

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

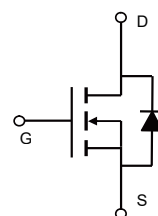
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- $V_{DS}=60V, I_D=210A$
 $R_{DS(ON)}=1.7m\Omega$, typical (TO-220) @ $V_{GS}=10V$
 $R_{DS(ON)}=1.5m\Omega$, 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-220



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VST06N010	VST06N010-TC	TO-220	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous ($T_c=25^\circ\text{C}$)	$I_D (T_c=25^\circ\text{C})$	210	A
Drain Current-Continuous($T_c=100^\circ\text{C}$)	$I_D (T_c=100^\circ\text{C})$	157	A
Pulsed Drain Current	I_{DM}	840	A
Maximum Power Dissipation($T_c=25^\circ\text{C}$)	$P_D(T_c=25^\circ\text{C})$	255	W
Derating factor		1.7	W/ $^\circ\text{C}$
Single pulse avalanche energy (Note 1)	E_{AS}	2332	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.59	$^\circ\text{C/W}$
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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	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} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics							
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	TO-220	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	1.7	2.0	mΩ
	TO-263		V _{GS} =10V, I _D =20A	-	1.5	2.0	mΩ
Forward Transconductance		g _{FS}	V _{DS} =5V, I _D =20A		150	-	S
Dynamic Characteristics							
Input Capacitance		C _{iss}	V _{DS} =30V, V _{GS} =0V, F=1.0MHz	-	9433	-	PF
Output Capacitance		C _{oss}		-	1647	-	PF
Reverse Transfer Capacitance		C _{rss}		-	92.6	-	PF
Switching Characteristics (Note 2)							
Turn-on Delay Time		t _{d(on)}	V _{DD} =30V, I _D =20A V _{GS} =10V, R _G =1.8Ω	-	20	-	nS
Turn-on Rise Time		t _r		-	29	-	nS
Turn-Off Delay Time		t _{d(off)}		-	50	-	nS
Turn-Off Fall Time		t _f		-	25	-	nS
Total Gate Charge		Q _g	V _{DS} =30V, I _D =20A, V _{GS} =10V	-	141	-	nC
Gate-Source Charge		Q _{gs}		-	40		nC
Gate-Drain Charge		Q _{gd}		-	26.7		nC
Drain-Source Diode Characteristics							
Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _S =210A	-		1.2	V
Diode Forward Current		I _S		-	-	210	A
Reverse Recovery Time		t _{rr}	T _J = 25°C, I _F =I _S	-	80	-	nS
Reverse Recovery Charge		Q _{rr}	di/dt = 100A/μs	-	175	-	nC

Notes:

1. EAS condition : T_J=25°C, V_{DD}=30V, V_G=10V, L=0.5mH, R_G=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 heat sink, assuming a maximum junction temperature of T_J(MAX)=175° C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

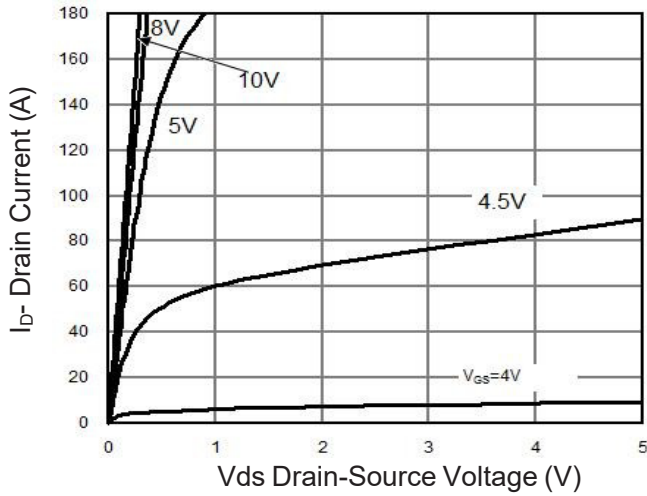


Figure 1 Output Characteristics

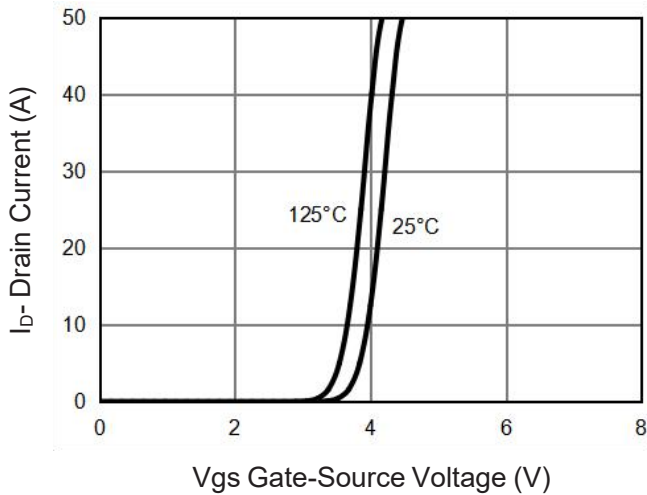


Figure 2 Transfer Characteristics

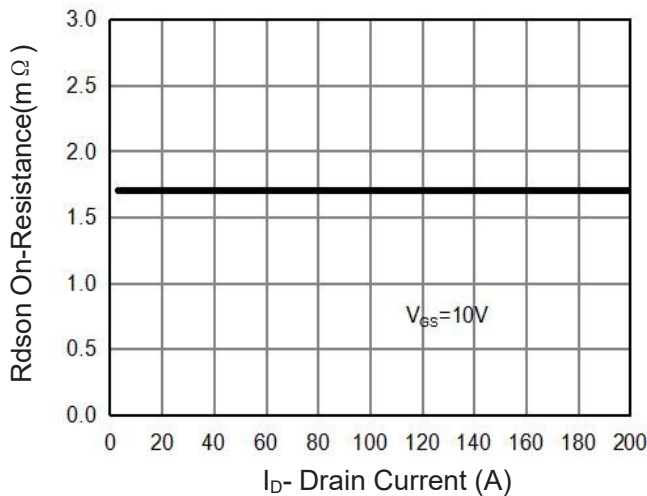


Figure 3 Rdson- Drain Current

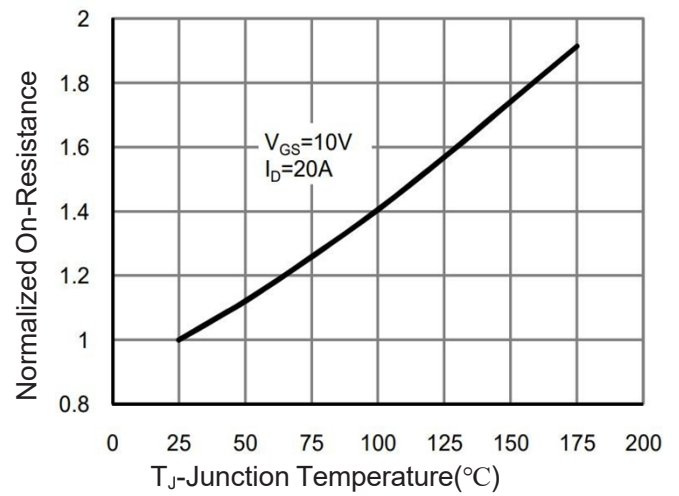


Figure 4 Rdson-Junction Temperature

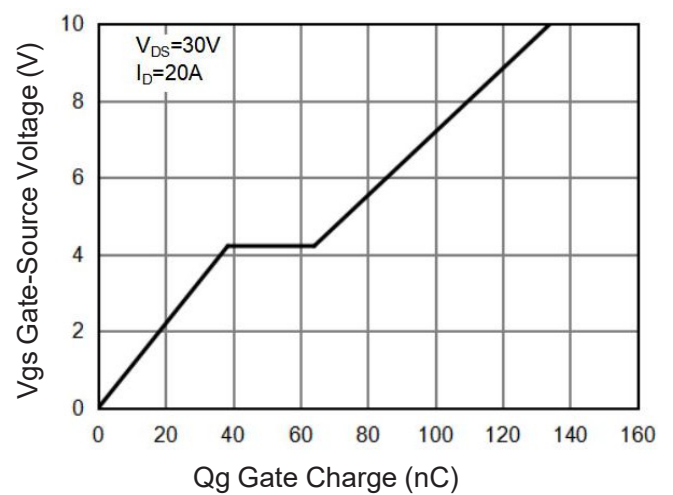


Figure 5 Gate Charge

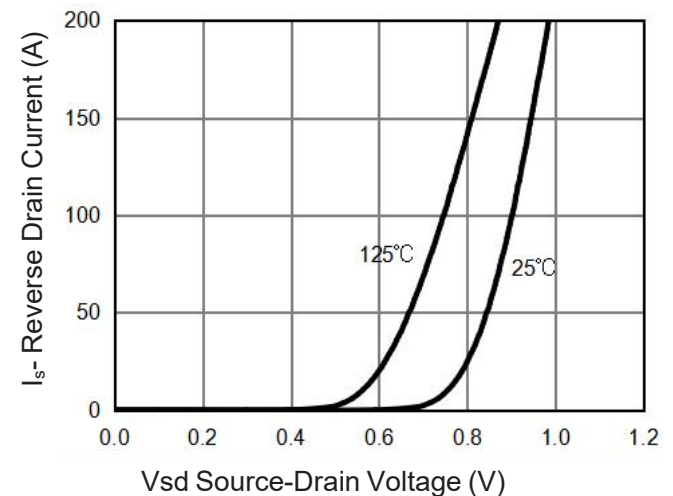
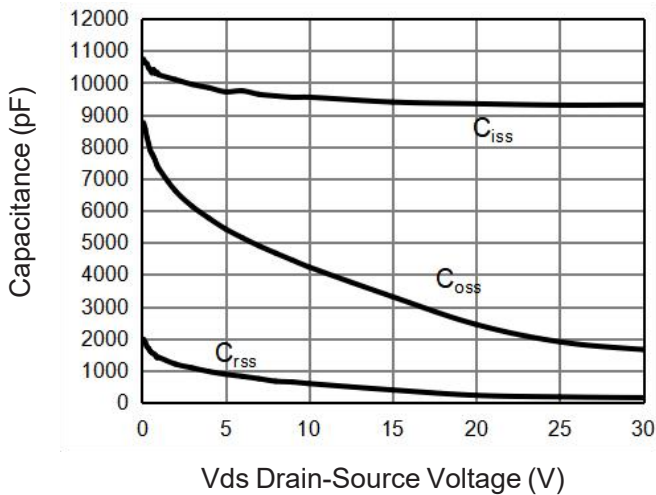
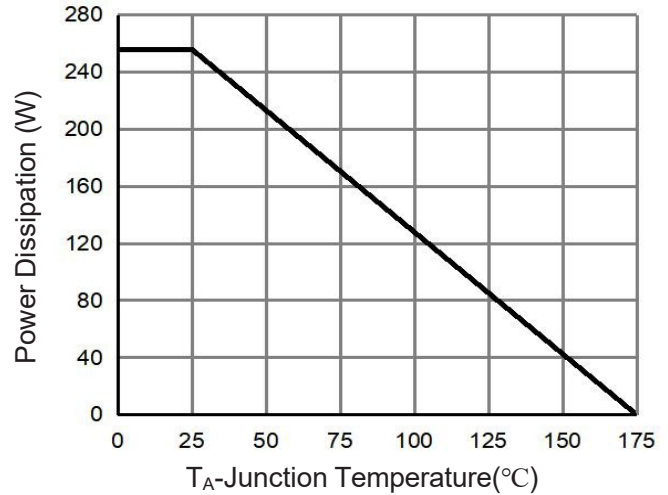
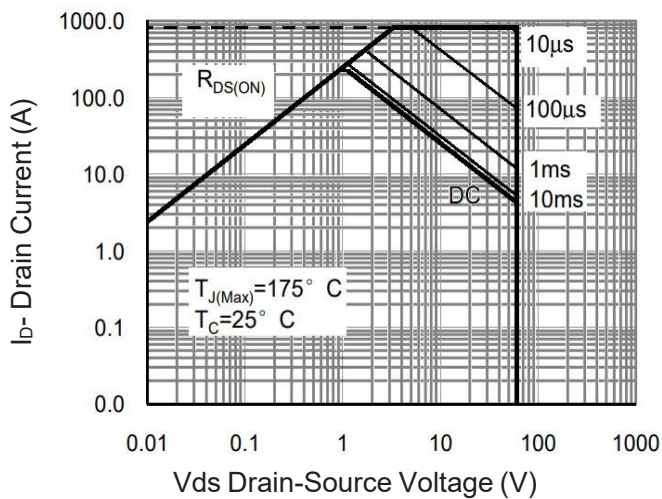
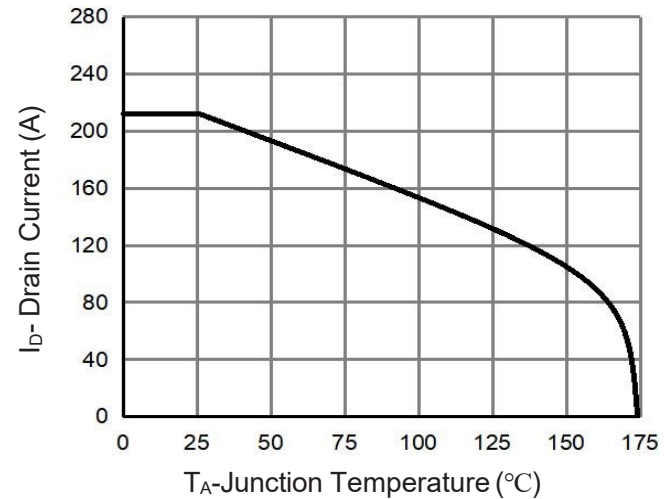
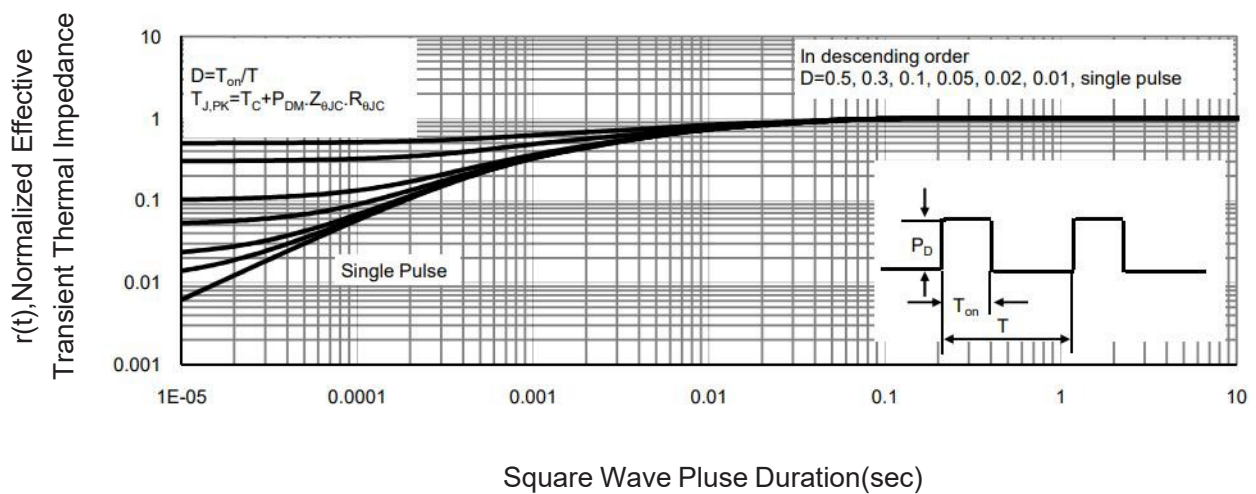


Figure 6 Source- Drain Diode Forward


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