Description

The VST04P010 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.

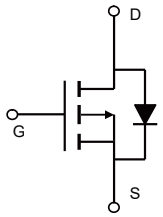
Application

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

General Features

- V_{DS} =-40V,I_D =-300A
  $R_{DS(ON)}$=1.6mΩ , typical@ V_{GS}=-10V
  $R_{DS(ON)}$=2.2mΩ , typical@ V_{GS}=-4.5V
- 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
- 100% ΔVds tested

TO-263



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST04P010	VST04P010-T3	TO-263	-	-	-

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	-300	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	-210	A
Pulsed Drain Current	I_{DM}	-1200	A
Maximum Power Dissipation	P_D	390	W
Derating factor		2.63	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	2400	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.38	℃/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	-40		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-40V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.0	-1.6	-2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-20A	-	1.6	2.3	mΩ
		V_{GS}=-4.5V, I_D=-20A	-	2.2	3.0	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-10V,I_D=-20A	-	80	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=-20V,V_{GS}=0V, F=1.0MHz	-	15148	-	PF
Output Capacitance	C_{oss}		-	3900	-	PF
Reverse Transfer Capacitance	C_{rss}		-	90	-	PF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-20V,I_D=-20A V_{GS}=-10V,R_G=1.6Ω	-	45	-	nS
Turn-on Rise Time	t_r		-	50	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	140	-	nS
Turn-Off Fall Time	t_f		-	45	-	nS
Total Gate Charge	Q_g	V_{DS}=-20V,I_D=-75A, V_{GS}=-10V	-	208.8	-	nC
Gate-Source Charge	Q_{gs}		-	41.6		nC
Gate-Drain Charge	Q_{gd}		-	27		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=-20A	-		-1.2	V
Diode Forward Current	I_S		-	-	-300	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =-20A di/dt = 100A/μs	-	78	-	nS
Reverse Recovery Charge	Qrr		-	200	-	nC

Notes:

1. EAS condition : Tj=25℃,V_{DD}=-20V,V_G=-10V,L=0.5mH,Rg=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

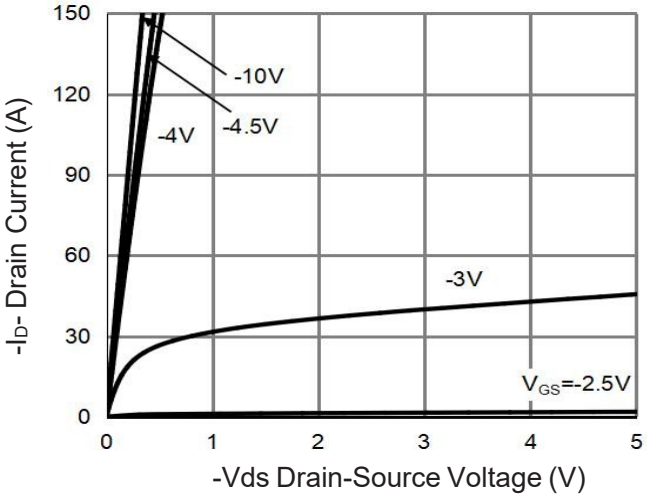


Figure 1 Output Characteristics

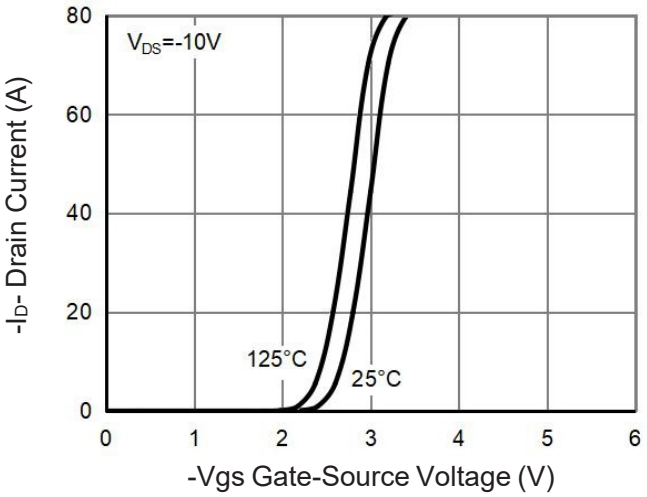


Figure 2 Transfer Characteristics

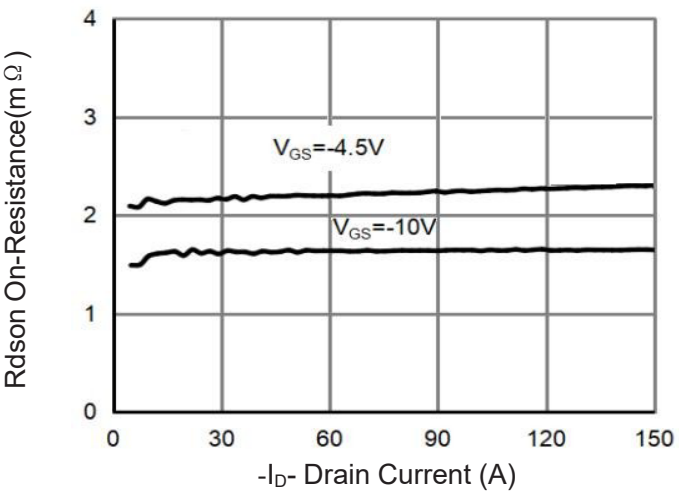


Figure 3 Rdson- Drain Current

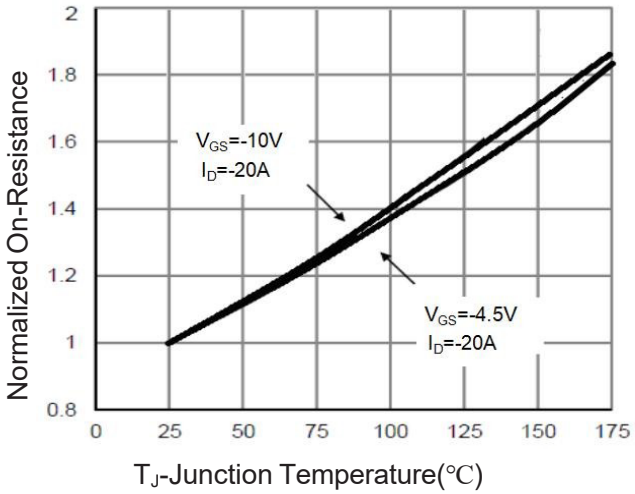


Figure 4 Rdson-JunctionTemperature

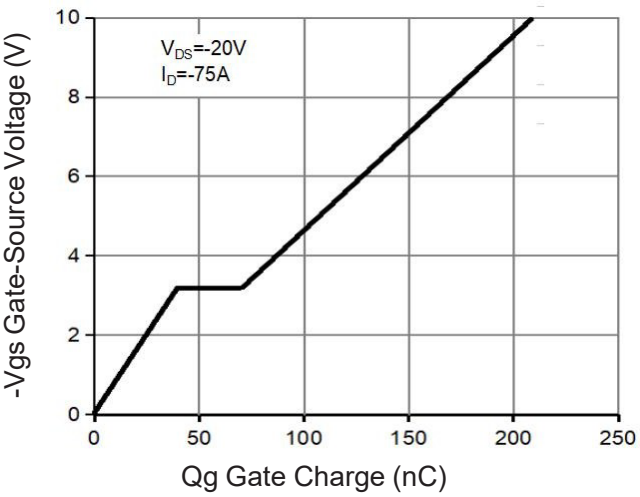


Figure 5 Gate Charge

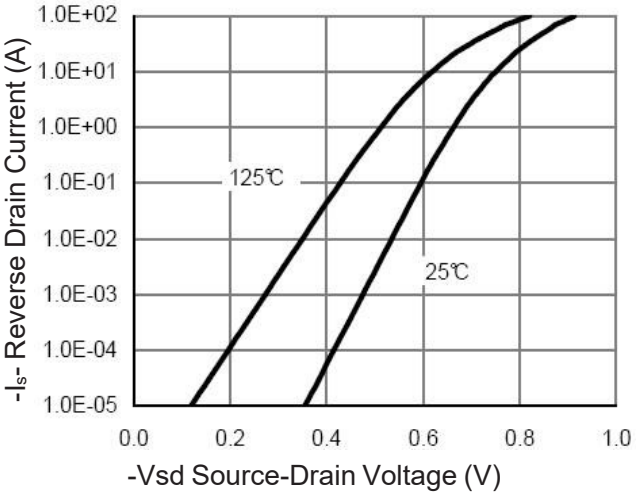


Figure 6 Source- Drain Diode Forward

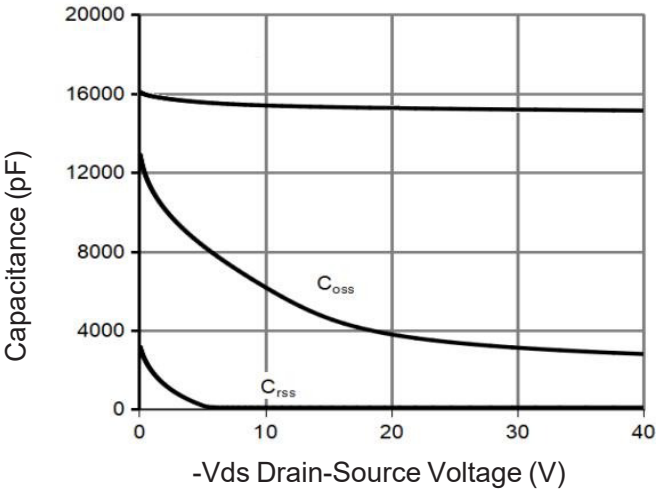


Figure 7 Capacitance vs Vds

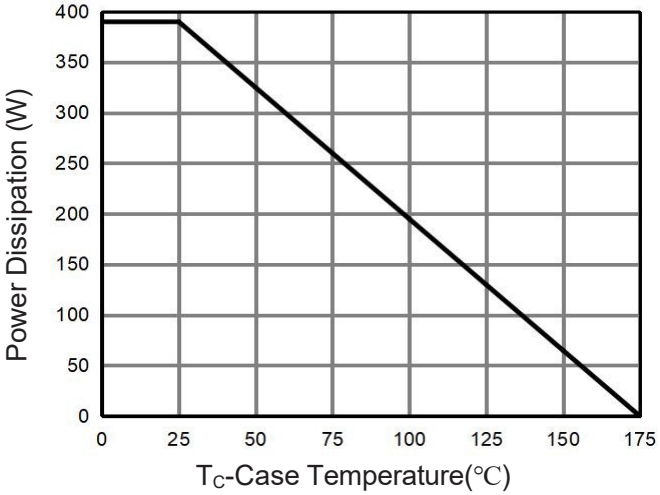


Figure 9 Power De-rating

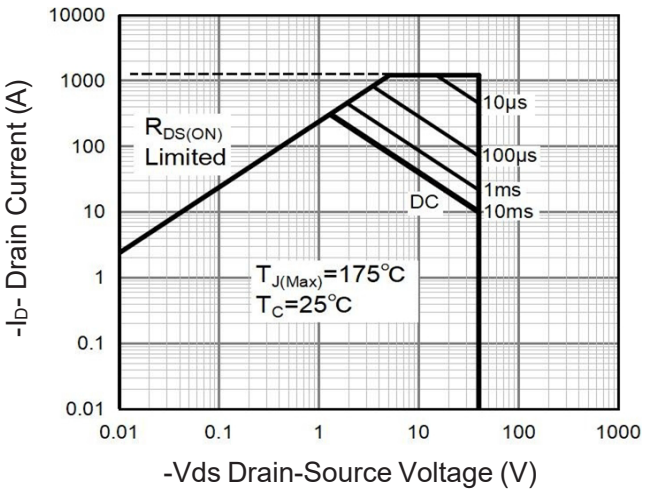


Figure 8 Safe Operation Area (Note3)

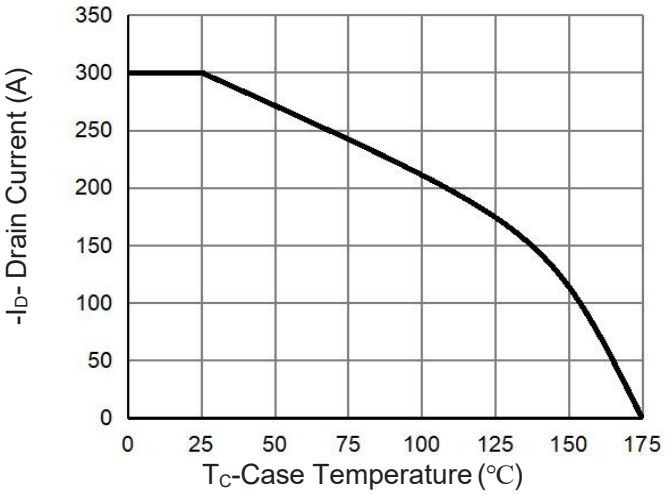


Figure 10 Current De-rating

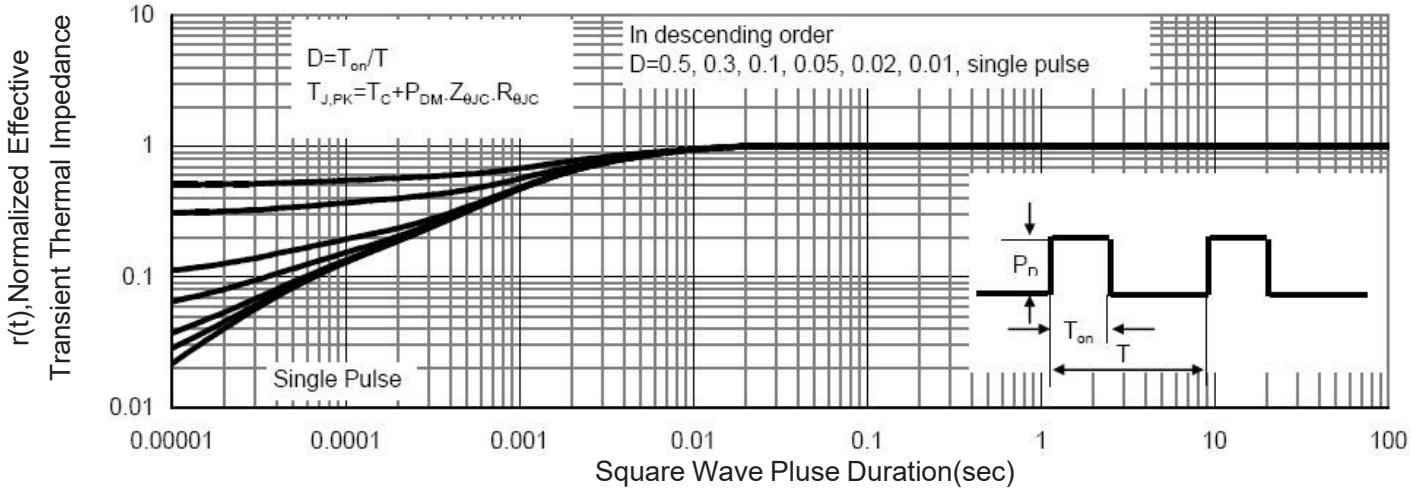


Figure 11 Normalized Maximum Transient Thermal Impedance