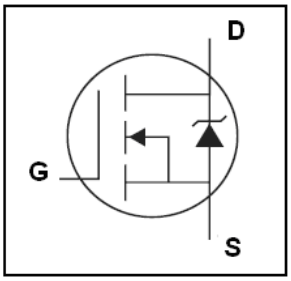
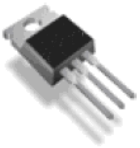
Features

- ♦ Low On-Resistance
- ♦ Fast Switching
- ♦ 100% Avalanche Tested
- ♦ Repetitive Avalanche Allowed up to Tjmax
- ♦ Lead-Free, RoHS Compliant



V_{DSS}	40V
$R_{DS(on)}$	1.9mΩ
I_D	300A



TO-220AB
VS40300AT

Description

VS40300AT designed by the trench processing techniques to achieve extremely low on-resistance. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating . These features combine to make this design an extremely efficient and reliable device for use in BLDC Motor、Brushed Motor drive applications and a wide variety of other applications.

Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only;and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (T_A) is 25°C, unless otherwise specified.

	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage		±20	V
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		40	V
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_D	Continuous Drain curren	T_C=25°C	300	A
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested (Sillicon Limit)	T_C=25°C	1050	A
I_D	Continuous Drain current@V_{GS}=10V (See Fig2)	T_C=25°C	300	A
	Continuous Drain current@V_{GS}=10V	T_C=100°C	185	
	Continuous Drain current@V_{GS}=10V,(Package Bonding imited)	T_C=25°C	120	
P_D	Maximum Power Dissipation	T_C=25°C	192	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.78	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		62	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed		972	mJ

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	40	--	--	V
$\triangle_{BR)DSS}/\triangle T_J$	Breakdown Voltage Temp. Coefficient	Ref 25°C, ID =1mA	--	0.028	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=40V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=40V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	2.0	3.0	4.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance①	V_{GS}=10V, I_D=90A	--	1.9	2.4	mΩ
gfs	Forward Transconductance	V_{DS}= 10V, I_D=90A	--	150	--	S
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	--	6980	--	pF
C_{oss}	Output Capacitance		--	1850	--	pF
C_{rss}	Reverse Transfer Capacitance		--	680	--	pF
Q_g	Total Gate Charge	V_{DS}=20V,I_D=60A, V_{GS}=10V	--	145	--	nC
Q_{gs}	Gate-Source Charge		--	37.5	--	nC
Q_{gd}	Gate-Drain Charge		--	48	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=1A, R_G=6.8Ω, V_{GS}=10V R_L=30Ω,	--	18	--	nS
t_r	Turn-on Rise Time		--	66	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	80	--	nS
t_f	Turn-Off Fall Time		--	62	--	nS
Source- Drain Diode Characteristics@ T_J = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=60A,V_{GS}=0V	--	0.8	1.3	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=30A, V_{GS}=0V di/dt=100A/μs	--	28	--	nS
Q_{rr}	Reverse Recovery Charge			21		nC

NOTE:

①Pulse width ≤ 300μs; duty cycle≤ 2%.

② Limited by TJmax, starting T_J = 25°C, L = 0.24mH,R_G = 25Ω, I_{AS} = 90A, V_{GS} =10V.

Part not recommended for use above this value

③Repetitive rating; pulse width limited by max. junction temperature.Package limit continuous current is 120A。

Typical Characteristics

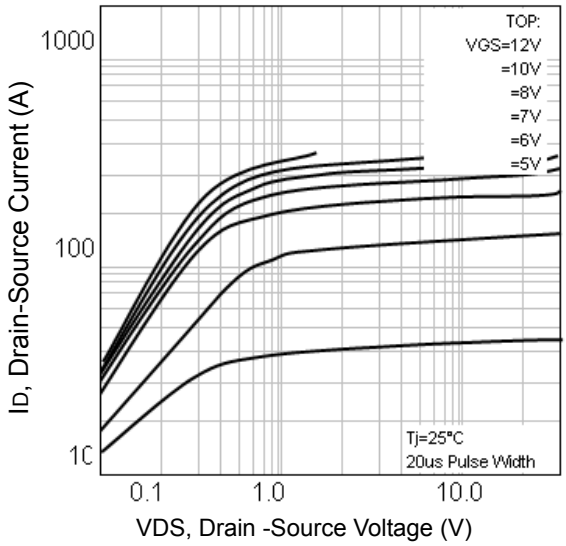


Fig1. Typical Output Characteristics

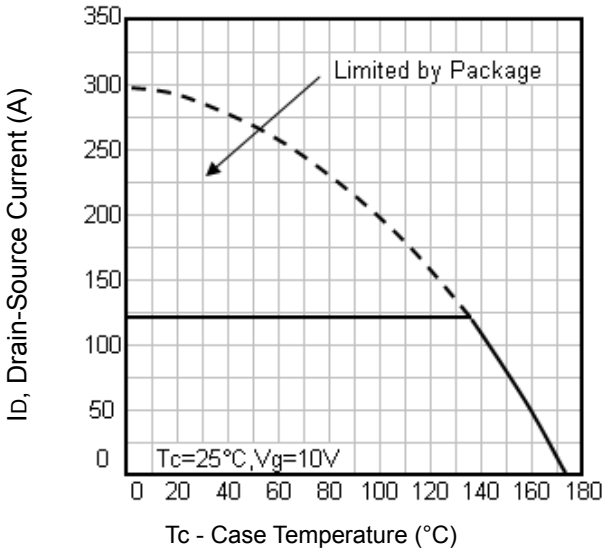


Fig2. Maximum Drain Current Vs.Case Temperature

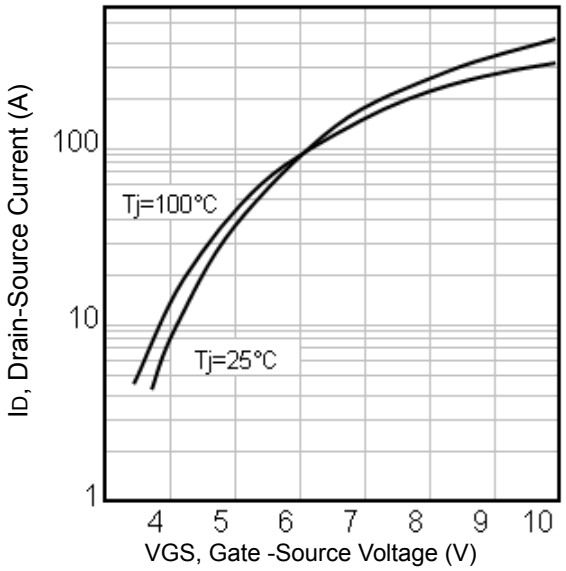


Fig3. Typical Transfer Characteristics

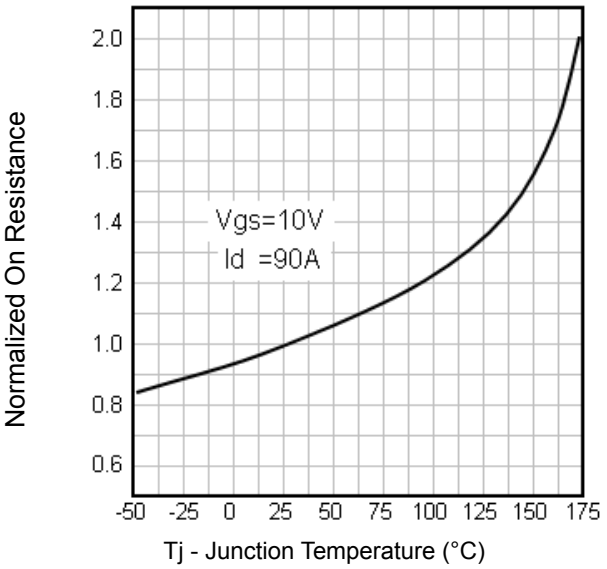


Fig4. Normalized On-Resistance Vs. Temperature

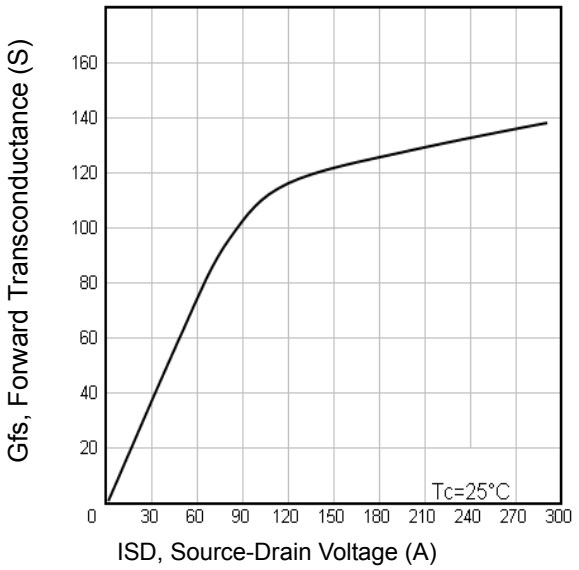


Fig5.Typical Forward Transconductance Vs. Drain Current

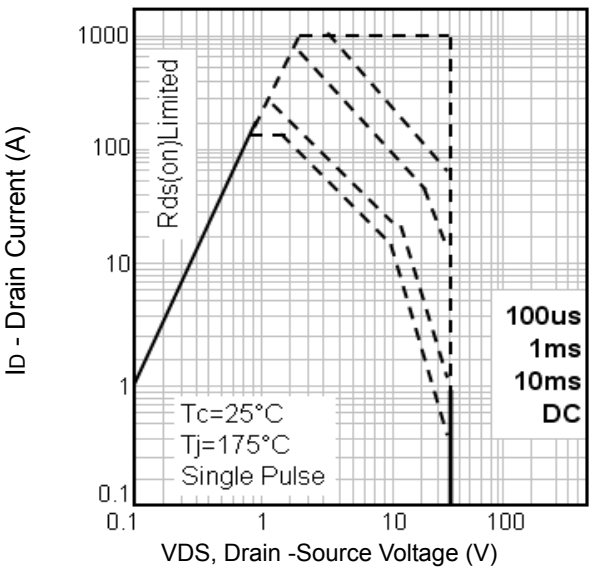


Fig6. Maximum Safe Operating Area

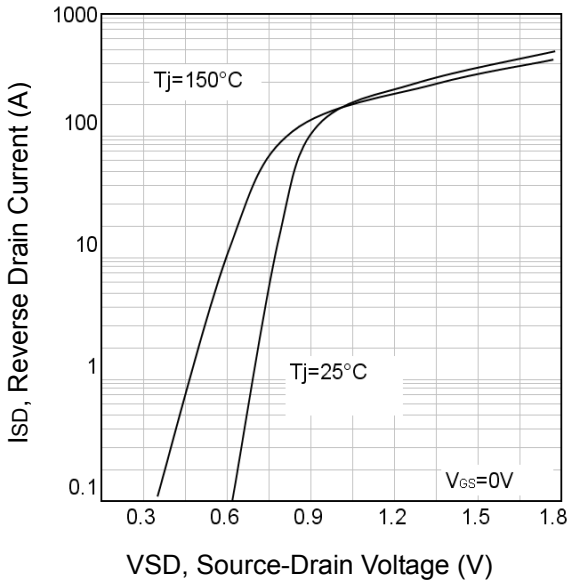


Fig7. Typical Source-Drain Diode Forward Voltage

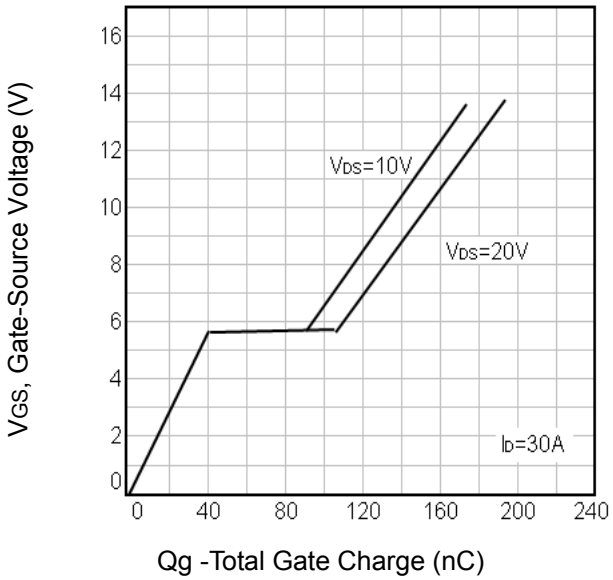


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

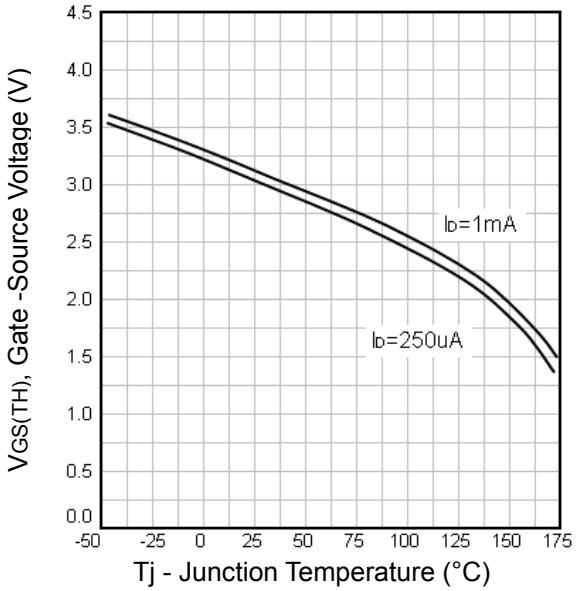


Fig9. Threshold Voltage Vs. Temperature

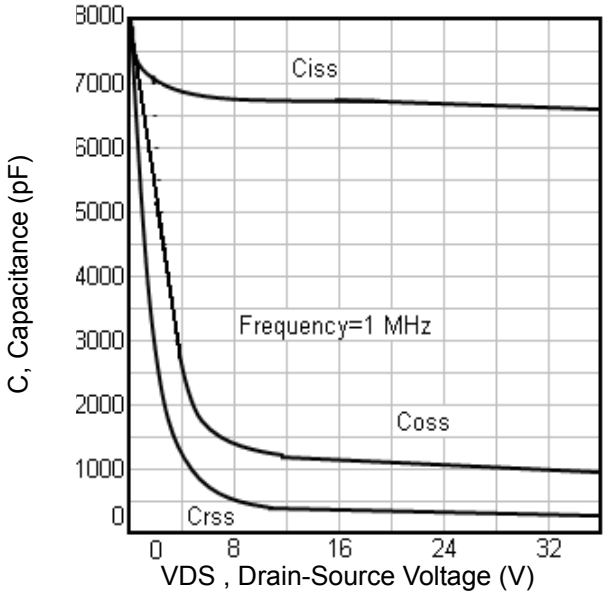


Fig10. Typical Capacitance Vs.Drain-Source Voltage

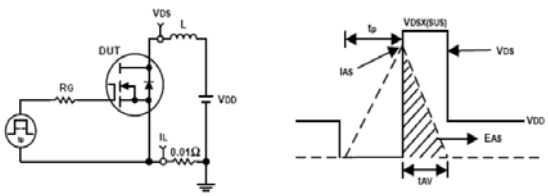


Fig11. Unclamped Inductive Test Circuit and waveforms

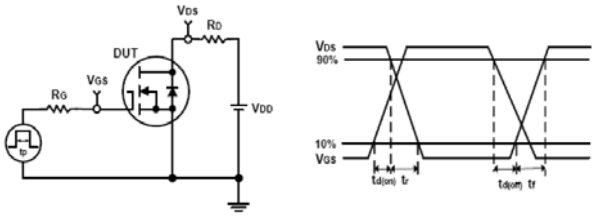
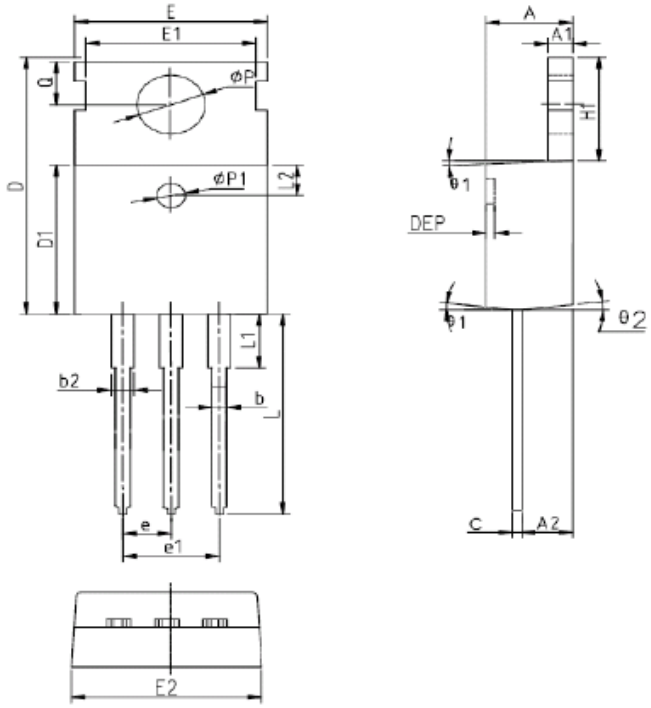


Fig12. Switching Time Test Circuit and waveforms

TO-220 Package Outline



SYMBOL	MM		
	MIN	NOM	MAX
A	4.40	4.57	4.70
A1	1.27	1.30	1.33
A2	2.35	2.40	2.50
b	0.77	-	0.90
b2	1.23	-	1.36
C	0.48	0.50	0.52
D	15.40	15.60	15.80
D1	9.00	9.10	9.20
DEP	0.05	0.10	0.20
E	9.70	9.90	10.10
E1	-	8.70	-
E2	9.80	10.00	10.20
Øp1	1.40	1.50	1.60
e	2.54BSC		
e1	5.08BSC		
H1	6.40	6.50	6.60
L	12.75	-	13.17
L1	-	-	3.95
L2	2.50REF.		
Øp	3.57	3.60	3.63
Q	2.73	2.80	2.87
θ1	5°	7°	9°
θ2	1°	3°	5°

Order Information

Product	Marking	Package	Packaging	Min Unit Quantity
VS40300AT	VS40300AT	TO-220	50PCS/Tube	1000PCS

Customer Service

Sales and Service:
sales@vgsemi.com
Shen Zhen Vangaurd Semiconductor CO., LTD
TEL: (86-755) -26902410
FAX: (86-755) -26907027
WEB: www.vgsemi.com