

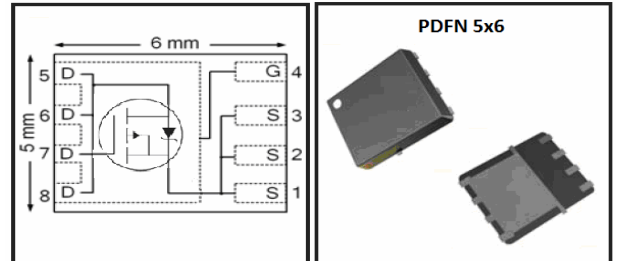
Features

- ◆ Low On-Resistance
- ◆ Fast Switching
- ◆ 100% Avalanche Tested
- ◆ Repetitive Avalanche Allowed up to T_{jmax}
- ◆ Lead-Free, RoHS Compliant

Description

VS30P39AP designed by the trench processing techniques to achieve extremely low on-resistance. Additional features of this design are a 150°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 Power applications and a wide variety of other supply applications.

V_{DS}	-30	V
$R_{DS(on),typ} @ V_{GS} = -10V$	9	mΩ
I_D	-39	A



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.

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V _{GS}	Gate-Source Voltage		±20	V
V _{(BR)DSS}	Drain-Source Breakdown Voltage		-30	V
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	°C
I _S	Diode Continuous Forward Current	T _C =25°C	-39	A
Mounted on Large Heat Sink				
I _{DM}	Pulse Drain Current Tested ①	T _C =25°C	-156	A
I _D	Continuous Drain current@V _{GS} =10V	T _C =25°C	-39	A
P _D	Maximum Power Dissipation	T _C =25°C	78	W
		T _C =70°C	50	W
R _{θJC}	Thermal Resistance-Junction to Case		1.6	°C/W
R _{θJA}	Thermal Resistance Junction-Ambient(ts<10s)		20	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed ②		35	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	-30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current(Tc=25°C)	V _{DS} =-24V,V _{GS} =0V	--	--	-1	μA
	Zero Gate Voltage Drain Current(Tc=125°C)	V _{DS} =-24V,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	-1.0	-1.5	-2.0	V
R _{DS(ON)}	Drain-Source On-State Resistance③	V _{GS} =-10V, I _D =-12A	--	9	13	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance③	V _{GS} =-5V, I _D =-10A	--	13	20	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =-15V,V _{GS} =0V, f=1MHz	--	1950	--	pF
C _{oss}	Output Capacitance		--	320	--	pF
C _{rss}	Reverse Transfer Capacitance		--	225	--	pF
Q _g	Total Gate Charge	V _{DS} =-10V,I _D =-10A, V _{GS} =-10V	--	28	--	nC
Q _{gs}	Gate-Source Charge		--	4.5	--	nC
Q _{gd}	Gate-Drain Charge		--	9	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =-15V, I _D =-1A, R _G =6.8Ω, V _{GS} =-10V	--	9	--	nS
t _r	Turn-on Rise Time		--	10	--	nS
t _{d(off)}	Turn-Off Delay Time		--	22	--	nS
t _f	Turn-Off Fall Time		--	11	--	nS
Source- Drain Diode Characteristics@ T _J = 25°C (unless otherwise stated)						
I _{SD}	Source-drain current(Body Diode)	T _c =25°C	--	--	-60	A
V _{SD}	Forward on voltage	I _{SD} =-10A,V _{GS} =0V	--	--	-1.3	V
t _{rr}	Reverse Recovery Time	T _j =25°C,I _{sd} =-8A, V _{GS} =0V	--	26	--	nS
Q _{rr}	Reverse Recovery Charge	di/dt=-100A/μs	--	35	--	nC

NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = -12A, V_{GS} = -10V. Part not recommended for use above this value
- ③ Pulse width ≤ 300μs; duty cycles ≤ 2%.

Typical Characteristics

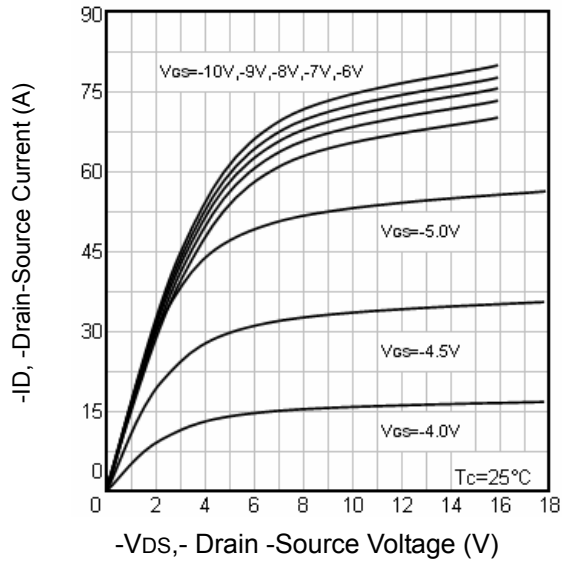


Fig1. Typical Output Characteristics

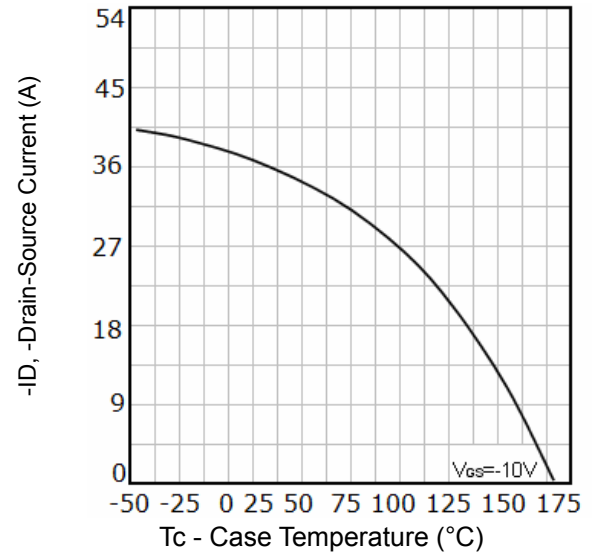


Fig2. Maximum Drain Current Vs. Case Temperature

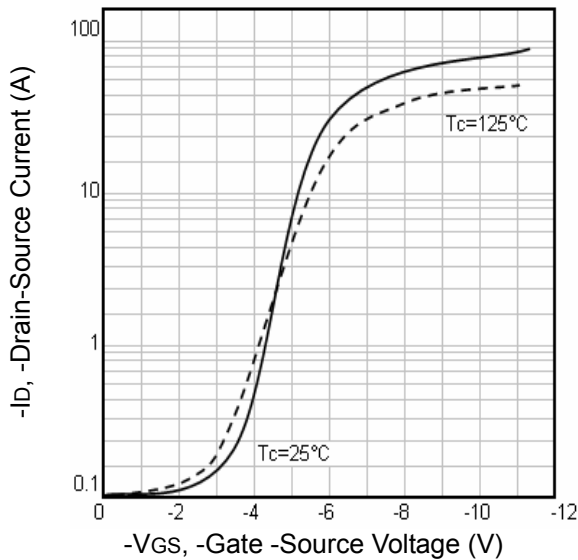


Fig3. Typical Transfer Characteristics

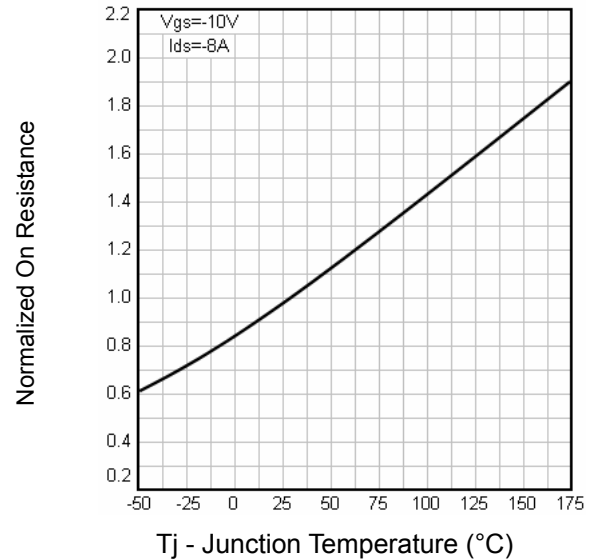


Fig4. Normalized On-Resistance Vs. Temperature

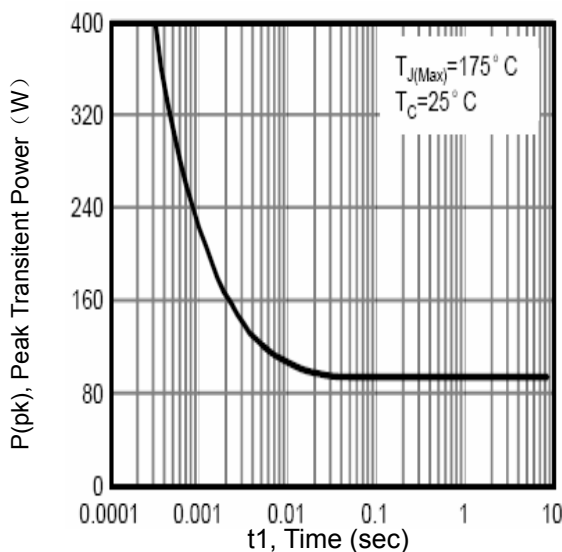


Fig5. Typical Peak Transient Power

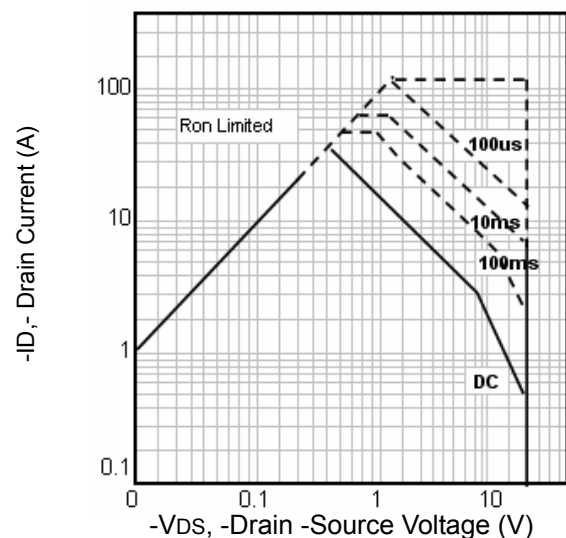


Fig6. Maximum Safe Operating Area

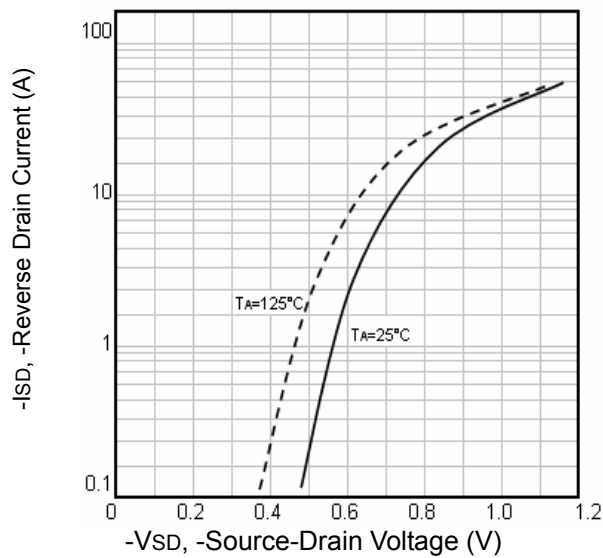


Fig7. Typical Source-Drain Diode Forward Voltage

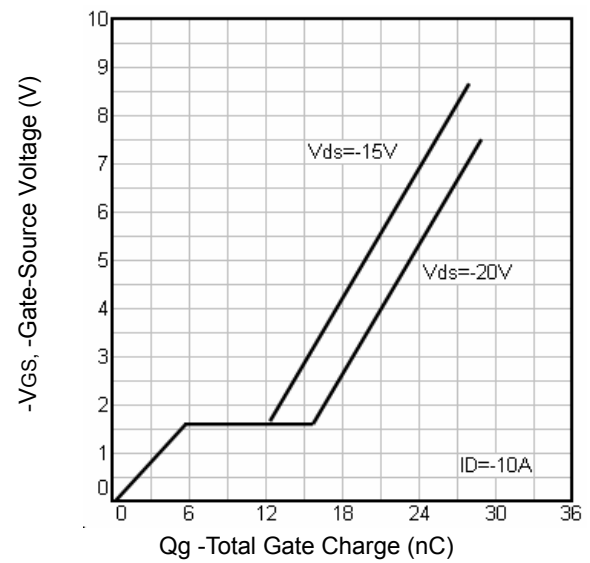


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

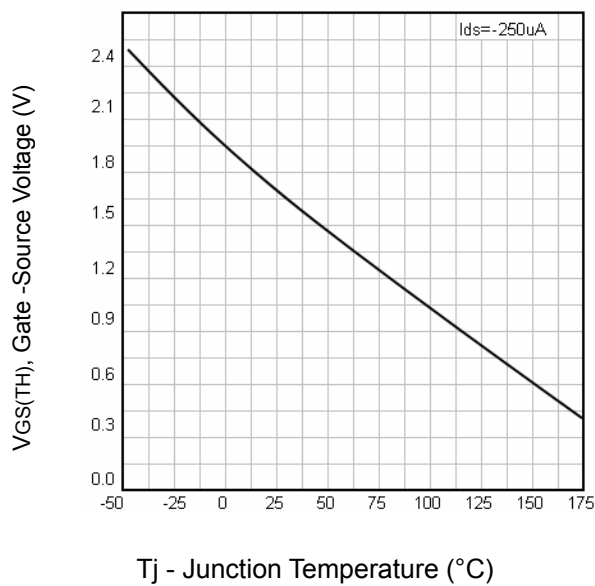


Fig9. Threshold Voltage Vs. Temperature

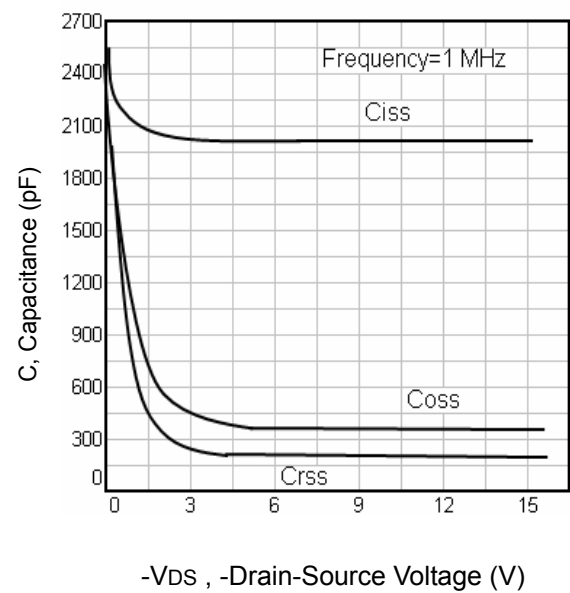


Fig10. Typical Capacitance Vs. Drain-Source Voltage

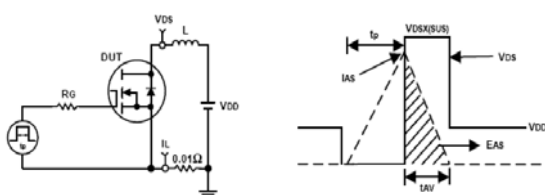


Fig11. Unclamped Inductive Test Circuit and Waveforms

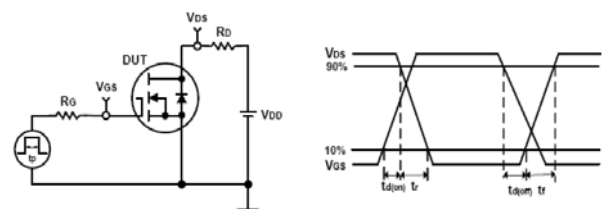
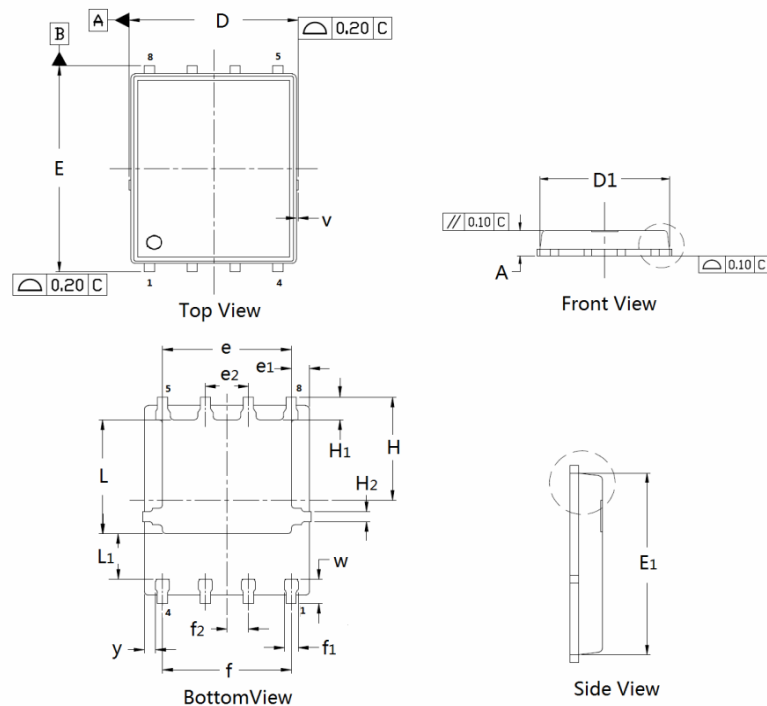


Fig12. Switching Time Test Circuit and waveforms

PQFN5×6 Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.02	1.10	D	4.90	4.98	5.10
D ₁	4.80	4.89	5.00	E	6.00	6.11	6.20
E ₁	5.65	5.74	5.85	e	3.72	3.80	3.92
e ₁	--	0.54	--	e ₂	--	1.27	--
f	--	3.82	--	f ₁	0.31	0.37	0.51
f ₂	--	0.64	--	H	--	3.15	--
H ₁	0.59	0.63	0.79	H ₂	0.26	0.28	0.32
L	3.38	3.45	3.58	L ₁	--	1.39	--
v	--	0.13	--	w	0.64	0.68	0.84
y	--	0.34	--		--		--

Product	Marking	Package	Packaging	Min Unit Quantity
VS30P39AP	VS30P39AP	PDFN5x6	3000/Reel	3000

Customer Service

Sales and Service:

sales@vgsemi.com

Vanguard Semiconductor CO., LTD

TEL: (86-755) -26902410

FAX: (86-755) -26907027

WEB: www.vgsemi.com