

Description

The VST08N020 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

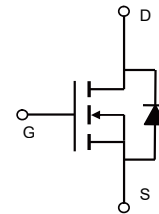
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- $V_{DS} = 85V, I_D = 140A$
 $R_{DS(ON)} = 2.65m\Omega$ (typical) @ $V_{GS} = 10V$
- 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
VST08N020	VST08N020-D56	DFN5x6	Ø330mm	12mm	5000units

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	140	A
Drain Current-Continuous($T_c = 100^\circ C$)	$I_D(100^\circ C)$	105	A
Pulsed Drain Current	I_{DM}	560	A
Maximum Power Dissipation	P_D	170	W
Derating factor		1.36	W/°C
Single pulse avalanche energy (Note 1)	E_{AS}	920	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.74	°C/W
--------------------------------------	-----------------	------	------

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	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						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =70A	-	2.65	3.05	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =70A		65	-	S
Dynamic Characteristics (Note2)						
Input Capacitance	C _{iss}	V _{DS} =40V, V _{GS} =0V, F=1.0MHz	-	5860	-	pF
Output Capacitance	C _{oss}		-	980	-	pF
Reverse Transfer Capacitance	C _{rss}		-	63	-	pF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =40V, I _D =70A V _{GS} =10V, R _G =3Ω	-	19	-	nS
Turn-on Rise Time	t _r		-	12	-	nS
Turn-Off Delay Time	t _{d(off)}		-	44	-	nS
Turn-Off Fall Time	t _f		-	11	-	nS
Total Gate Charge	Q _g	V _{DS} =40V, I _D =70A, V _{GS} =10V	-	96	-	nC
Gate-Source Charge	Q _{gs}		-	31	-	nC
Gate-Drain Charge	Q _{gd}		-	23	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =70A	-	-	1.2	V
Diode Forward Current	I _S		-	-	140	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =70A	-	76	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs	-	130	-	nC

Notes:

1. EAS condition : T_J=25°C, V_{DD}=40V, 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 heatsink, assuming a maximum junction temperature of T_J(MAX)=150°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

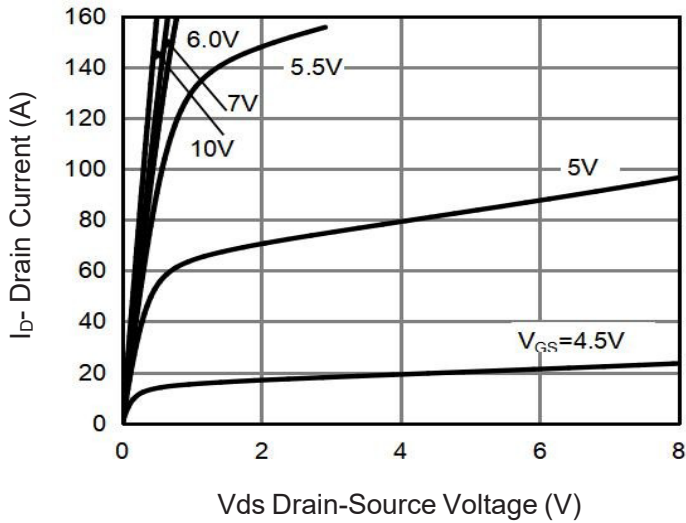


Figure 1 Output Characteristics

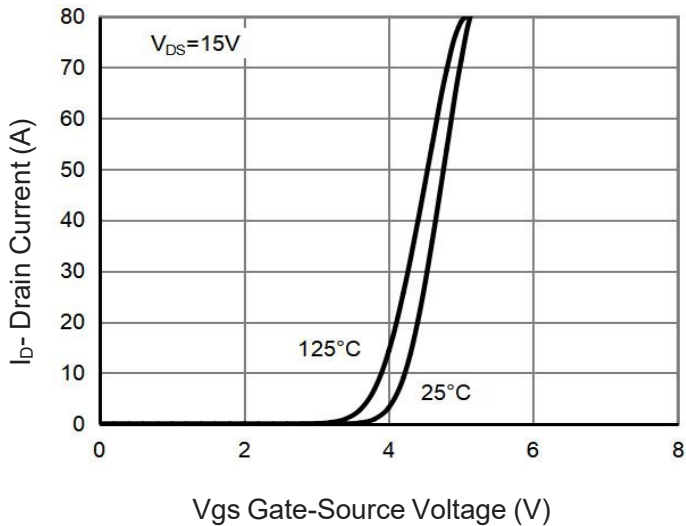


Figure 2 Transfer Characteristics

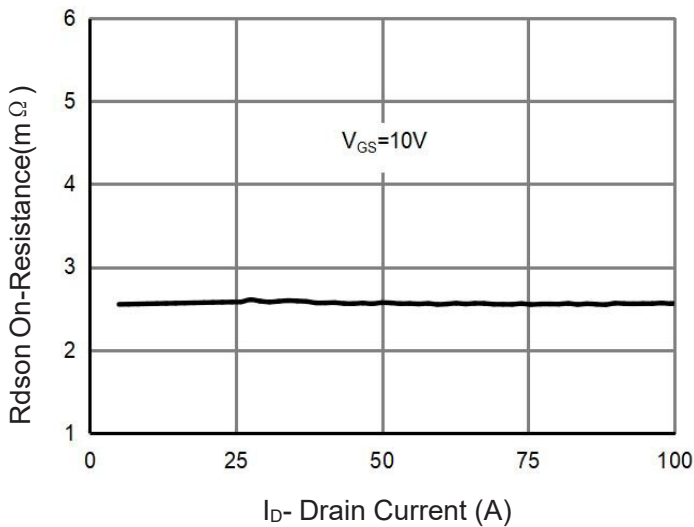


Figure 3 Rdson- Drain Current

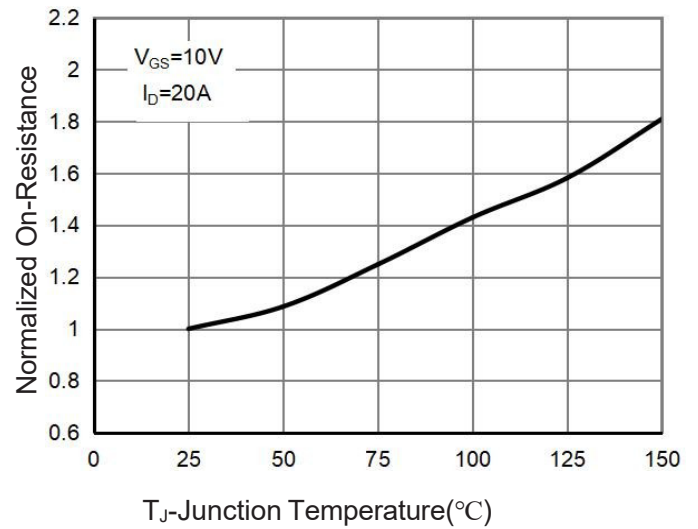


Figure 4 Rdson-Junction Temperature

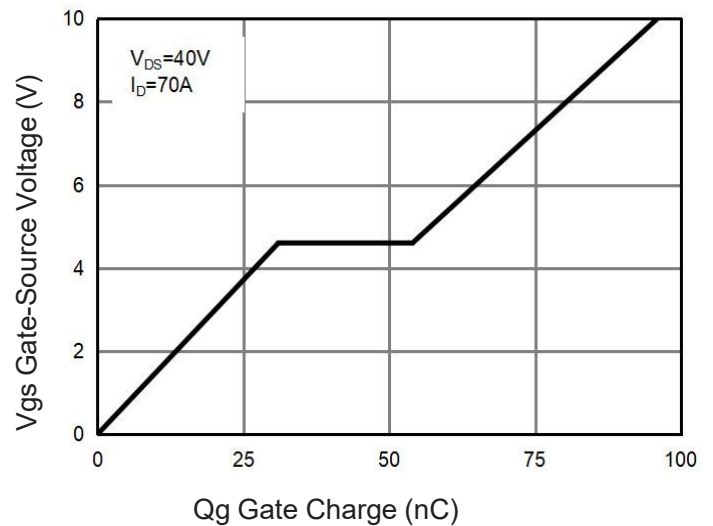


Figure 5 Gate Charge

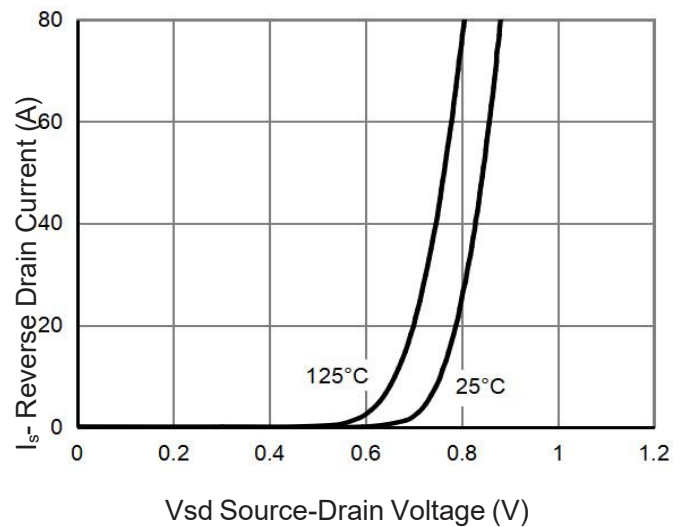
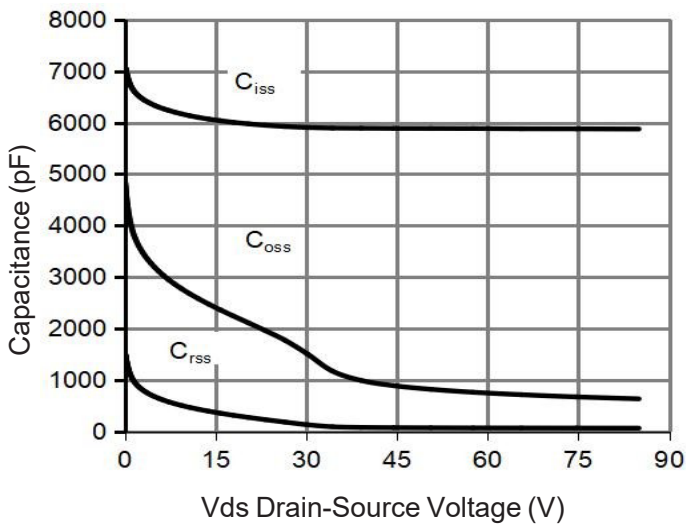
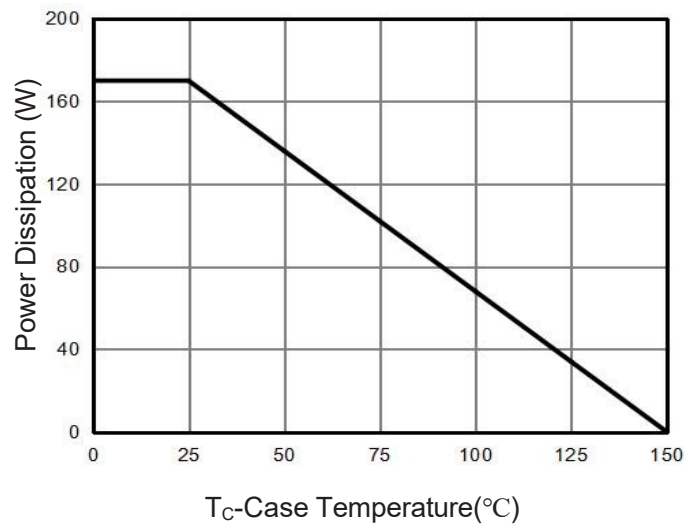
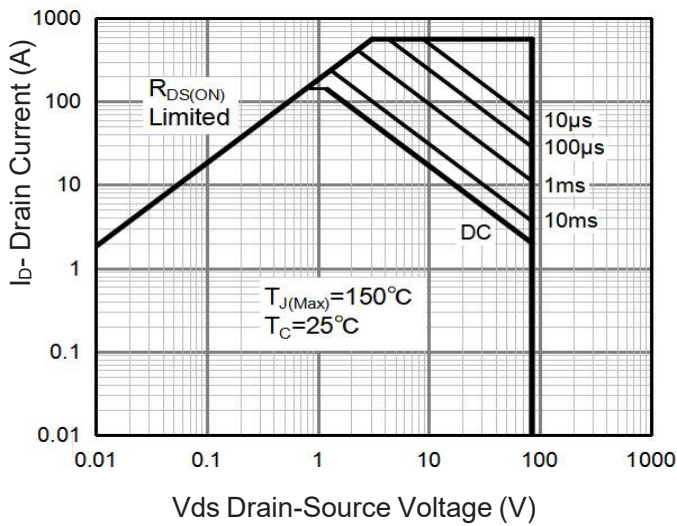
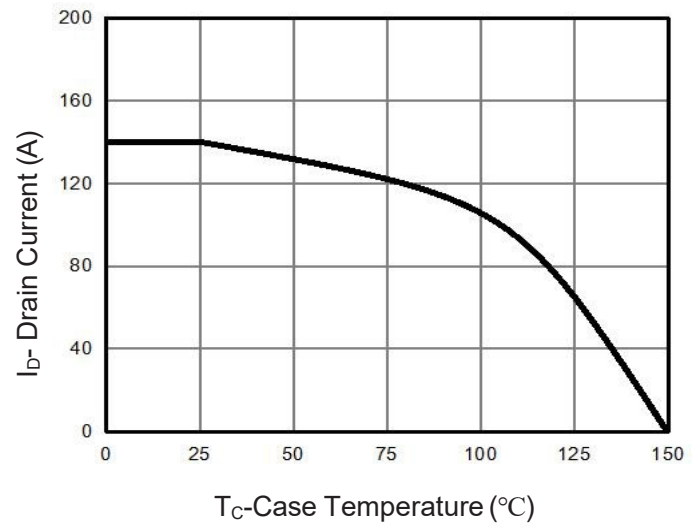
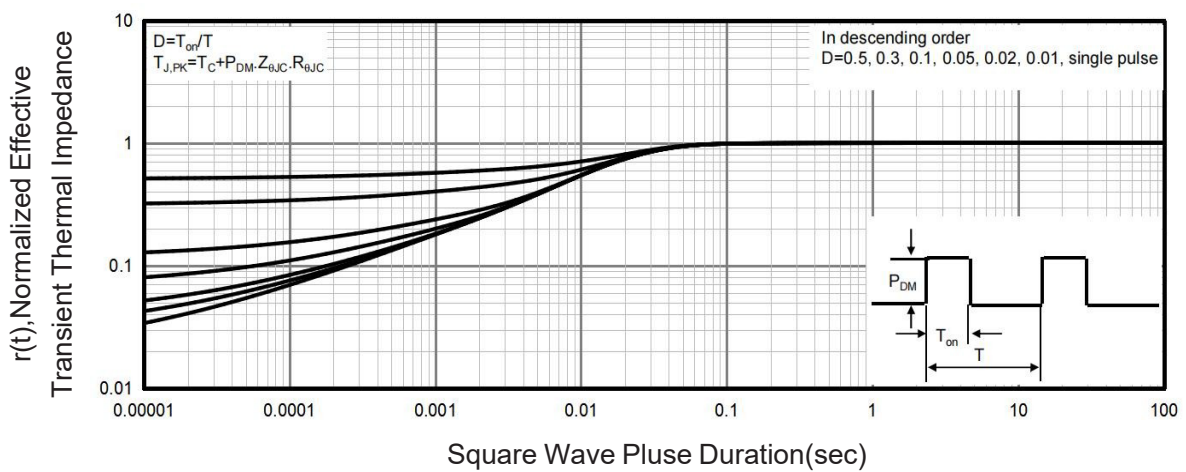


Figure 6 Source- Drain Diode Forward


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