

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

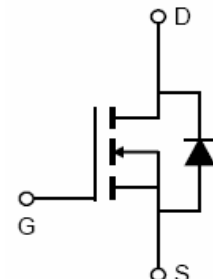
- $V_{DS} = 85V, I_D = 100A$
 $R_{DS(ON)} = 4.8m\Omega$, typical (TO-220)@ $V_{GS} = 10V$
 $R_{DS(ON)} = 4.6m\Omega$, typical (TO-263)@ $V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating



TO-220C



TO-263



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST08N046-TC	VST08N046	TO-220C	-	-	-
VST08N046-T3	VST08N046	TO-263	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ 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	100	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	73.5	A
Pulsed Drain Current	I_{DM}	400	A
Maximum Power Dissipation	P_D	125	W
Derating factor		0.83	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	580	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)	$R_{\theta JC}$	1.2	$^{\circ}\text{C/W}$
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Off Characteristics							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	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} =±20V, V _{DS} =0V	-	-	±100	nA	
On Characteristics (Note 3)							
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 =50A	TO-220	-	4.8	5.5	mΩ
			TO-263		4.6	5.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =50A		60	-	S	
Dynamic Characteristics (Note4)							
Input Capacitance	C _{ISS}	V _{DS} =40V, V _{GS} =0V, F=1.0MHz	-	3600	-	PF	
Output Capacitance	C _{OSS}		-	570	-	PF	
Reverse Transfer Capacitance	C _{RSS}		-	30	-	PF	
Switching Characteristics (Note 4)							
Turn-on Delay Time	t _{d(on)}	V _{DD} =40V, I _D =50A V _{GS} =10V, R _G =1.6Ω	-	18	-	nS	
Turn-on Rise Time	t _r		-	55	-	nS	
Turn-Off Delay Time	t _{d(off)}		-	38	-	nS	
Turn-Off Fall Time	t _f		-	10	-	nS	
Total Gate Charge	Q _g	V _{DS} =40V, I _D =50A, V _{GS} =10V	-	56	-	nC	
Gate-Source Charge	Q _{gs}		-	21		nC	
Gate-Drain Charge	Q _{gd}		-	13		nC	
Drain-Source Diode Characteristics							
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =50A	-		1.2	V	
Diode Forward Current (Note 2)	I _S		-	-	100	A	
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S di/dt = 100A/μs (Note3)	-	64	-	nS	
Reverse Recovery Charge	Q _{rr}		-	130	-	nC	

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=40V, V_G=10V, L=0.5mH, R_G=25\Omega$

Typical Electrical and Thermal Characteristics

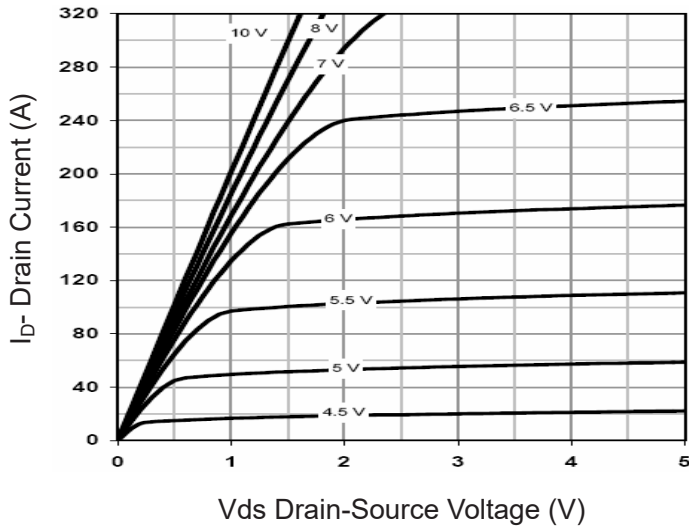


Figure 1 Output Characteristics

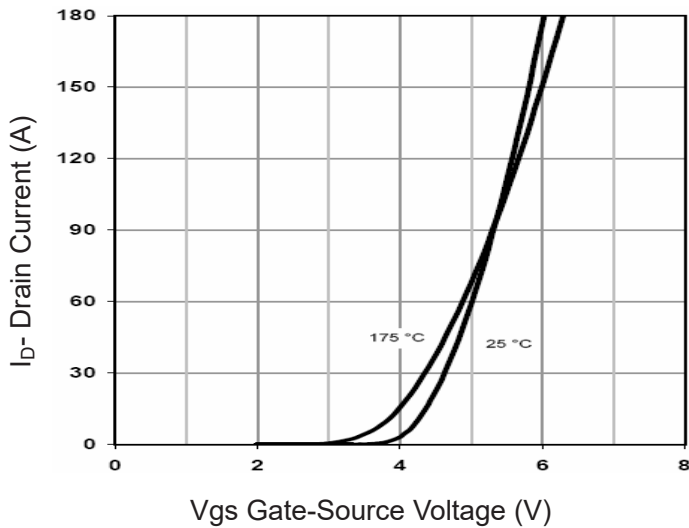


Figure 2 Transfer Characteristics

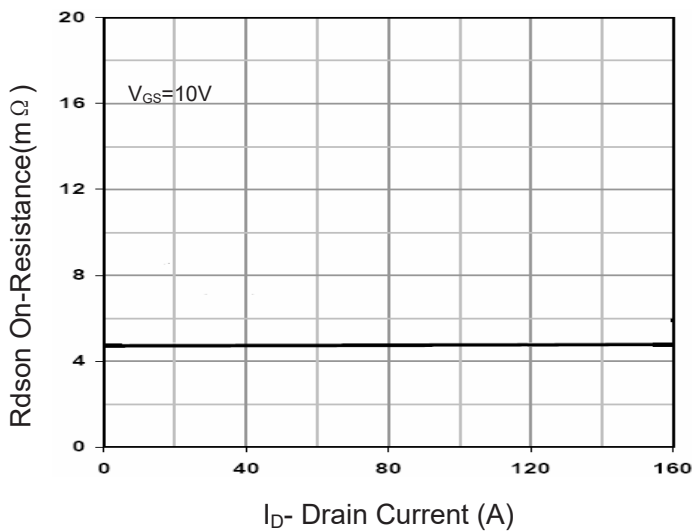


Figure 3 $R_{DS(on)}$ - Drain Current

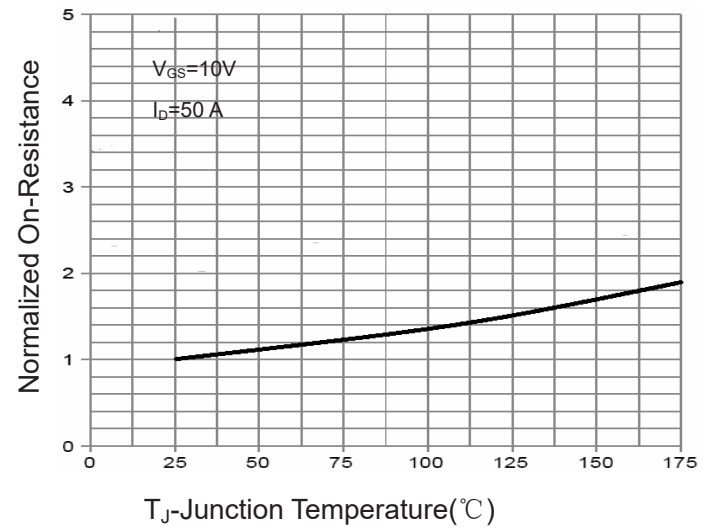


Figure 4 $R_{DS(on)}$ -Junction Temperature

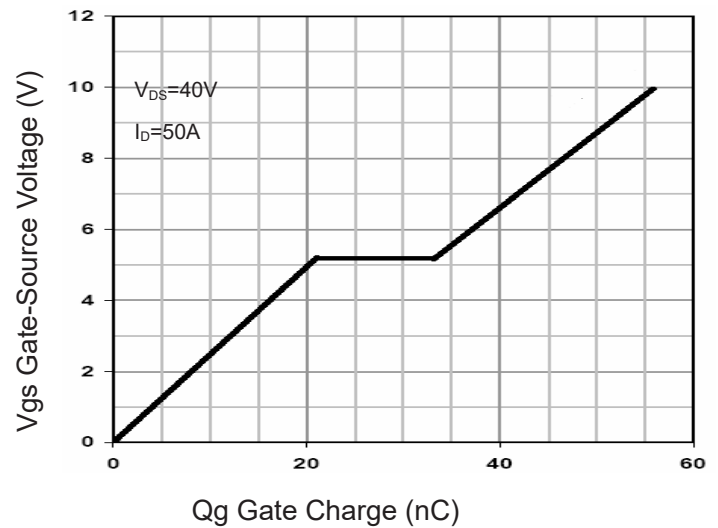


Figure 5 Gate Charge

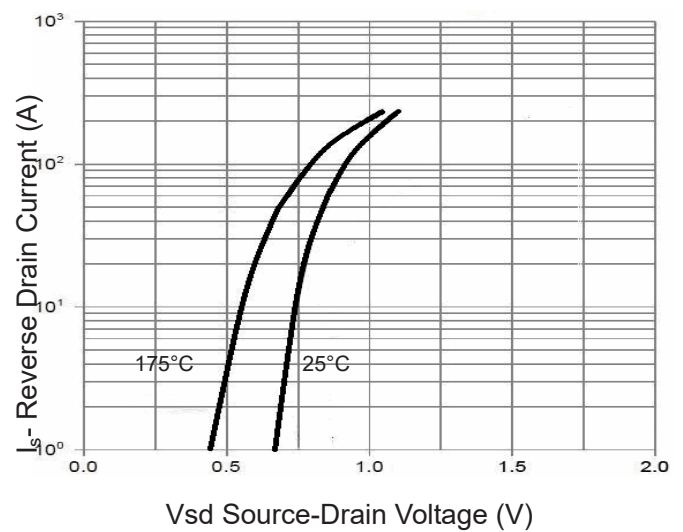
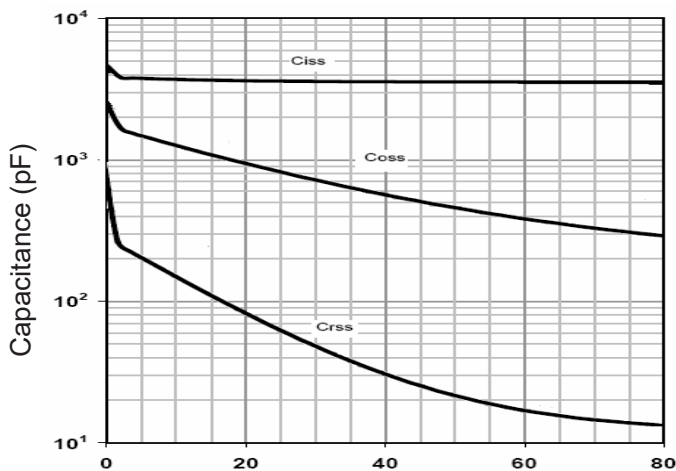
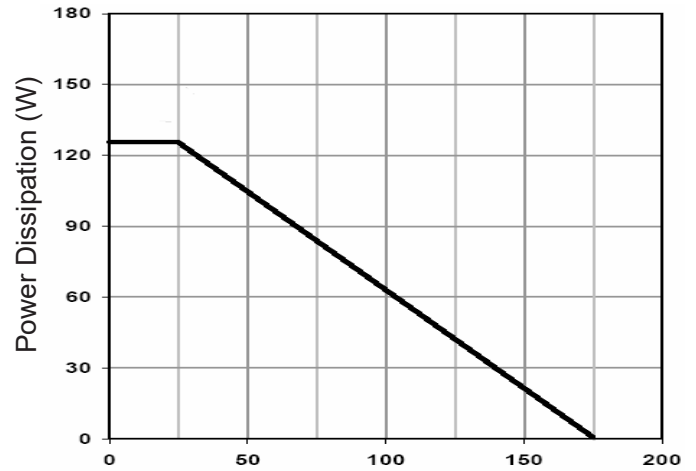


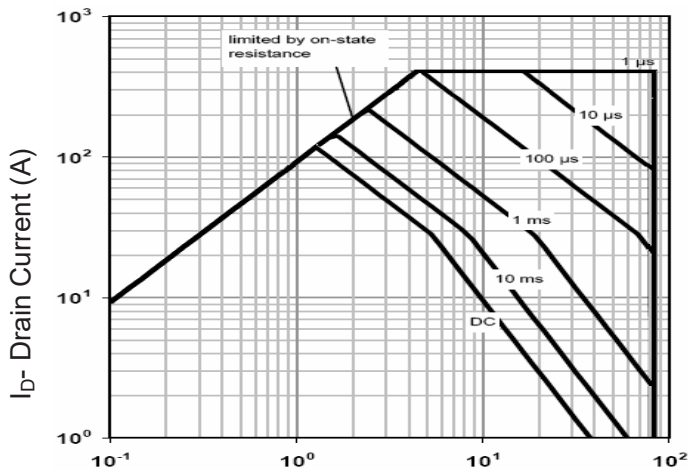
Figure 6 Source- Drain Diode Forward



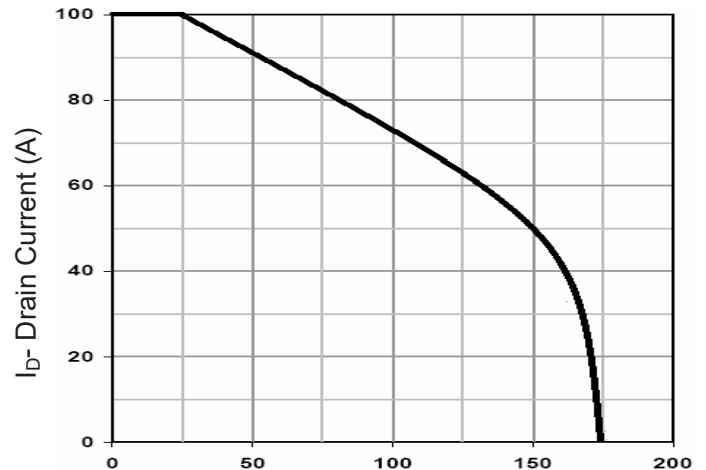
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



TJ-Junction Temperature(°C)
Figure 9 Power De-rating



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



TJ-Junction Temperature (°C)
Figure 10 Current De-rating

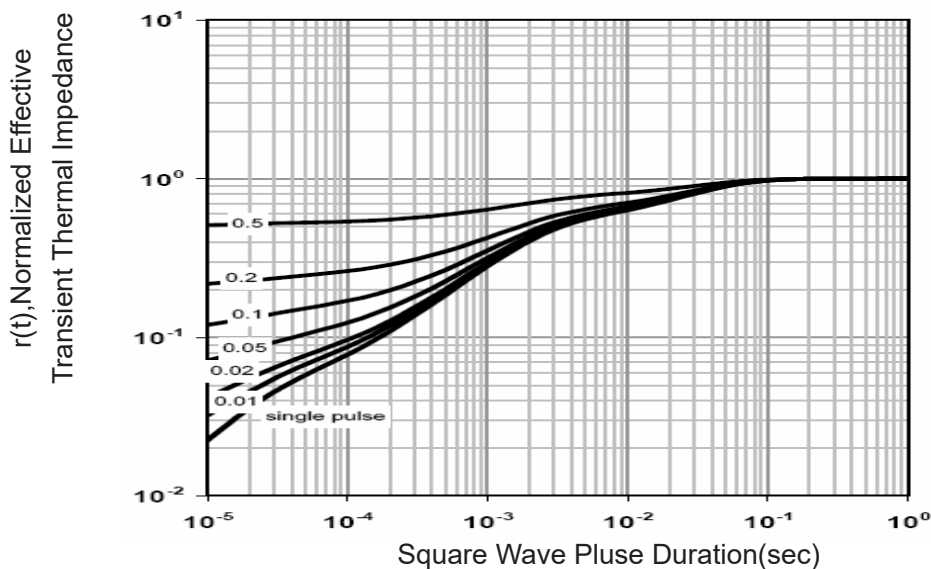


Figure 11 Normalized Maximum Transient Thermal Impedance