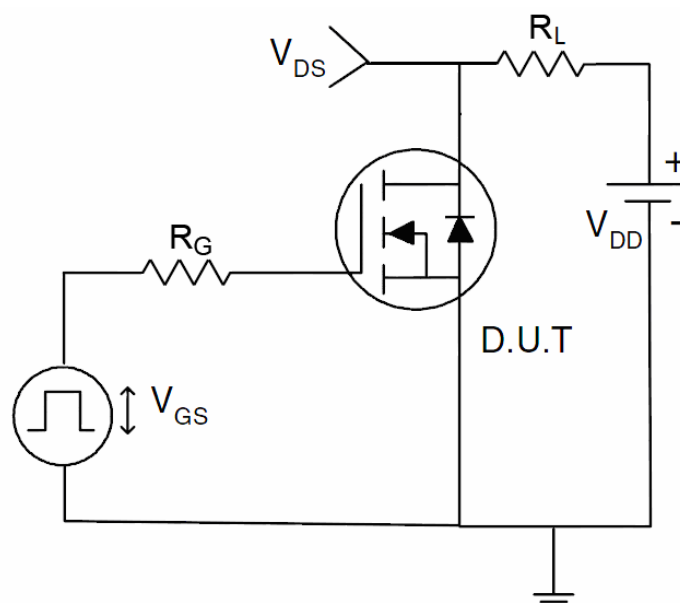
Typical Electrical and Thermal Characteristics
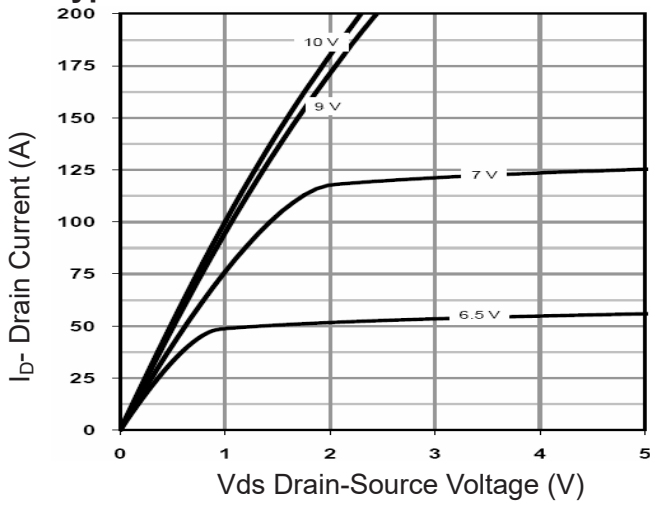
Figure 1 Output Characteristics
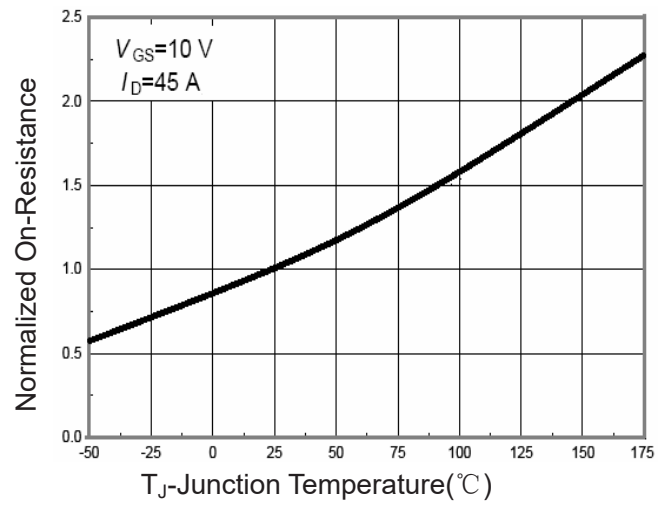
Figure 4 Rdson-JunctionTemperature
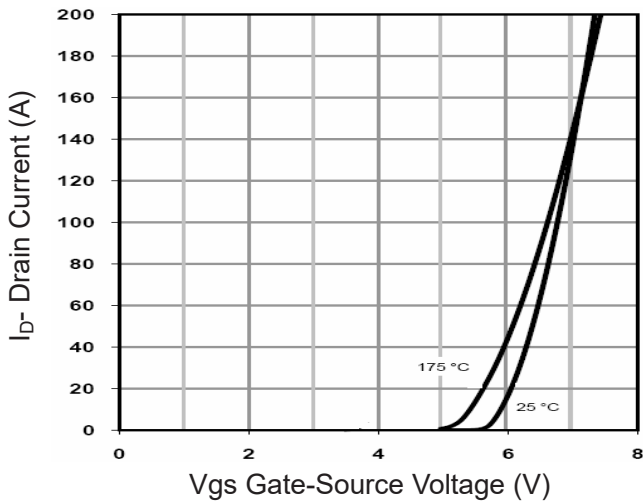
Figure 2 Transfer Characteristics
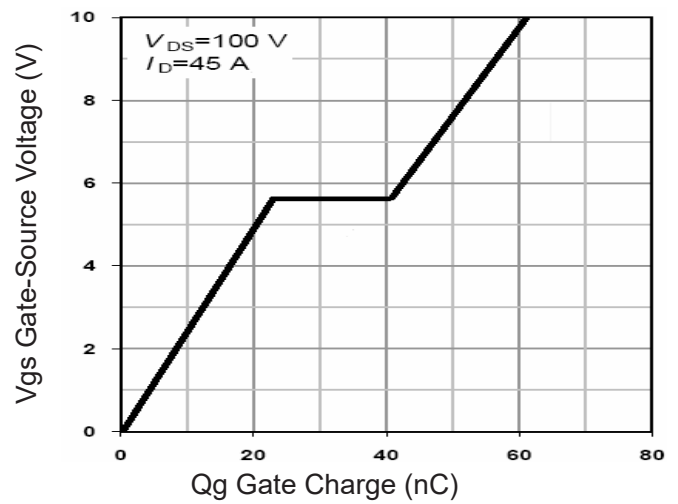
Figure 5 Gate Charge
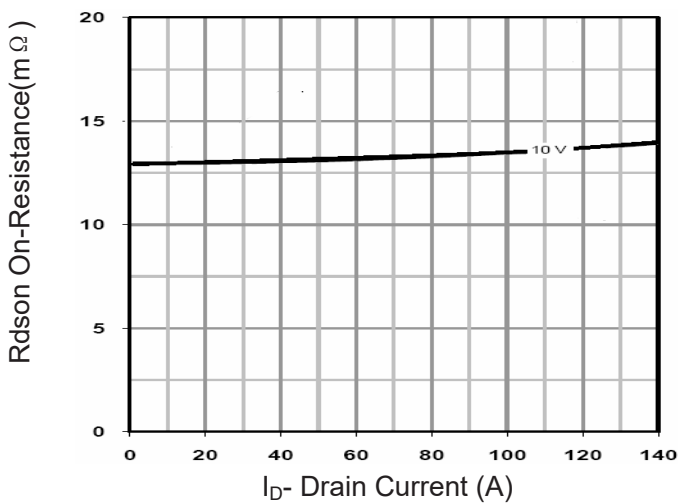
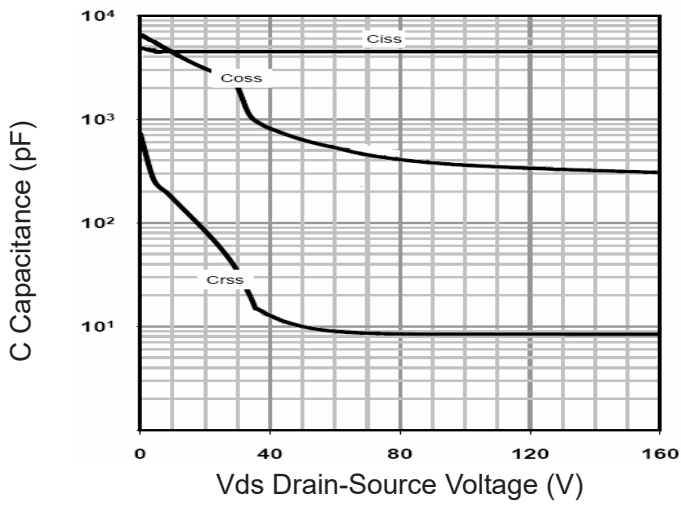**Figure 3 Rdson- Drain Current**
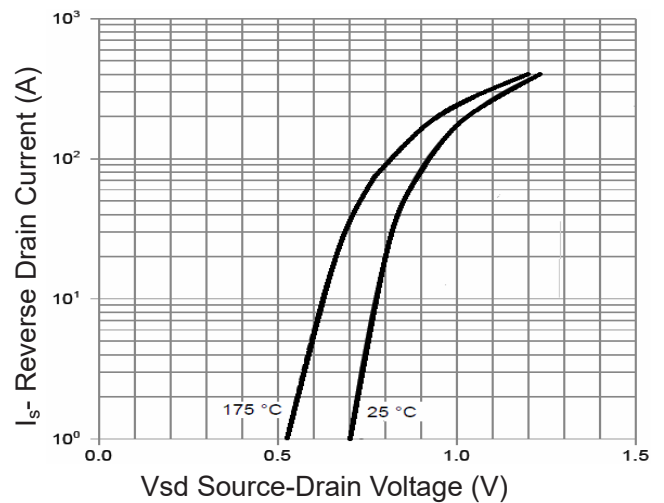
Figure 6 Source- Drain Diode Forward
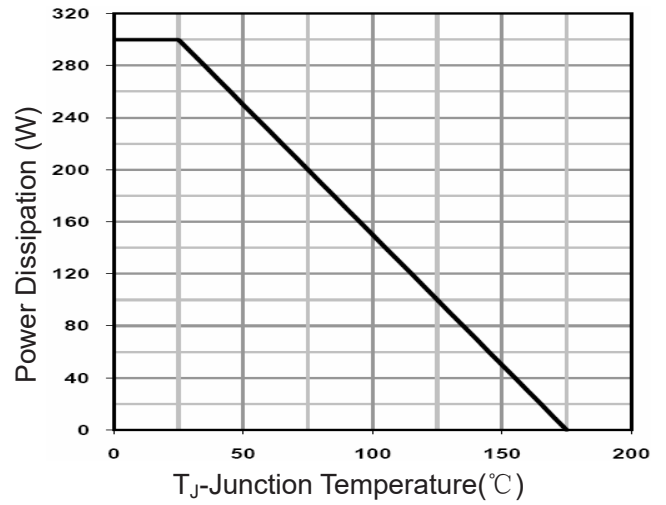
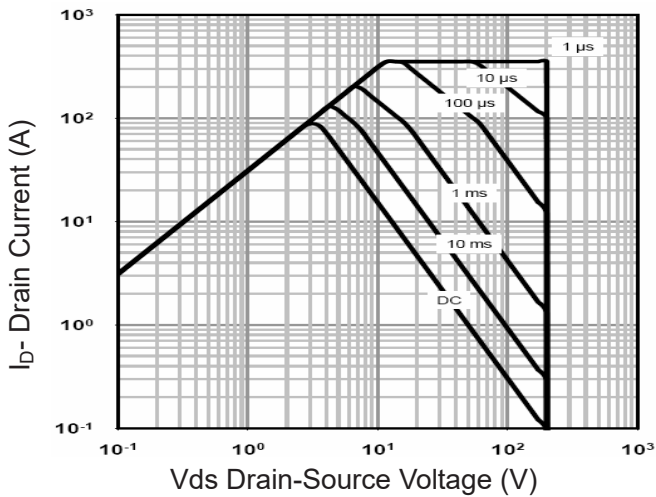**Figure 7 Capacitance vs Vds**

Figure 9 Power De-rating

Figure 8 Safe Operation Area
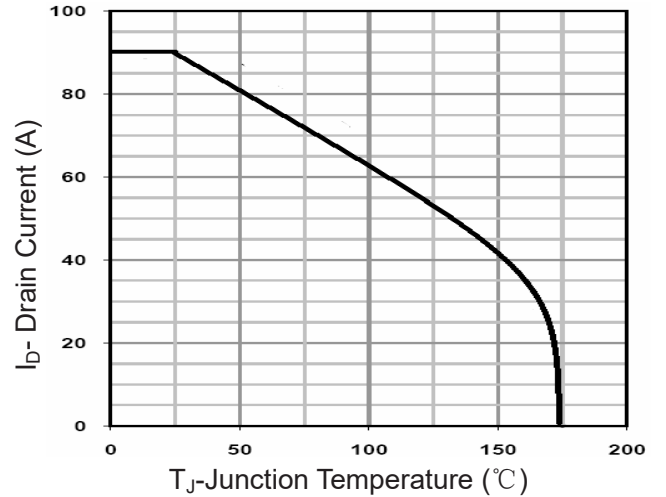
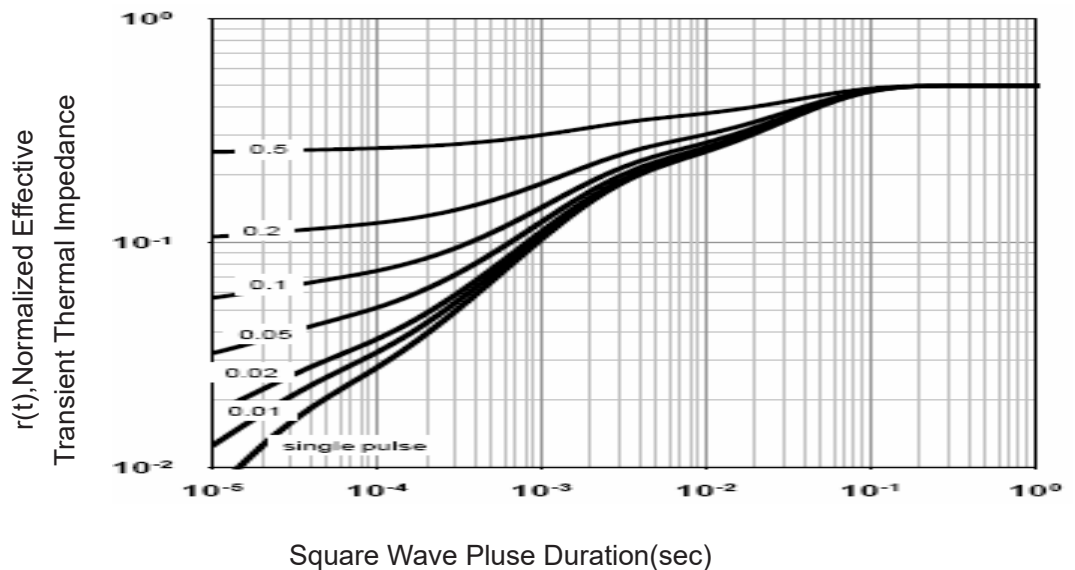**Figure 10 Current De-rating**

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