Description

The VST10N750 uses **Super Trench** 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.

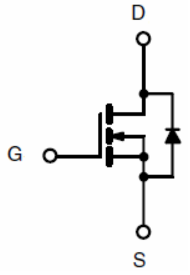
General Features

- V_{DS} = 100V,I_D = 7A
  $R_{DS(ON)}$ < 85mΩ @ V_{GS}=10V (Typ:75mΩ)
  $R_{DS(ON)}$ < 105mΩ @ V_{GS}=4.5V (Typ:85mΩ)
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

SOT-223



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST10N750-S23	VST10N750	SOT-223	Ø330mm	12mm	2500 units

Absolute Maximum Ratings (T_A=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	7	A
Drain Current-Pulsed (Note 1)	I_{DM}	28	A
Single pulse avalanche energy (Note 5)	E_{AS}	20	mJ
Maximum Power Dissipation	P_D	2.5	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	50	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

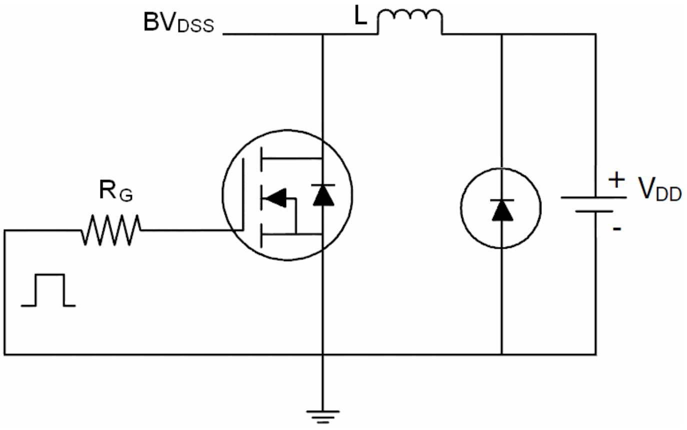
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.2	1.9	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=7A	-	75	85	mΩ
		V_{GS}=4.5V, I_D=7A	-	85	105	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=7A	-	8	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{Iss}	V_{DS}=50V,V_{GS}=0V, F=1.0MHz	-	443	-	PF
Output Capacitance	C_{oss}		-	80	-	PF
Reverse Transfer Capacitance	C_{rss}		-	15.4	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V, R_L=7Ω V_{GS}=10V,R_G=2.5Ω	-	6	-	nS
Turn-on Rise Time	t_r		-	2.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	18	-	nS
Turn-Off Fall Time	t_f		-	2.5	-	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=7A, V_{GS}=10V	-	7.2		nC
Gate-Source Charge	Q_{gs}		-	1.3	-	nC
Gate-Drain Charge	Q_{gd}		-	1.0	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=7A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	7	A
Reverse Recovery Time	trr	T_J = 25°C, I_F =3.5A di/dt = 100A/μs(Note3)	-	31.2	-	nS
Reverse Recovery Charge	Qrr		-	41.2	-	nC

Notes:

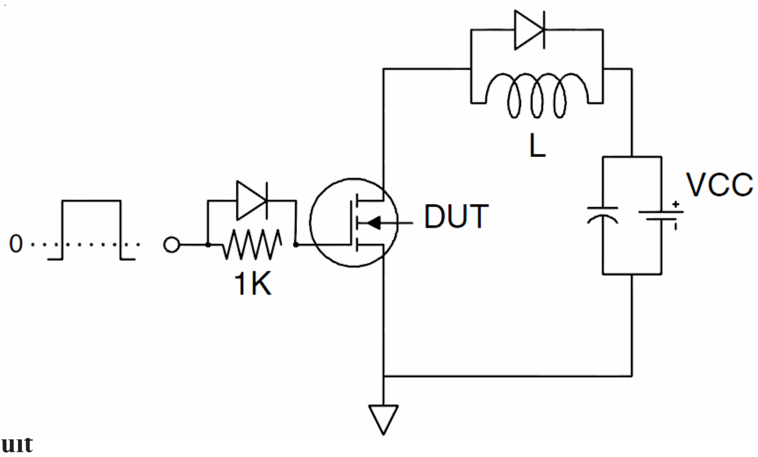
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to product
5. EAS condition：Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω

Test Circuit

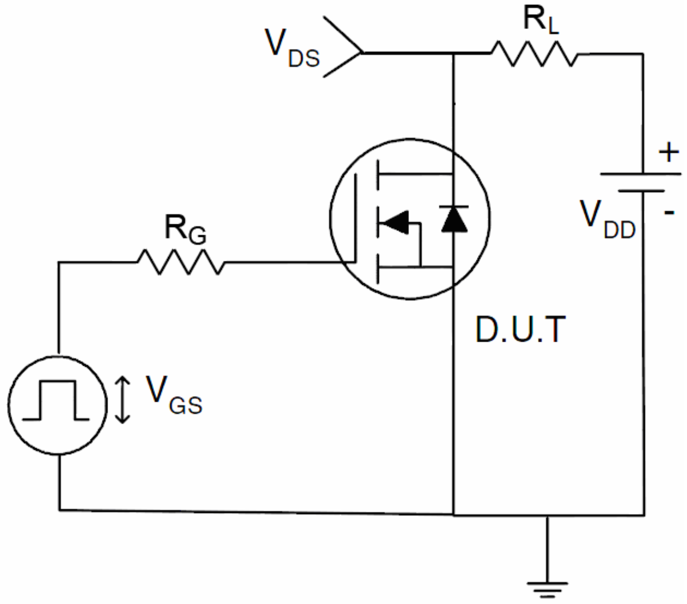
1）E_{AS} test circuit



2）Gate charge test circuit



3）Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

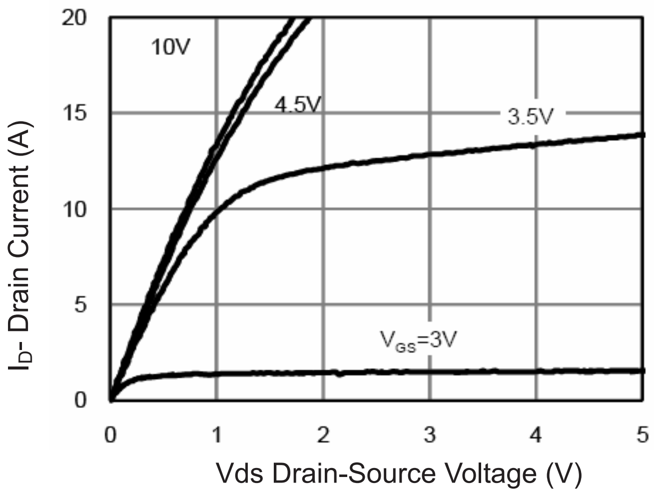


Figure 1 Output Characteristics

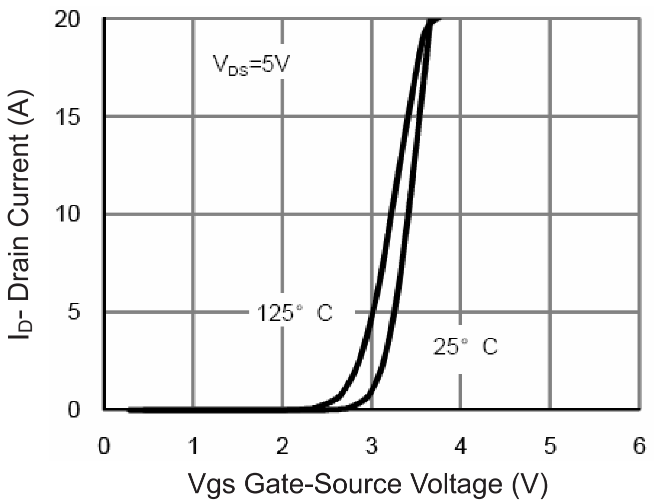


Figure 2 Transfer Characteristics

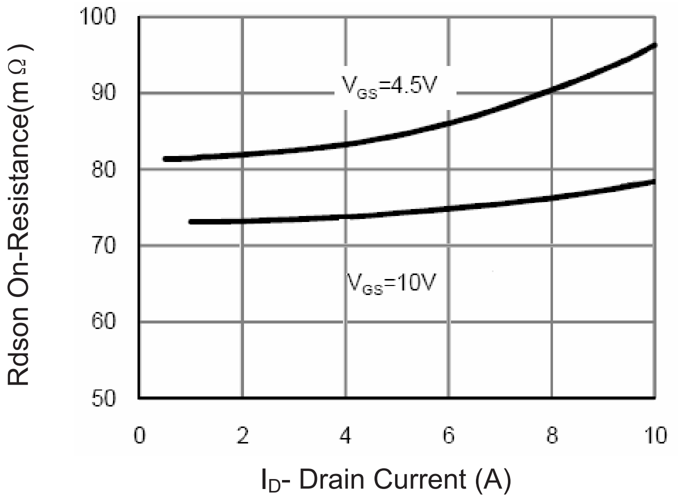


Figure 3 Rdson- Drain Current

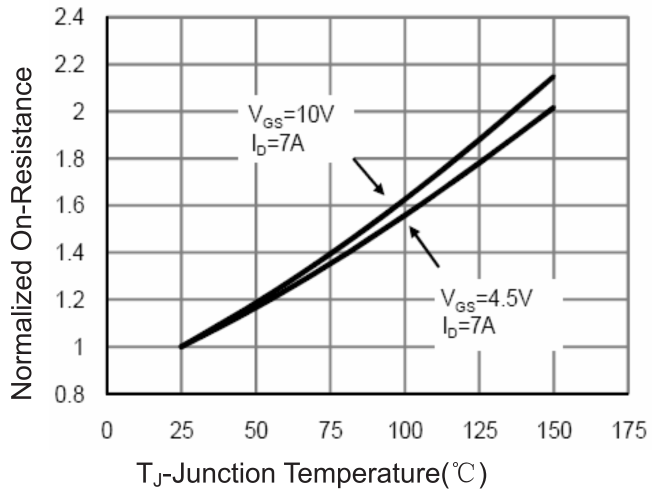


Figure 4 Rdson-Junction Temperature

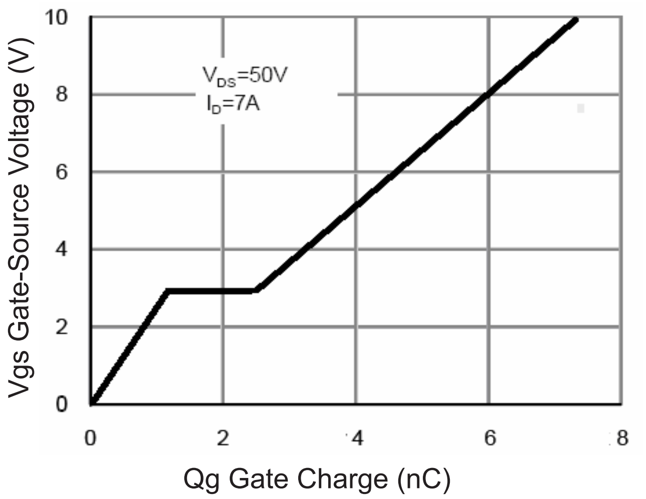


Figure 5 Gate Charge

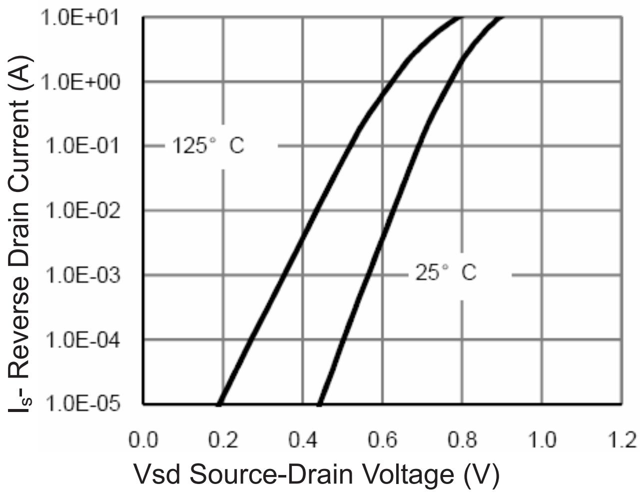


Figure 6 Source- Drain Diode Forward

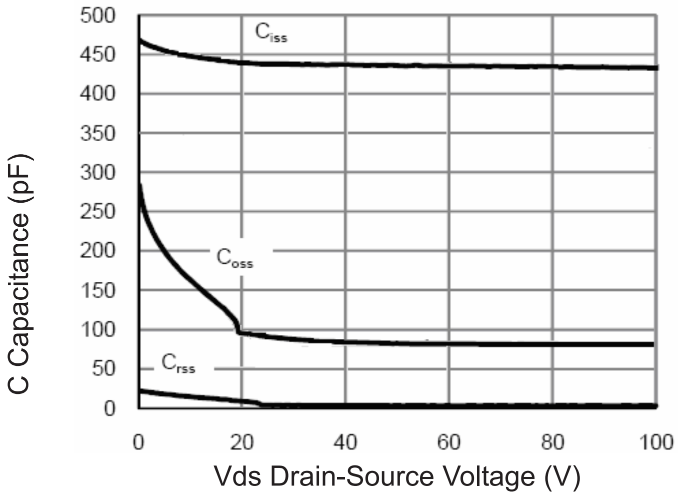


Figure 7 Capacitance vs Vds

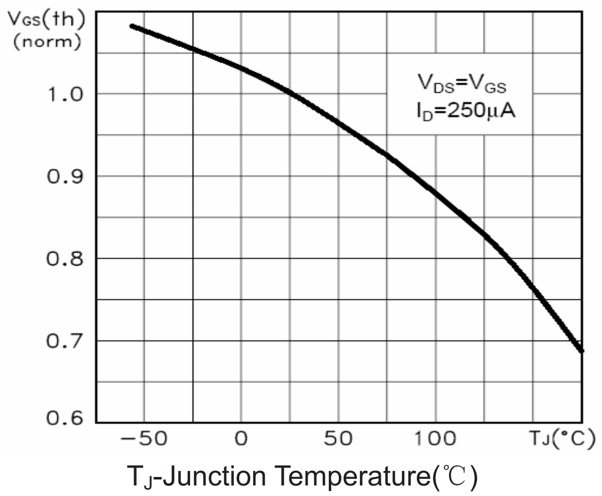


Figure 9 V_{GS}(th) vs Junction Temperature

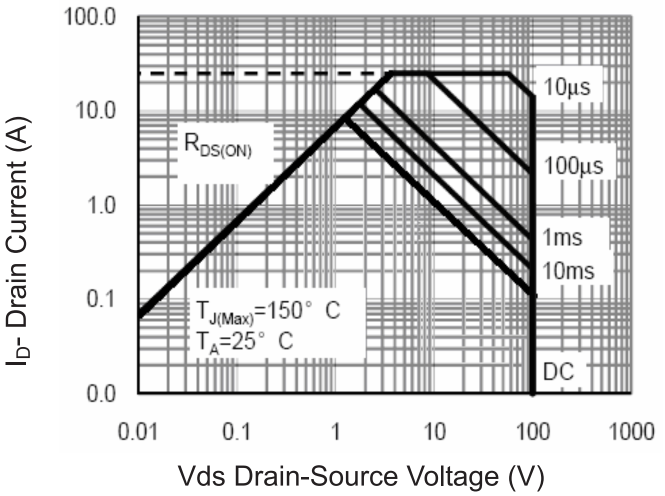


Figure 8 Safe Operation Area

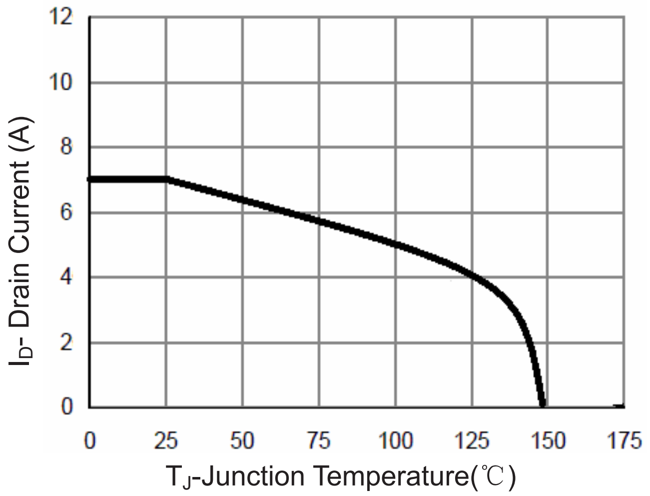


Figure 10 Current De-ratin

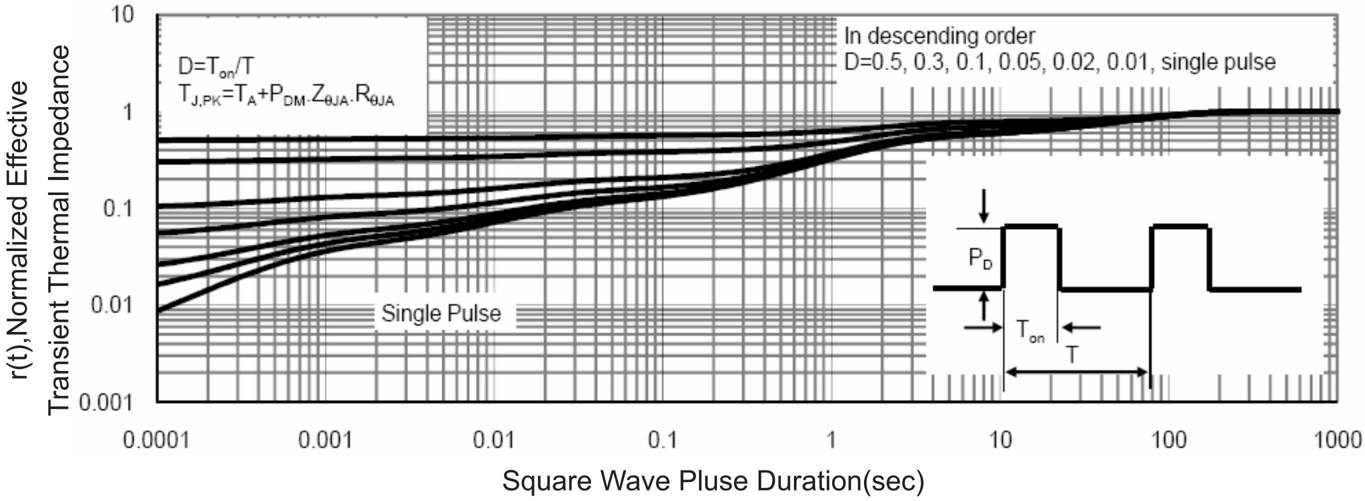


Figure 11 Normalized Maximum Transient Thermal Impedance