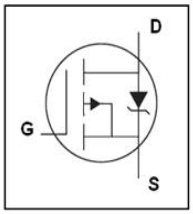
Features

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



V_{DSS}	-30V
$R_{DS(on)}$	10mΩ
I_D	-39A

PDFN3333

Description

VS30P39AE 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.

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 (TA) is 25°C, unless otherwise specified.

Symbol	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		-30	V
T_{STG} T_J	Storage and operating 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
$R_{\theta JC}$	Thermal Resistance-Junction to Case		1.6	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient(ts<10s)		20	°C/W
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed ②		36	mJ

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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℃)	V_{DS}=-24V,V_{GS}=0V	--	--	-1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	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	--	10	13	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=-5V, I_D=-10A	--	14	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℃	--	--	-60	A
V_{SD}	Forward on voltage	I_{SD}=-10A,V_{GS}=0V	--	--	-1.3	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=-8A, V_{GS}=0V di/dt=-100A/μs	--	26	--	nS
Q_{rr}	Reverse Recovery Charge		--	35	--	nC

NOTE:

① Repetitive rating; pulse width limited by max. junction temperature.

② Limited by TJmax, starting TJ = 25°C, L = 0.5mH,RG = 25Ω, IAS =-12A, VGS =-10V. Part not recommended for use above this value

③ Pulse width ≤ 300μs; duty cycle≤ 2%.

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Typical Characteristics

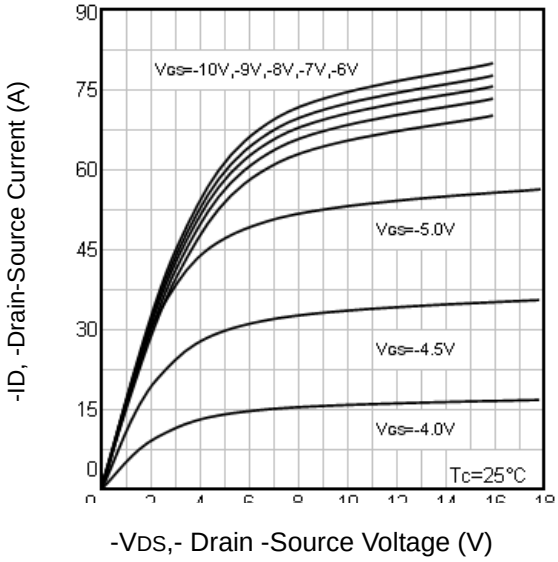

Fig1. Typical Output Characteristics

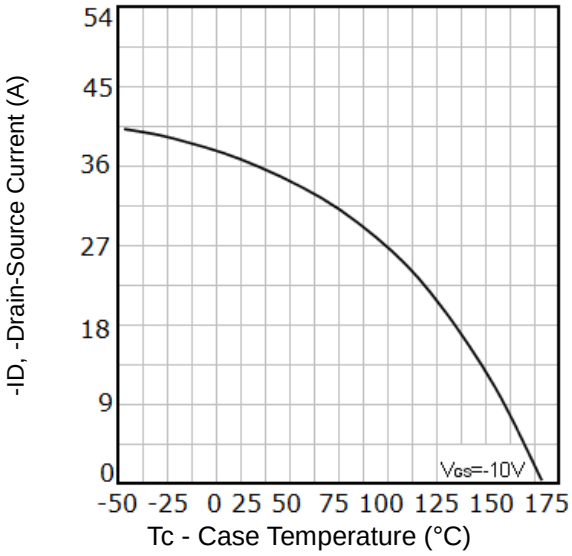

Fig2. Maximum Drain Current Vs.Case Temperature

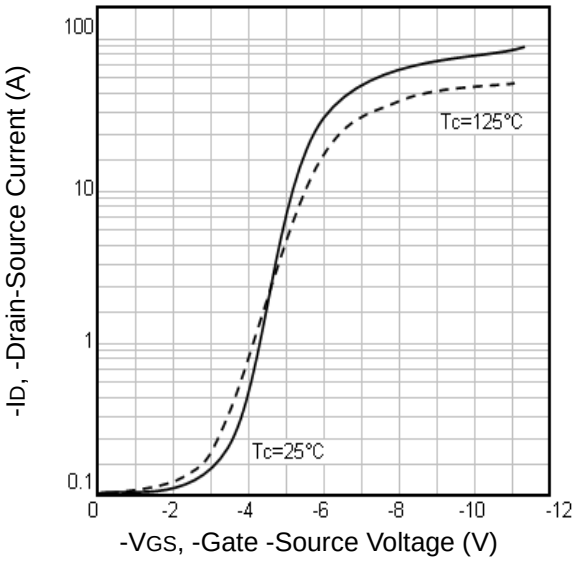

Fig3. Typical Transfer Characteristics

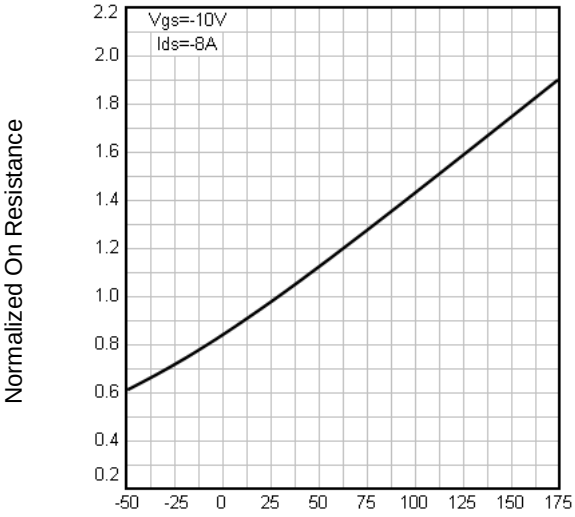

Fig4. Normalized On-Resistance Vs. Temperature

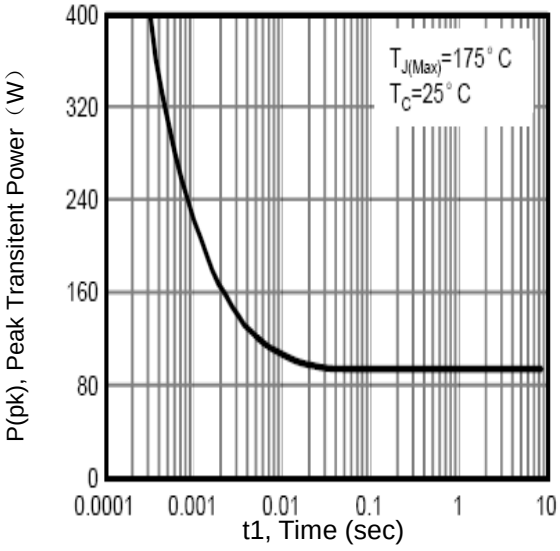

Fig5. Typical Peak Transitent Power

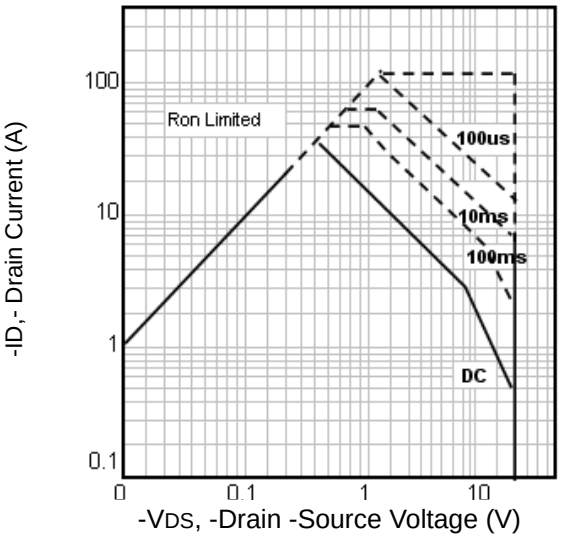

Fig6. Maximum Safe Operating Area

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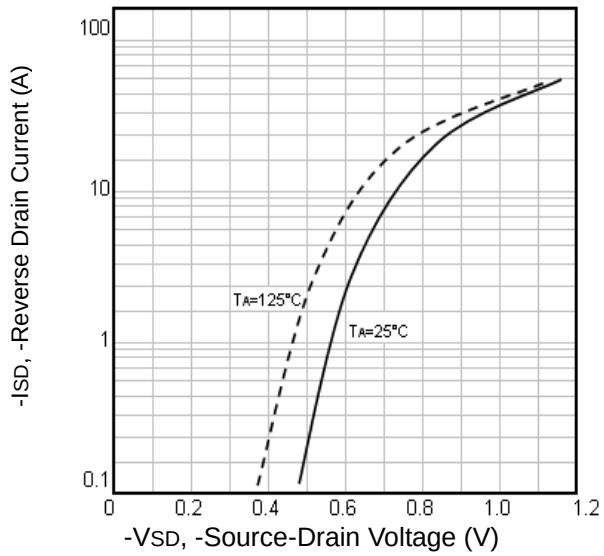

Fig7. Typical Source-Drain Diode Forward Voltage

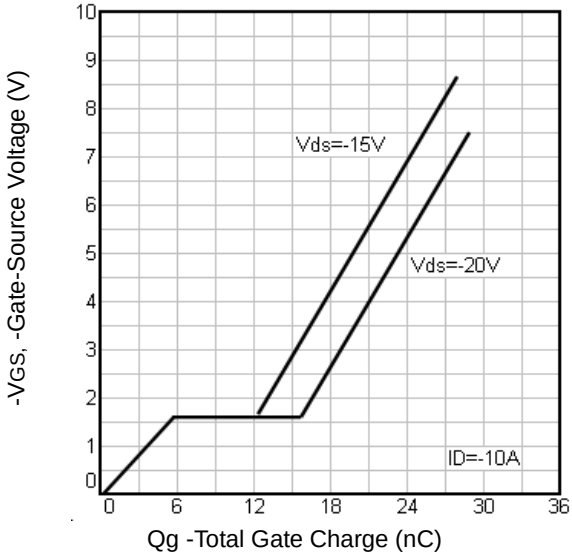

Fig8. Typical Gate Charge Vs.Gate-Source Voltage

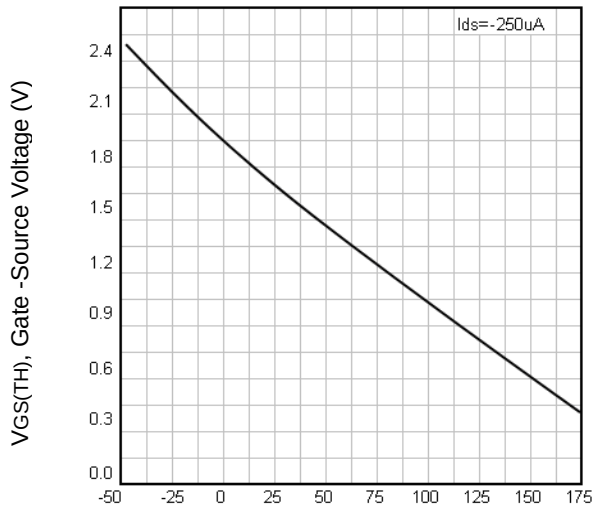

Fig9. Threshold Voltage Vs. Temperature

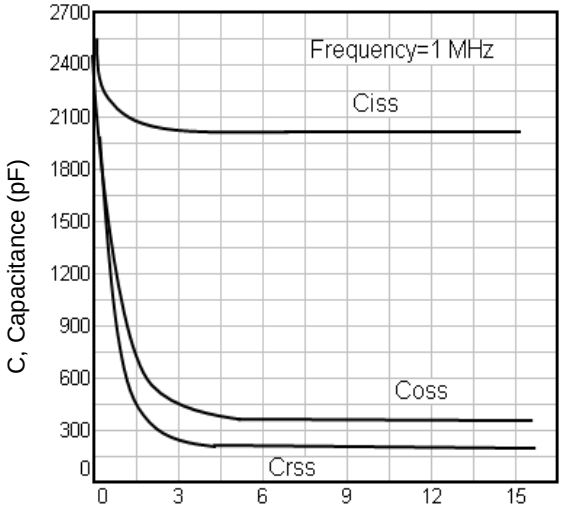

Fig10. Typical Capacitance Vs.Drain-Source Voltage

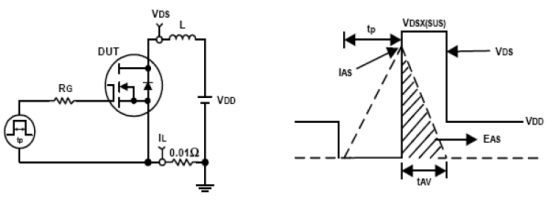

Fig11. Unclamped Inductive Test Circuit and Waveforms

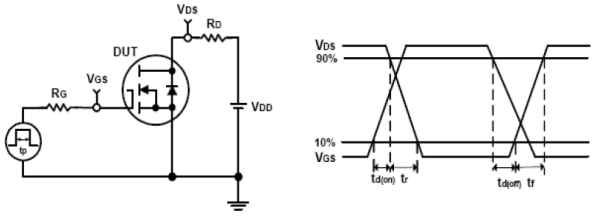

Fig12. Switching Time Test Circuit and waveforms

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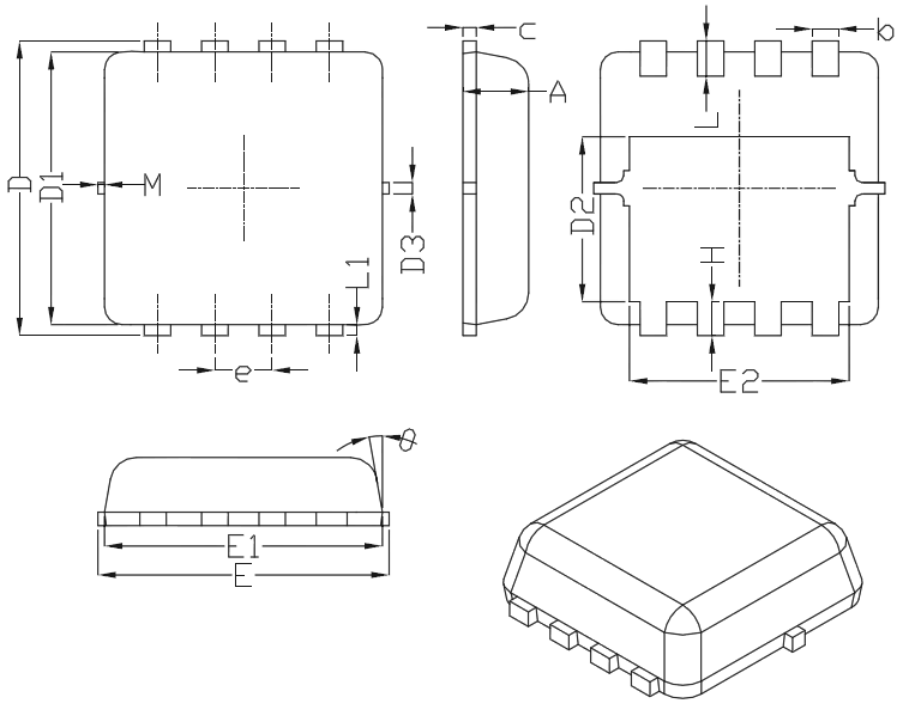
PDFN3333 Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.70	0.75	0.80	**b**	0.25	0.30	0.35
C	0.10	0.15	0.25	**D**	3.25	3.35	3.45
D1	3.00	3.10	3.20	**D2**	1.78	1.88	1.98
D3	--	0.13	--	**E**	3.20	3.30	3.40
E1	3.00	3.15	3.20	**E2**	2.39	2.49	2.59
e	0.65BSC			**H**	0.30	0.39	0.50
L	0.30	0.40	0.50	**L1**	--	0.13	--
θ	--	10°	12°	**M**	*	*	0.15
*Not specified							

Order Information

Product	Marking	Package	Packaging	Min Unit Quantity
VS30P39AE	30P39AE	PDFN3333	5000/Reel	5000

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