

Description

The VST06P060 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

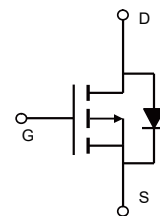
- High-frequency Switching and Synchronous Rectification
- DC/DC and AC/DC Converter
- Motor Driver
- Battery Management System (BMS)

General Features

- $V_{DS} = -60V, I_D = -73A$
 $R_{DS(ON)} = 6.7m\Omega$ (typical) @ $V_{GS} = -10V$
 $R_{DS(ON)} = 8.9m\Omega$ (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



DFN5x6



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST06P060	VST06P060-D56	DFN5x6	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-73	A
Drain Current-Continuous($T_c = 100^\circ C$)	$I_D(100^\circ C)$	-51	A
Pulsed Drain Current	I_{DM}	-292	A
Maximum Power Dissipation	P_D	85	W
Derating factor		0.68	W/ $^\circ C$
Single pulse avalanche energy (Note 1)	E_{AS}	500	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.47	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient (Note 4)	$R_{\theta JA}$	50	$^\circ C/W$

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}	$V_{GS}=0V, I_D=-250\mu A$	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-60V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-20A$	-	6.7	10.0	m Ω
		$V_{GS}=-4.5V, I_D=-20A$	-	8.9	12.0	m Ω
Gate resistance	R_G	F=1.0MHz	-	4.2	-	Ω
Forward Transconductance	g_{FS}	$V_{DS}=-10V, I_D=-20A$	-	60	-	S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=-30V, V_{GS}=0V,$ F=1.0MHz	-	4291	-	pF
Output Capacitance	C_{OSS}		-	643	-	pF
Reverse Transfer Capacitance	C_{RSS}		-	23.6	-	PF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-30V, I_D=-20A$ $V_{GS}=-10V, R_G=1.6\Omega$	-	15	-	nS
Turn-on Rise Time	t_r		-	18	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	50	-	nS
Turn-Off Fall Time	t_f		-	18	-	nS
Total Gate Charge	Q_g	$V_{DS}=-30V, I_D=-20A,$ $V_{GS}=-10V$	-	67	-	nC
Gate-Source Charge	Q_{gs}		-	9.0	-	nC
Gate-Drain Charge	Q_{gd}		-	9.1	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-20A$	-	-	-1.2	V
Diode Forward Current	I_S		-	-	-73	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}C, I_F = -20A$ $di/dt = 100A/\mu s$	-	55	-	nS
Reverse Recovery Charge	Q_{rr}		-	101	-	nC

Notes:

1. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=-30V, V_G=-10V, L=0.5mH, R_g=25\Omega$
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 k, assuming a maximum junction temperature of $T_J(MAX)=150^{\circ}\text{C}$. The SOA curve provides a single pulse rating.
4. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$. The maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.

Typical Electrical and Thermal Characteristics

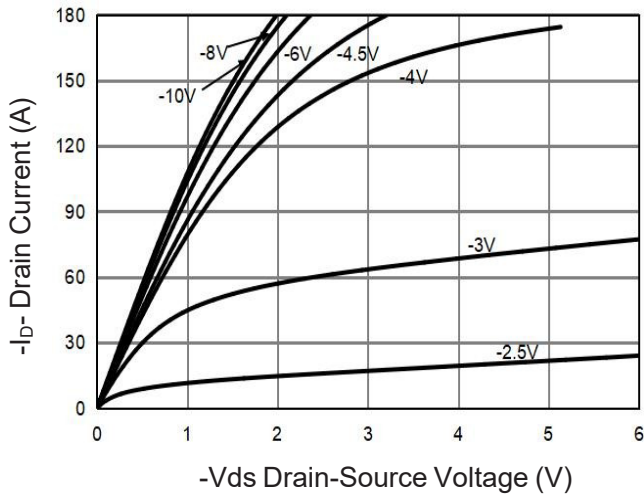


Figure 1 Output Characteristics

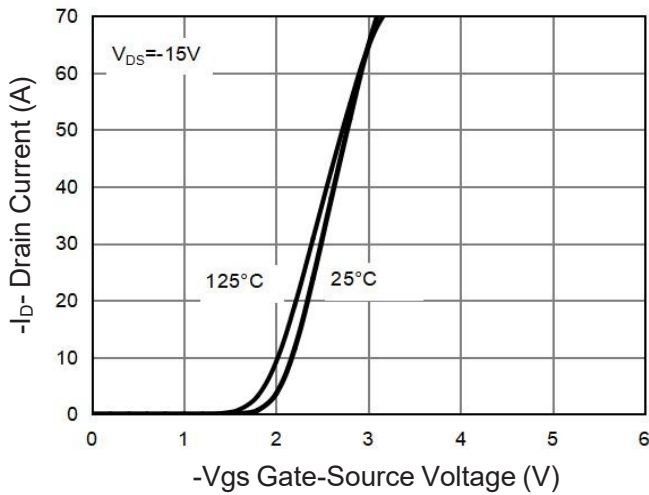


Figure 2 Transfer Characteristics

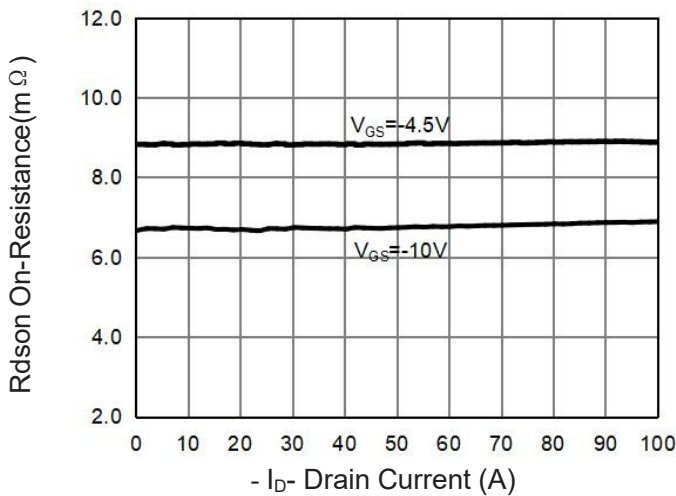


Figure 3 Rdson- Drain Current

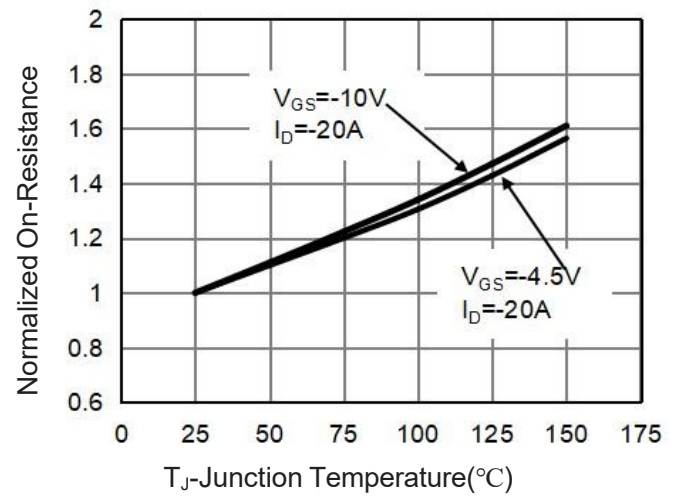


Figure 4 Rdson-Junction Temperature

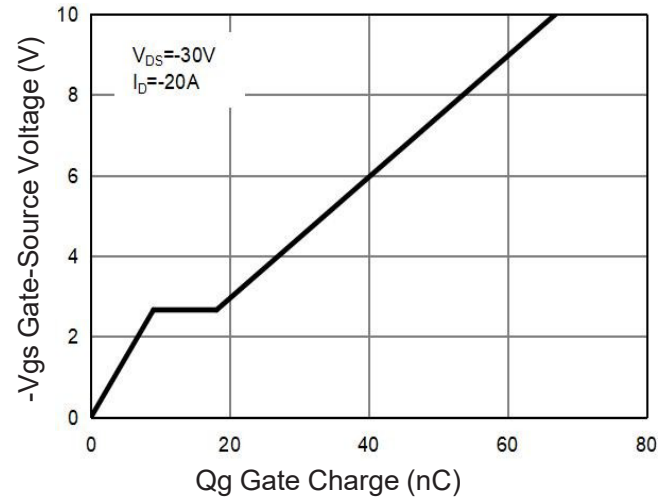


Figure 5 Gate Charge

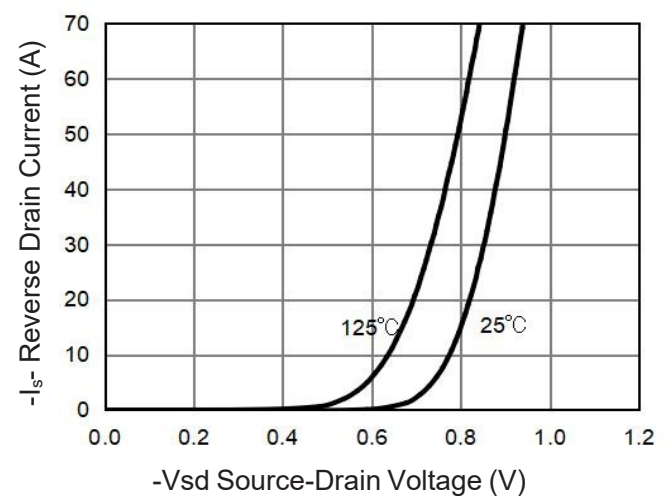
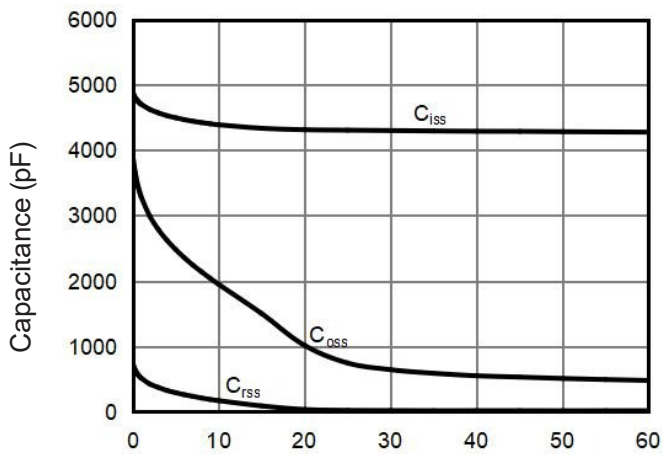
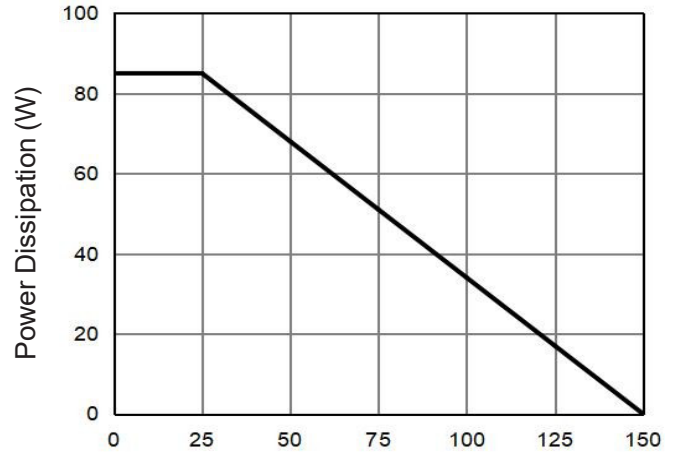


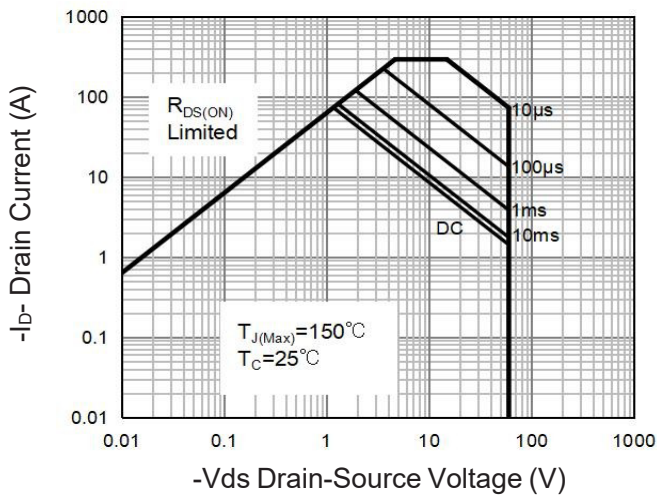
Figure 6 Source- Drain Diode Forward



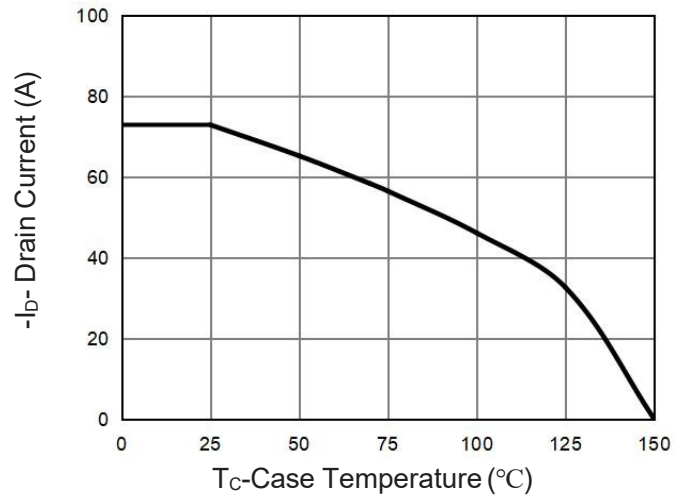
-Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



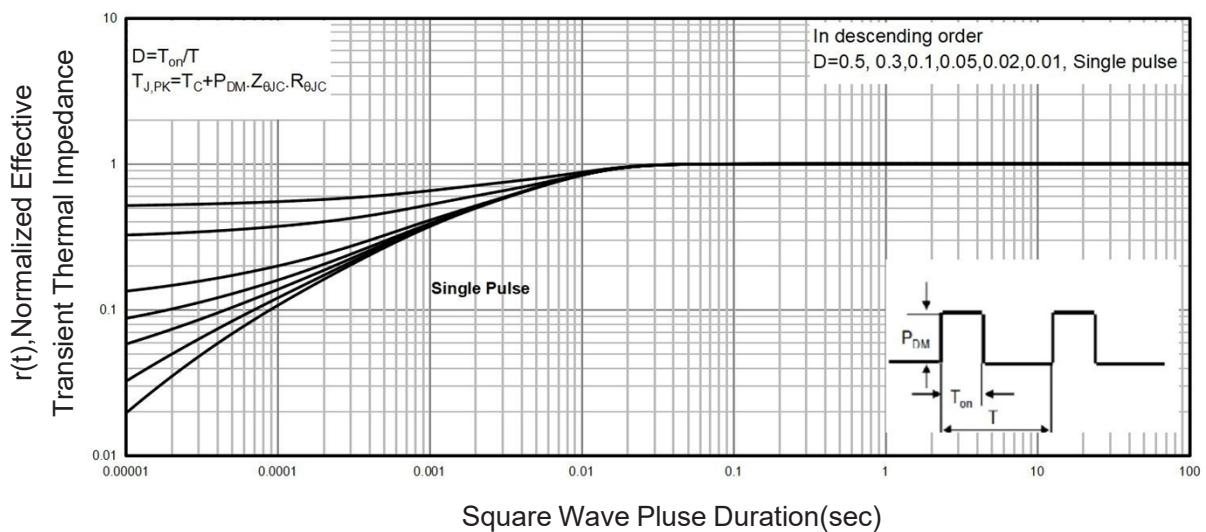
T_C-Case Temperature(°C)
Figure 9 Power De-rating



-Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area(Note 3)



T_C-Case Temperature (°C)
Figure 10 Current De-rating



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