

Description

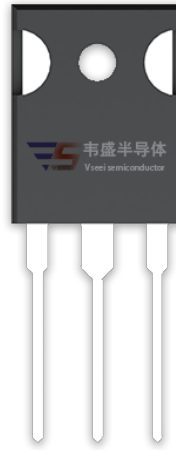
The VST10N027 uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(on)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

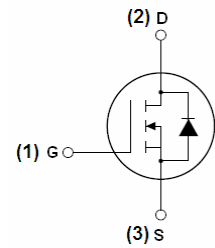
- $V_{DS} = 100V, I_D = 180A$
 $R_{DS(on)} < 3.0m\Omega @ V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

Application

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



TO-247



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST10N027-T7	VST10N027	TO-247	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ 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	180	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	128	A
Pulsed Drain Current	I_{DM}	720	A
Maximum Power Dissipation	P_D	300	W
Derating factor		2	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	1800	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

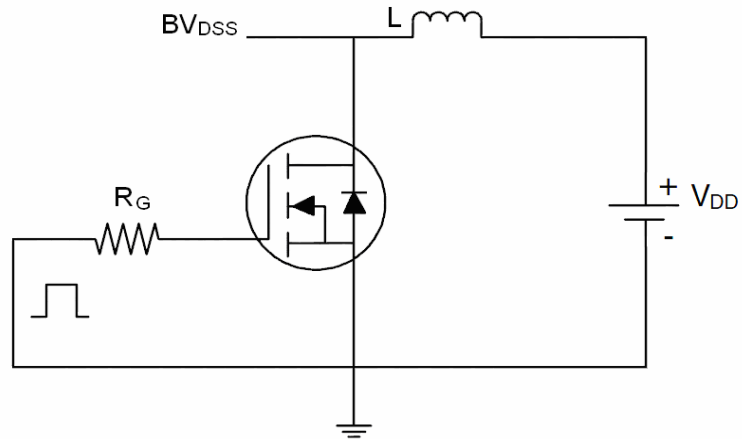
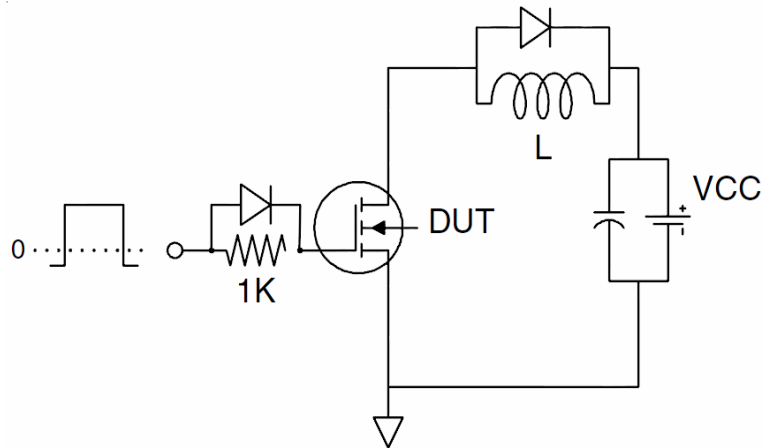
Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.5	$^\circ C/W$
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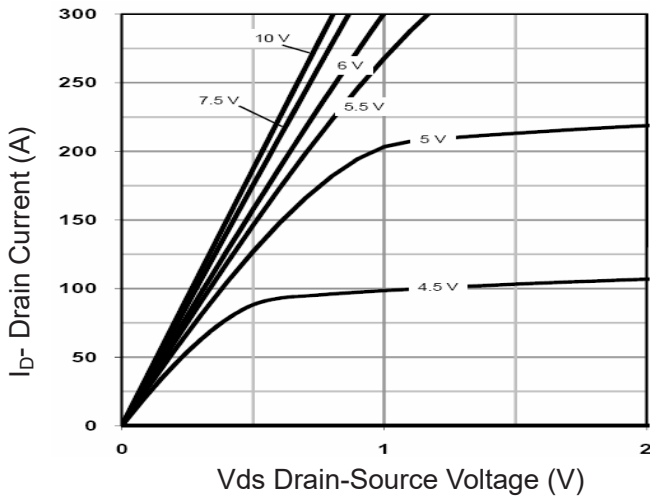
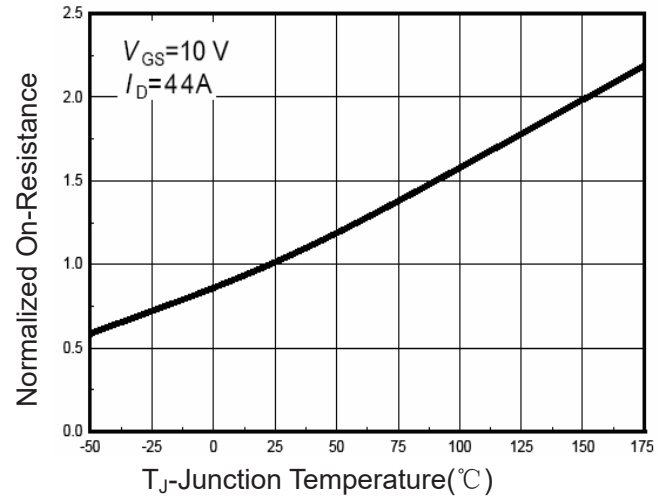
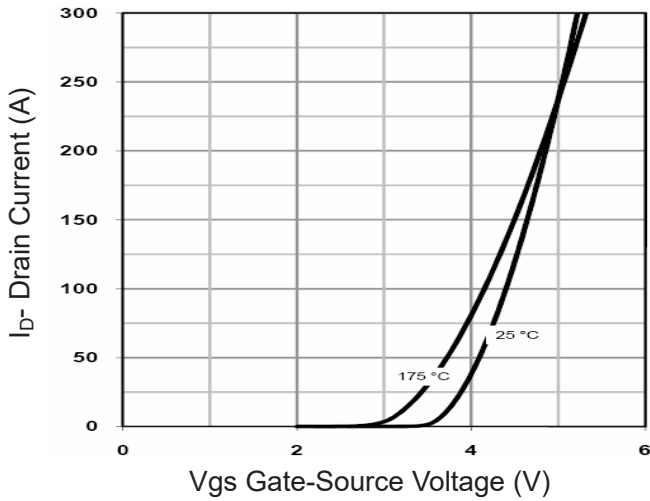
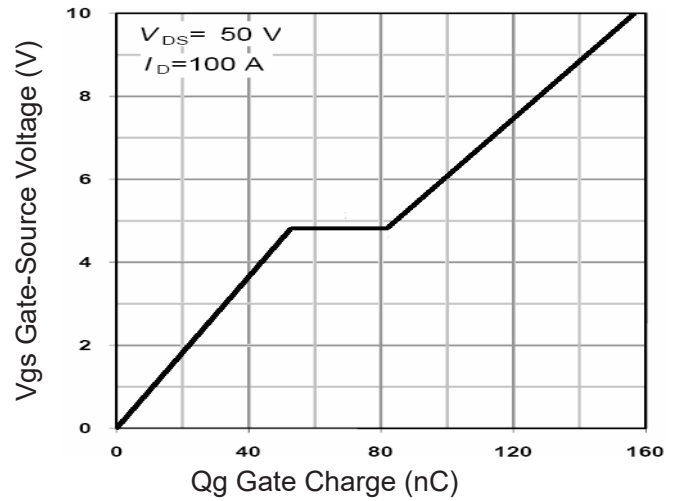
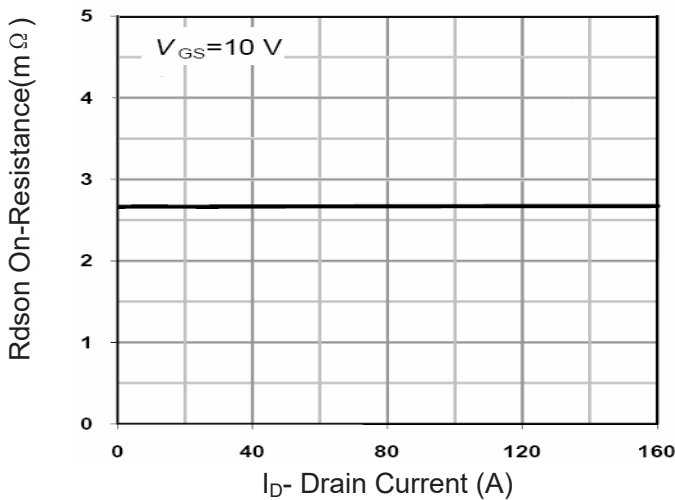
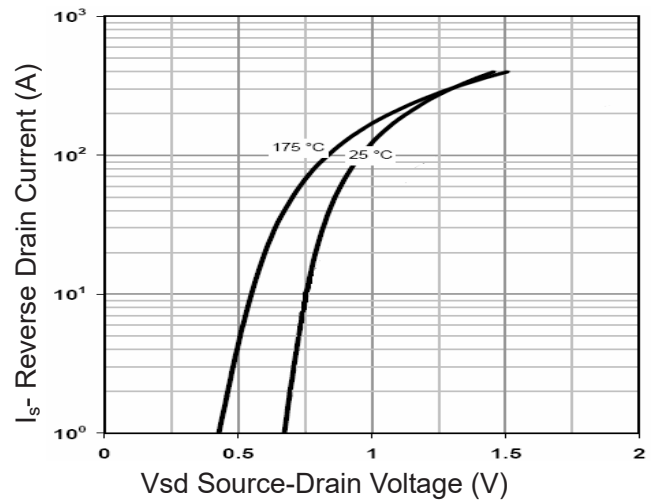
Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =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	2.5	-	4.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =100A	-		3.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =50A	40	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, F=1.0MHz	-	11500	-	PF
Output Capacitance	C _{oss}		-	2480	-	PF
Reverse Transfer Capacitance	C _{rss}		-	75	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =50V, I _D =100A V _{GS} =10V, R _G =1.6Ω	-	25	-	nS
Turn-on Rise Time	t _r		-	75	-	nS
Turn-Off Delay Time	t _{d(off)}		-	89	-	nS
Turn-Off Fall Time	t _f		-	29	-	nS
Total Gate Charge	Q _g	V _{DS} =50V, I _D =100A, V _{GS} =10V	-	158		nC
Gate-Source Charge	Q _{gs}		-	52		nC
Gate-Drain Charge	Q _{gd}		-	29		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =180A	-		1.2	V
Diode Forward Current (Note 2)	I _S		-	-	180	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S di/dt = 100A/μs (Note 3)	-	75		nS
Reverse Recovery Charge	Q _{rr}		-	185		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 : T_J=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, R_G=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-Junction Temperature

Figure 2 Transfer Characteristics

Figure 5 Gate Charge

Figure 3 Rdson- Drain Current

Figure 6 Source- Drain Diode Forward

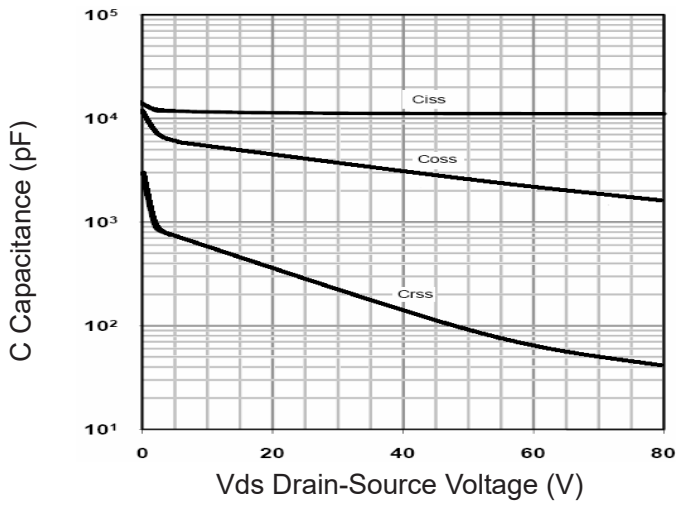


Figure 7 Capacitance vs Vds

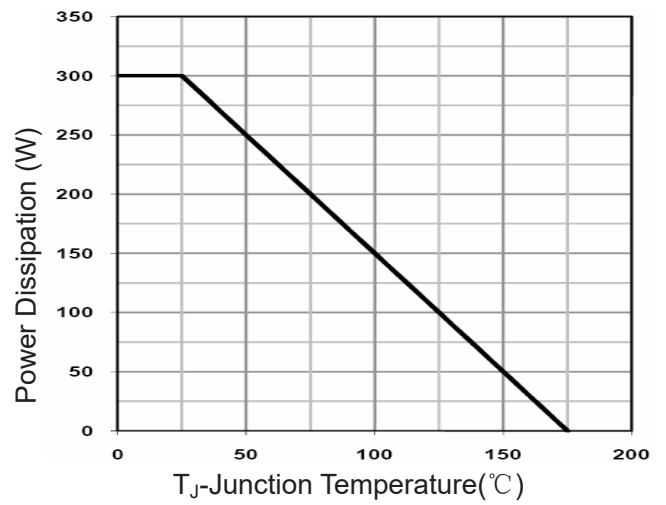


Figure 9 Power De-rating

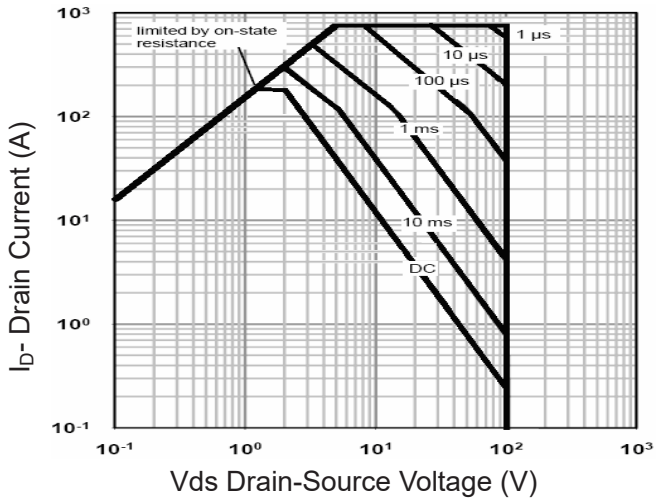


Figure 8 Safe Operation Area

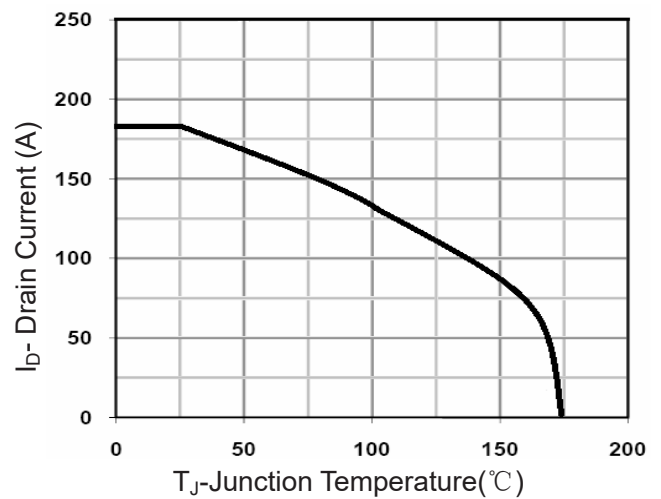


Figure 10 Current De-rating

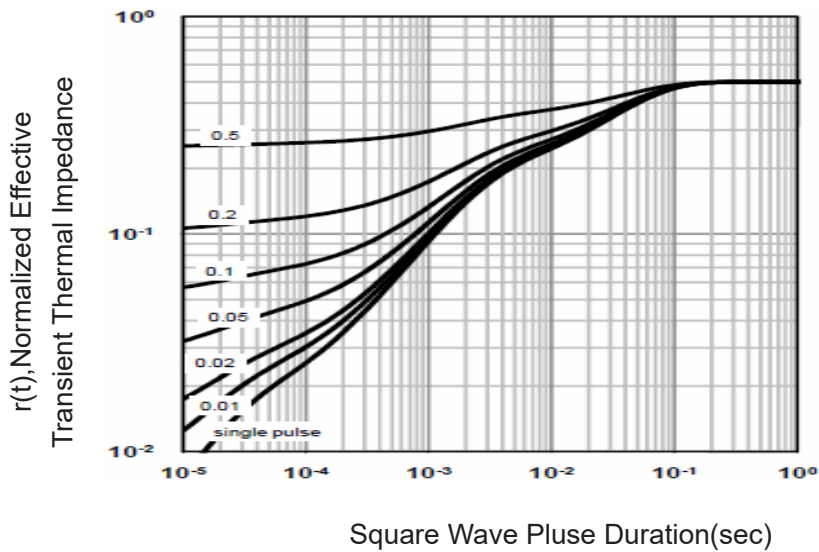


Figure 11 Normalized Maximum Transient Thermal Impedance