Description

These N-Channel enhancement mode power field effect transistors are using split gate trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

Features

- 40V,141A, $R_{DS(on),max}$ =2.8mΩ@V_{GS} = 10V
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green device available

Applications

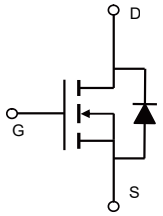
- Motor Drives
- UPS
- DC-DC Converter

Product Summary

V_{DSS}	40V
$R_{DS(on),max}$@ V_{GS}=10V	2.8mΩ
I_D	141A

Pin Configuration

TO-263



Schematic

Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	40	V
Continuous drain current (T_C = 25°C)	I_D	141	A
(T_C = 100°C)		89	A
Pulsed drain current[1)]	I_{DM}	423	A
Gate-Source voltage	V_{GSS}	±20	V
Avalanche energy[2)]	E_{AS}	36	mJ
Power Dissipation	P_D	89	W
Storage Temperature Range	T_{STG}	-55 to +150	°C
Operating Junction Temperature Range	T_J	-55 to +150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.4	°C/W
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	50	°C/W

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Reel
VST04N028-T3	TO-263	VST04N028-T3	800

Electrical Characteristics

T_J = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0 V, I_D=250uA	40	---	---	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	1.2	1.7	2.5	V
Drain-source leakage current	I_{DSS}	V_{DS}=40 V, V_{GS}=0V	---	---	1	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=20 V, V_{DS}=0 V	---	---	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-20 V, V_{DS}=0 V	---	---	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=20 A	---	2.2	2.8	mΩ
		V_{GS}=4.5 V, I_D=20 A	---	2.8	3.8	mΩ
Forward transconductance	g_{fs}	V_{DS} =5V , I_D=20A	---	55	---	S
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V, F = 1MHz	---	3975	---	pF
Output capacitance	C_{oss}		---	1123	---	
Reverse transfer capacitance	C_{rss}		---	84	---	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 15V,V_{GS}=10V, I_D = 20A R_G=3.3Ω	---	18.7	---	ns
Rise time	t_r		---	9.3	---	
Turn-off delay time	$t_{d(off)}$		---	58.1	---	
Fall time	t_f		---	32.5	---	
Gate resistance	Rg	V_{GS}=0 V,V_{DS}=0 V, F=1MHz	---	1.1	---	Ω
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DS}=15V, I_D=20A, V_{GS}= 10 V	---	12.3	---	nC
Gate to drain charge	Q_{gd}		---	18.2	---	
Gate charge total	Q_g		---	56	---	
Drain-Source diode characteristics and Maximum Ratings						
Continuous Source Current	I_S		---	---	74	A
Pulsed Source Current[3)]	I_{SM}		---	---	222	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=20A, T_J=25℃	---	---	1.2	V

Notes:

1: Repetitive Rating: Pulse width limited by maximum junction temperature.

2: V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=27A, Starting T_J=25℃.

3: Pulse Test：Pulse Width ≤300μs, Duty Cycle≤2%.

Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

Figure 2. Transfer Characteristics

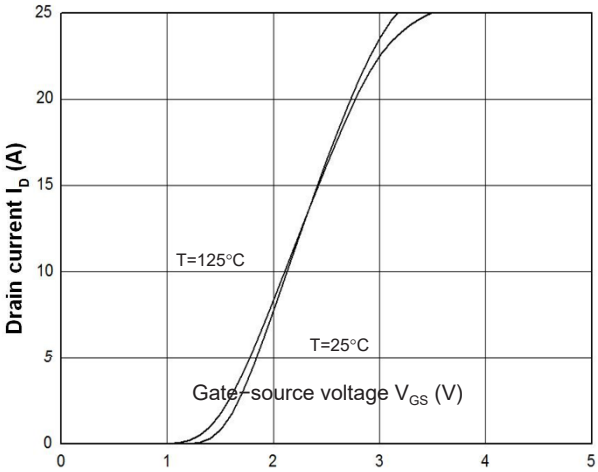


Figure 3. Capacitance Characteristics

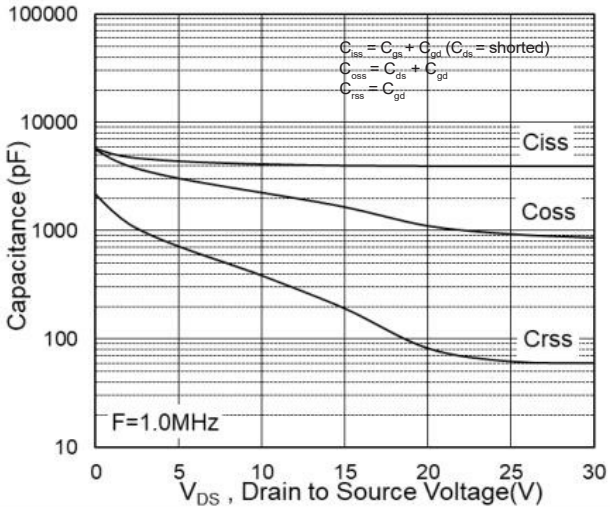


Figure 4. Gate Charge Waveform

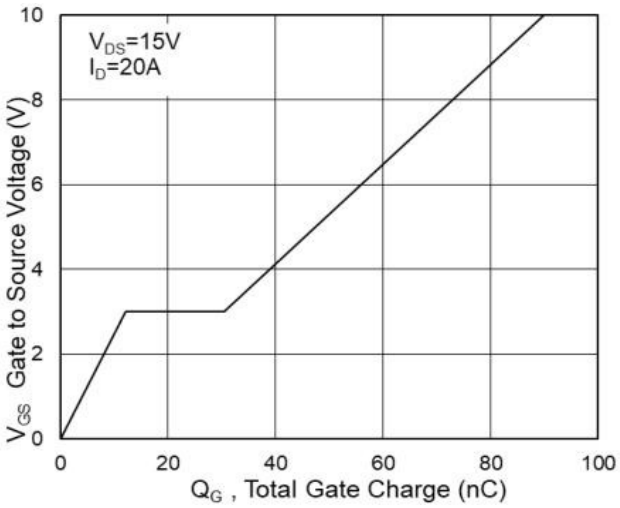


Figure 5. Body-Diode Characteristics

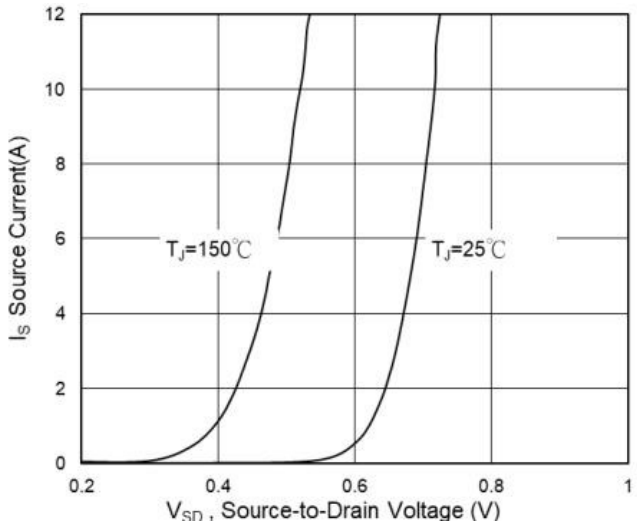


Figure 6. Rdson-Drain Current

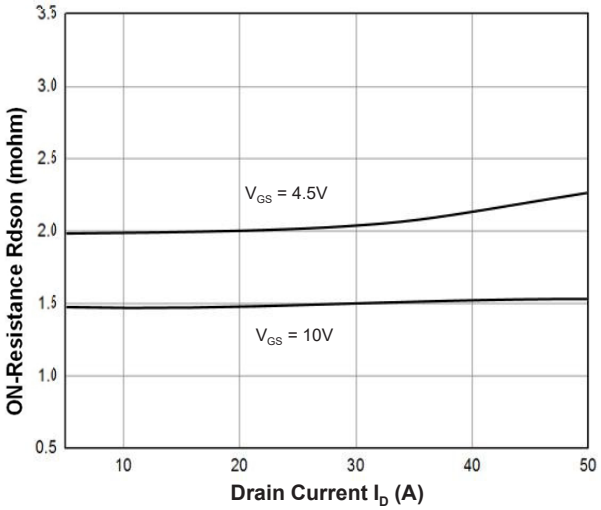


Figure 7. Rdson-Junction Temperature

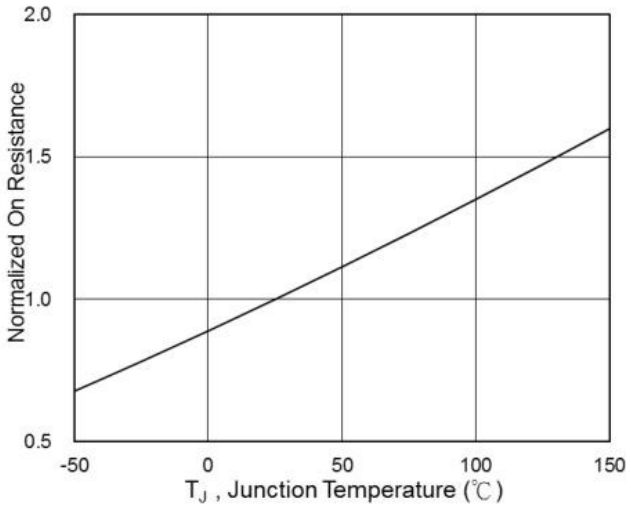


Figure 8. $V_{GS(th)}$-Junction Temperature

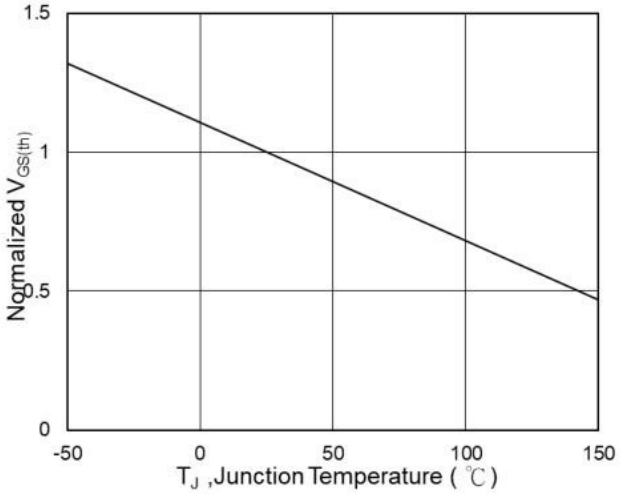


Figure 9. On-Resistance vs. Gate-to-Source voltage

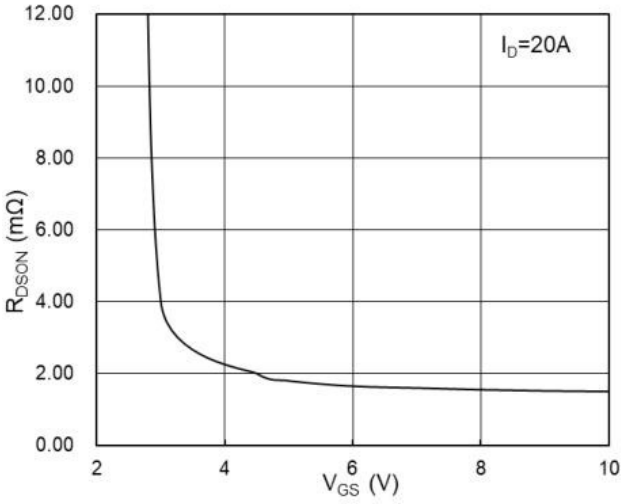


Figure 10: Safe Operating Area

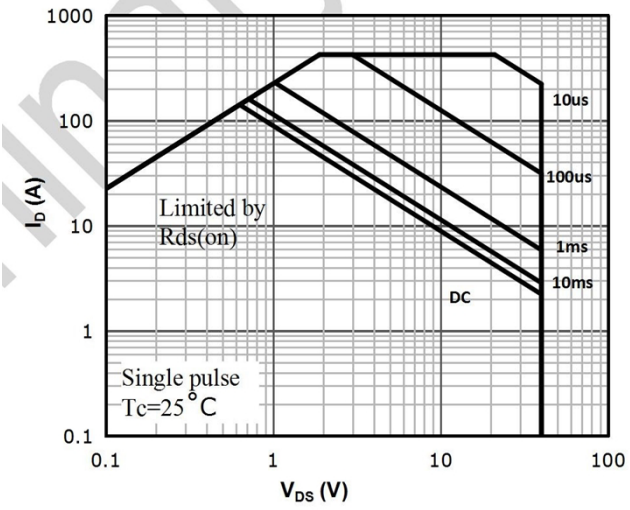
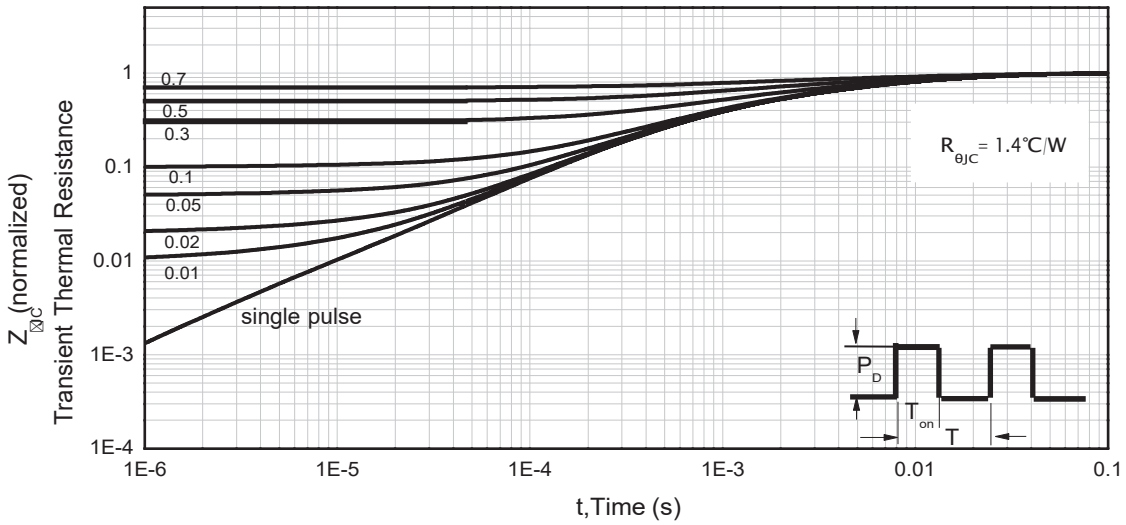
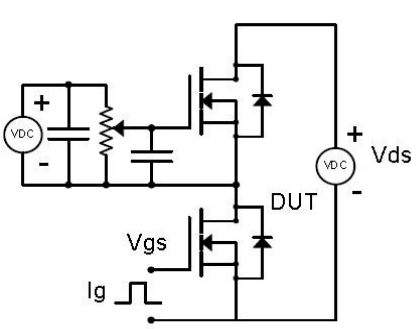


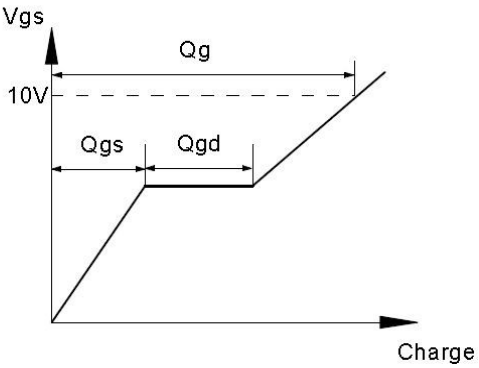
Figure 11. Normalized Maximum Transient Thermal Impedance (RthJC)



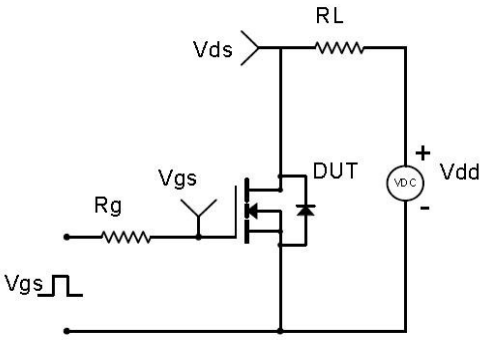
Test Circuit & Waveform

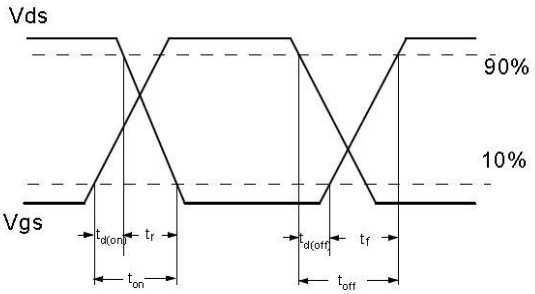
Gate Charge Test Circuit & Waveform



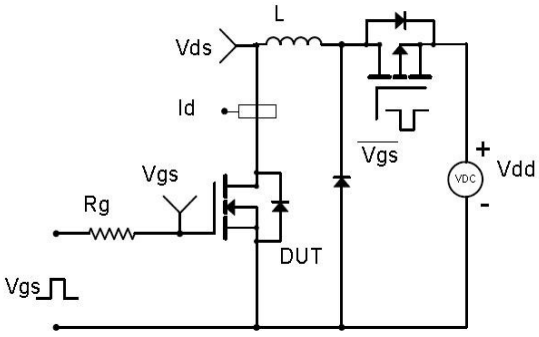


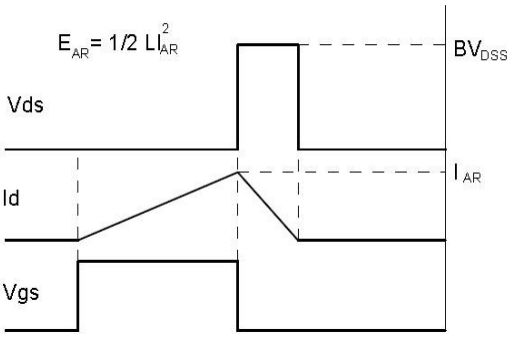
Resistive Switching Test Circuit & Waveforms





Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms