

Description

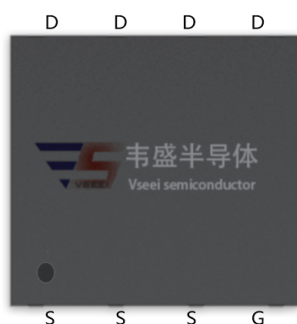
The series of devices uses **Super Trench II** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency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

Application

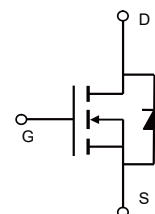
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- $V_{DS} = 30V, I_D = 70A$
 $R_{DS(ON)} = 1.75m\Omega$ (typical) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 3.0m\Omega$ (typical) @ $V_{GS} = 4.5V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating



DFN3x3



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST03N010	VST03N010-D33	DFN3x3	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	70	A
Drain Current-Continuous($T_c = 100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	55	A
Pulsed Drain Current	I_{DM}	280	A
Maximum Power Dissipation	P_D	55	W
Derating factor		0.44	W/ $^\circ\text{C}$
Single pulse avalanche energy (Note 5)	E_{AS}	352	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	2.3	$^\circ\text{C/W}$
---	-----------------	-----	--------------------

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	30		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V, 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	1.0	1.6	2.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =35A	-	1.75	2.0	mΩ
		V _{GS} =4.5V, I _D =35A	-	3.0	4.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =35A		65	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, F=1.0MHz	-	2400	-	PF
Output Capacitance	C _{oss}		-	1700	-	PF
Reverse Transfer Capacitance	C _{rss}		-	120	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =15V, I _D =35A V _{GS} =10V, R _G =1.6Ω	-	5.0	-	nS
Turn-on Rise Time	t _r		-	7.0	-	nS
Turn-Off Delay Time	t _{d(off)}		-	27.0	-	nS
Turn-Off Fall Time	t _f		-	5.0	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =35A, V _{GS} =10V	-	40.5	-	nC
Gate-Source Charge	Q _{gs}		-	6.5		nC
Gate-Drain Charge	Q _{gd}		-	7		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =35A	-		1.2	V
Diode Forward Current (Note 2)	I _S		-	-	70	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S di/dt = 100A/μs (Note3)	-	14	-	nS
Reverse Recovery Charge	Q _{rr}		-	21	-	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 : $T_J=25^{\circ}\text{C}, V_{DD}=20V, V_G=10V, L=0.5mH, R_g=25\Omega$

Typical Electrical and Thermal Characteristics

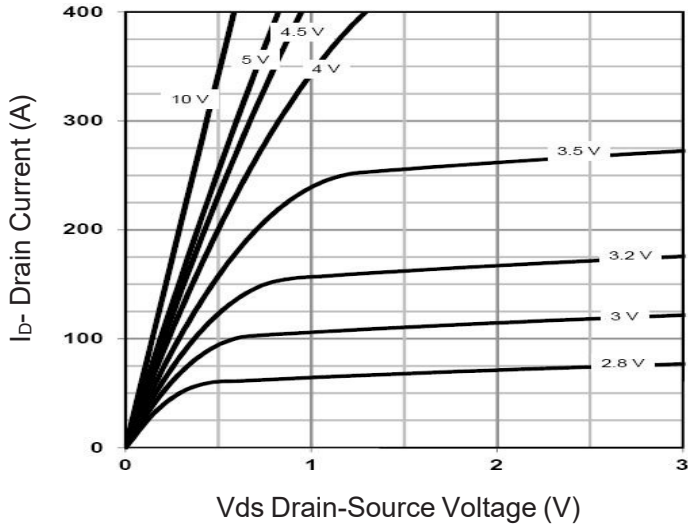


Figure 1 Output Characteristics

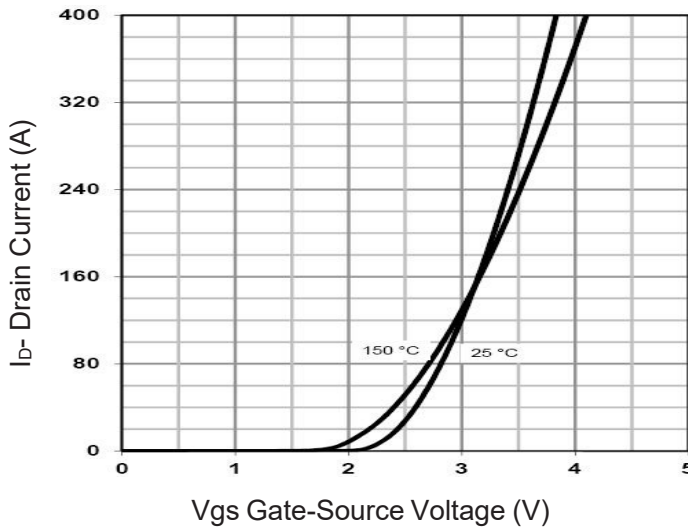


Figure 2 Transfer Characteristics

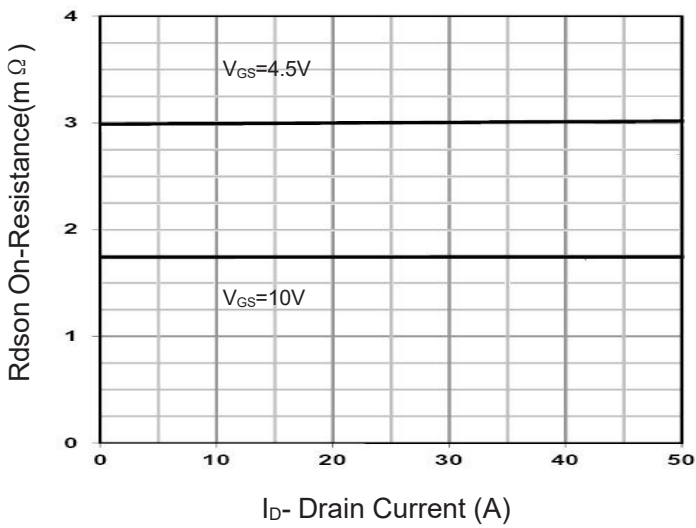


Figure 3 $R_{DS(on)}$ - Drain Current

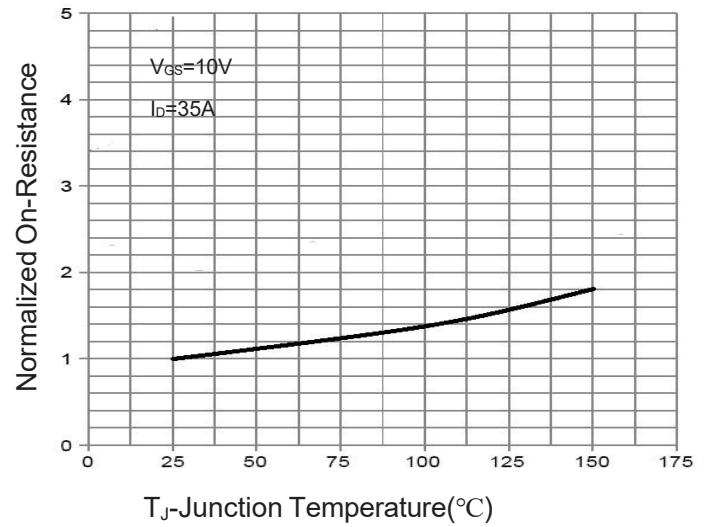


Figure 4 $R_{DS(on)}$ -Junction Temperature

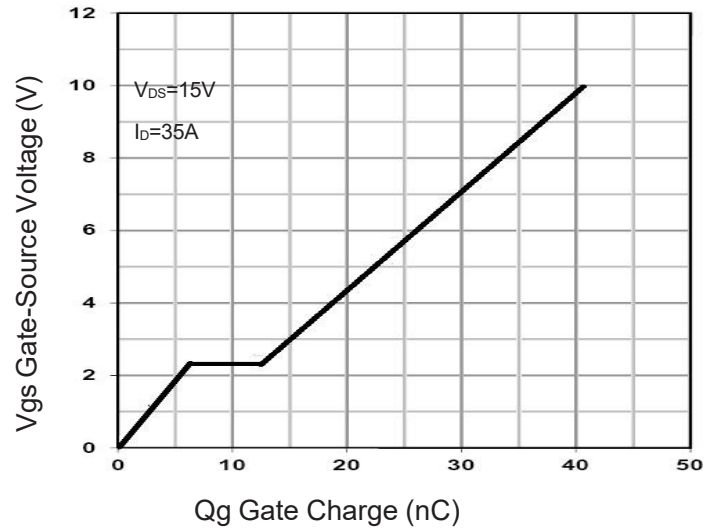


Figure 5 Gate Charge

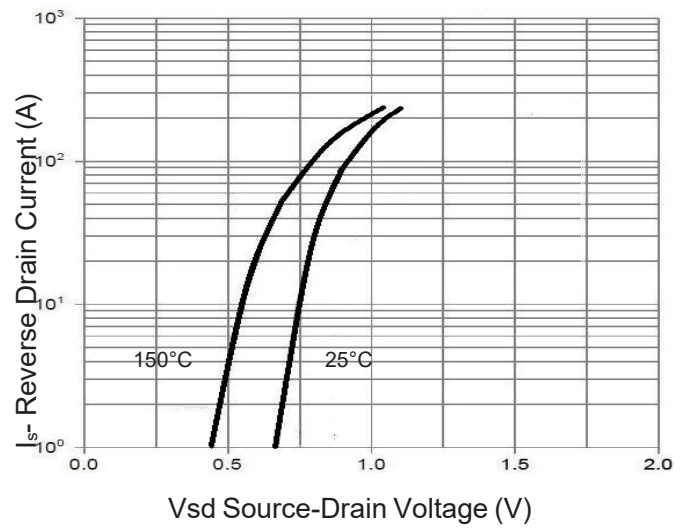
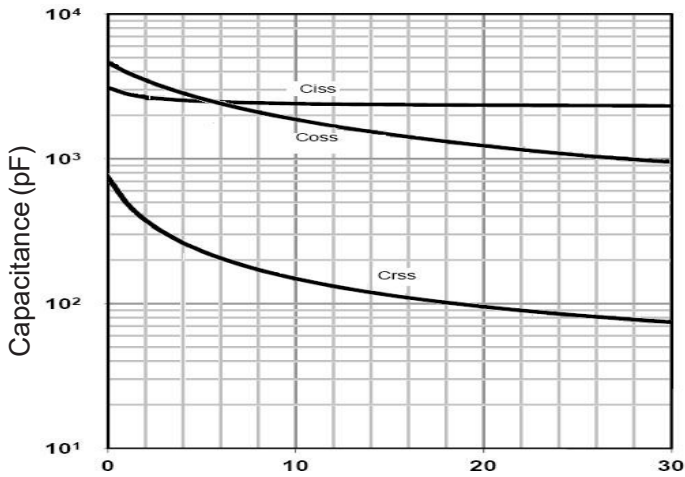
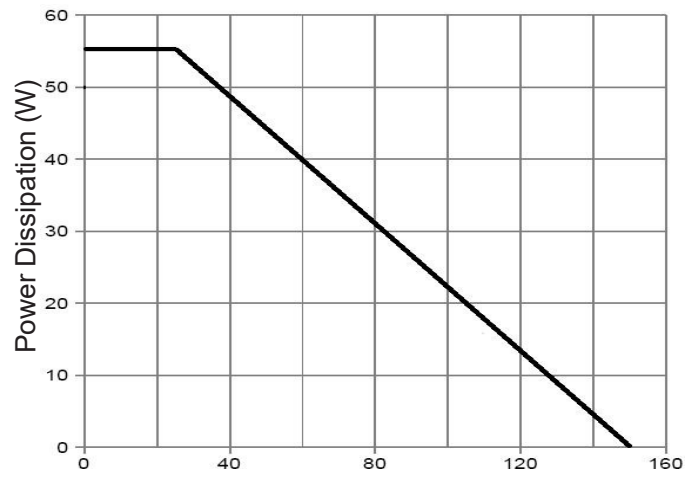


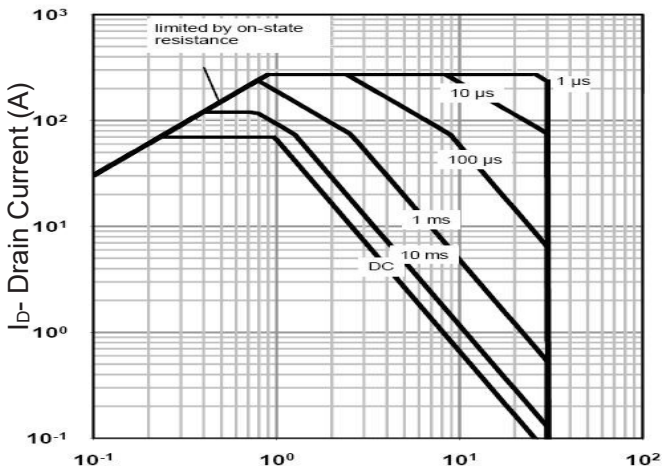
Figure 6 Source- Drain Diode Forward



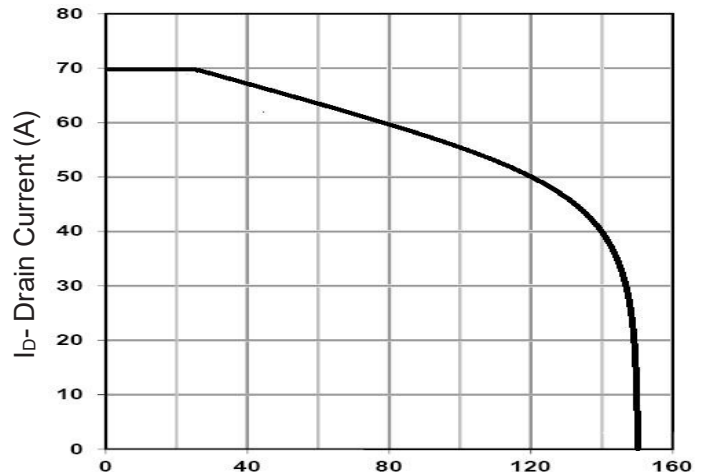
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



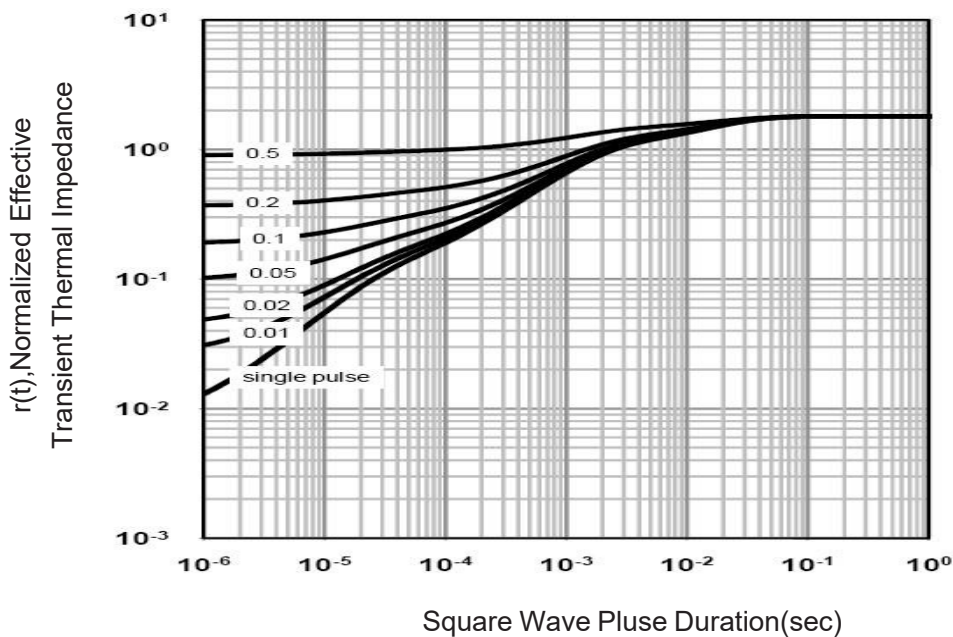
TA-Junction Temperature(°C)
Figure 9 Power De-rating



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



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



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