

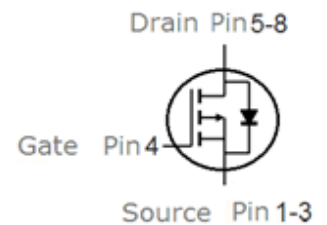
## Features

- P-Channel, -5V Logic Level Control
- Very low on-resistance  $R_{DS(on)}$  @  $V_{GS}=-4.5V$
- Fast Switching
- Enhancement mode
- Pb-free lead plating; RoHS compliant

$V_{DS}$	-30	V
$R_{DS(on),TYP} @ V_{GS}=-10V$	8.5	m $\Omega$
$R_{DS(on),TYP} @ V_{GS}=-4.5V$	15	m $\Omega$
$I_D$	-47	A

**PDFN3333**


Part ID	Package Type	Marking	Tape and reel information
VS3508AE	PDFN3333	3508AE	5000pcs/Reel



## Maximum ratings, at $T_A=25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	-30	V
$I_S$	Diode continuous forward current	$T_C=25^\circ\text{C}$	A
$I_D$	Continuous drain current @ $V_{GS}=-10V$	$T_C=25^\circ\text{C}$	A
		$T_C=100^\circ\text{C}$	A
$I_{DM}$	Pulse drain current tested ①	$T_C=25^\circ\text{C}$	A
EAS	Avalanche energy, single pulsed ②	81	mJ
$P_D$	Maximum power dissipation	$T_C=25^\circ\text{C}$	W
$V_{GS}$	Gate-Source voltage	$\pm 20$	V
$T_{STG} T_J$	Storage and operating temperature range	-55 to 150	$^\circ\text{C}$

## Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.3	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	35	$^\circ\text{C/W}$

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V I <sub>D</sub> =-250μA	-30	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V	--	--	-1	μA
	Zero Gate Voltage Drain Current(T <sub>j</sub> =125°C)	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V	--	--	-100	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.0	-1.8	-2.5	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance ②	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	--	8.5	11	mΩ
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance ②	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	--	15	20	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	--	3320	--	pF
C <sub>oss</sub>	Output Capacitance		--	395	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	245	--	pF
R <sub>g</sub>	Gate Resistance	f=1MHz	--	2.3	--	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-15V, I <sub>D</sub> =-10A, V <sub>GS</sub> =-10V	--	39	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	7	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	11	--	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =-15V, I <sub>D</sub> =-10A, R <sub>G</sub> =6.8Ω, V <sub>GS</sub> =-10V	--	15	--	nS
t <sub>r</sub>	Turn-on Rise Time		--	33	--	nS
t <sub>d(off)</sub>	Turn-Off Delay Time		--	67	--	nS
t <sub>f</sub>	Turn-Off Fall Time		--	21	--	nS
<b>Source- Drain Diode Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
V <sub>SD</sub>	Forward on voltage	I <sub>SD</sub> =-20A, V <sub>GS</sub> =0V	--	-0.89	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	T <sub>j</sub> =25°C, I <sub>sd</sub> =-10A, V <sub>GS</sub> =0V	--	29	--	nS
Q <sub>rr</sub>	Reverse Recovery Charge		di/dt=-100A/μs		144	

NOTE:

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

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

③ Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.5mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = -18A, V<sub>GS</sub> = -10V. Part not recommended for use above this value

Typical Characteristics

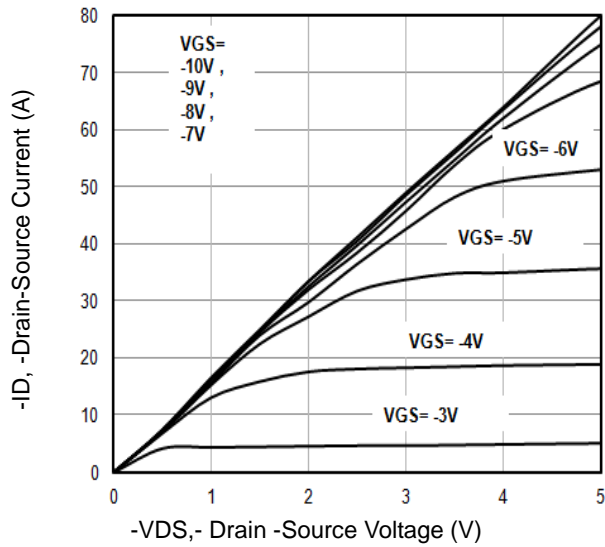


Fig1. Typical Output Characteristics

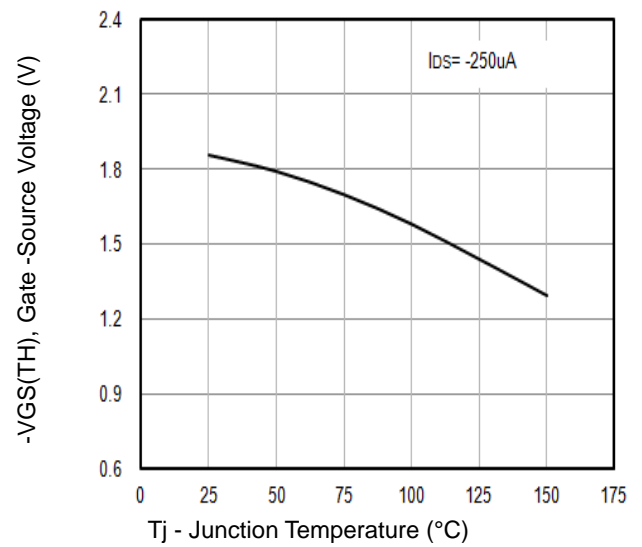


Fig2. -VGS(TH) Gate -Source Voltage Vs. Tj

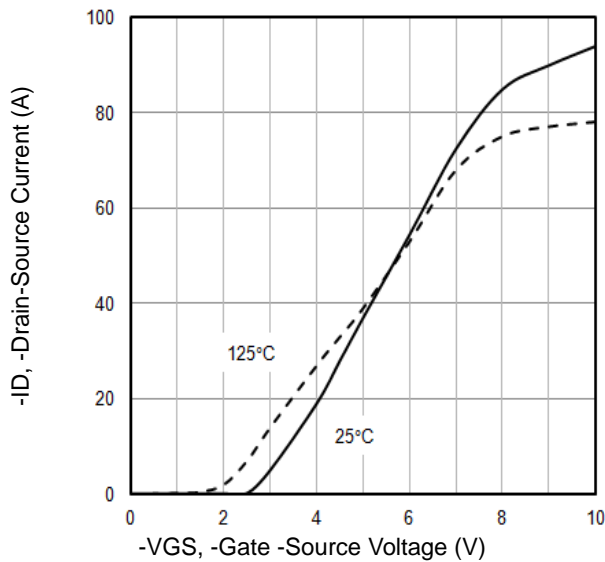


Fig3. Typical Transfer Characteristics

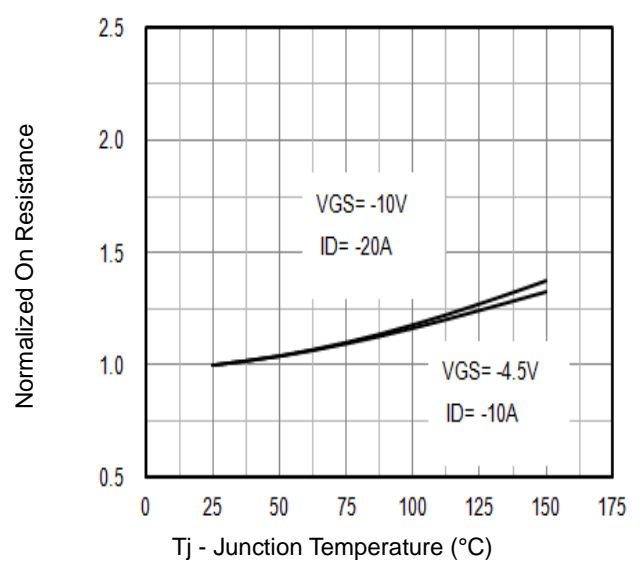


Fig4. Normalized On-Resistance Vs. Tj

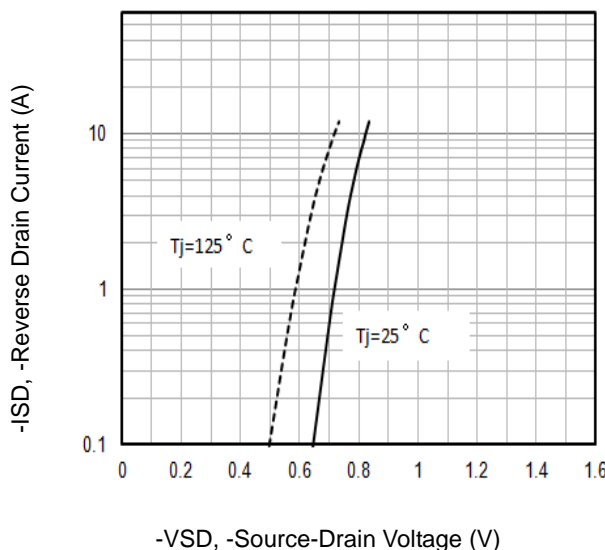


Fig5. Typical Source-Drain Diode Forward Voltage

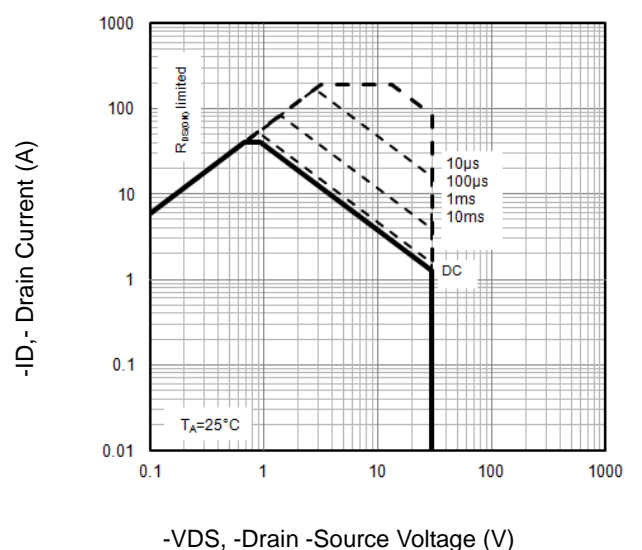


Fig6. Maximum Safe Operating Area

Typical Characteristics

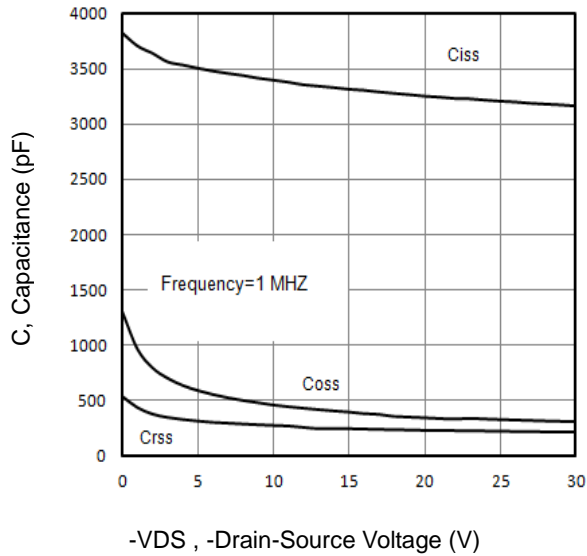


Fig7. Typical Capacitance Vs. Drain-Source Voltage

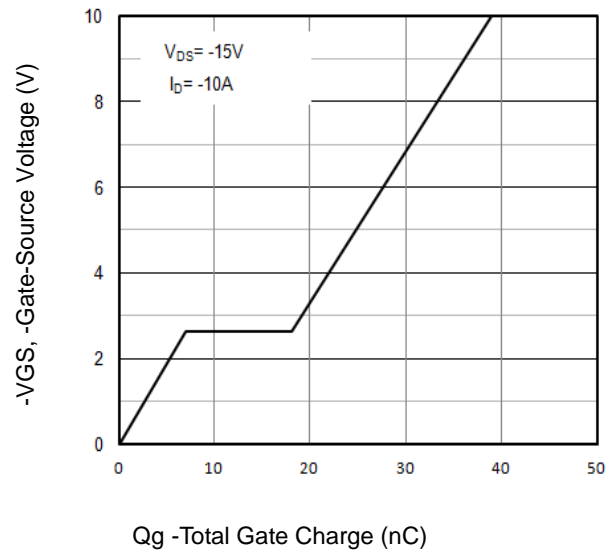


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

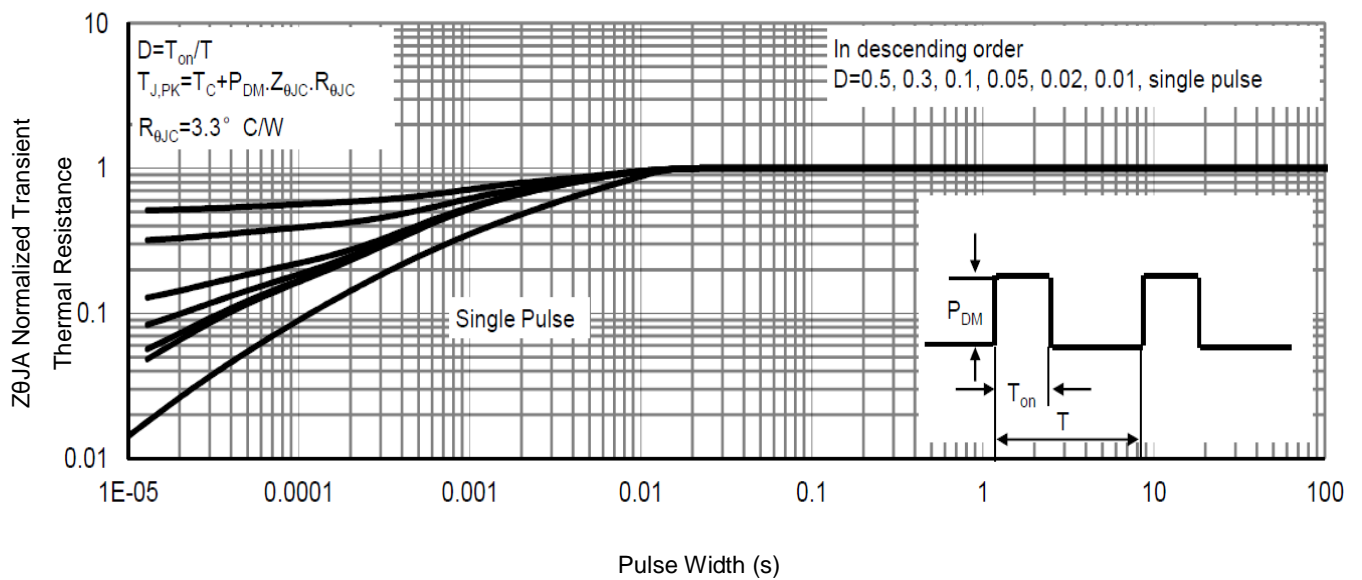


Fig9. Normalized Maximum Transient Thermal Impedance

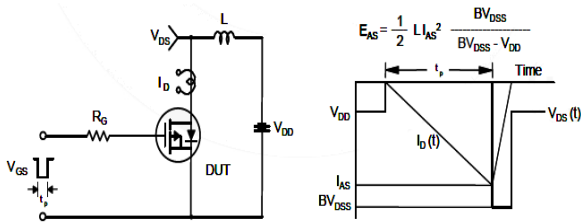


Fig10. Unclamped Inductive Test Circuit and Waveforms

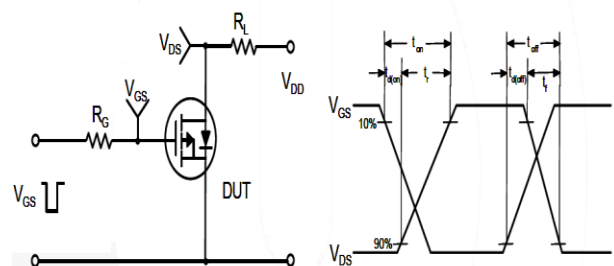
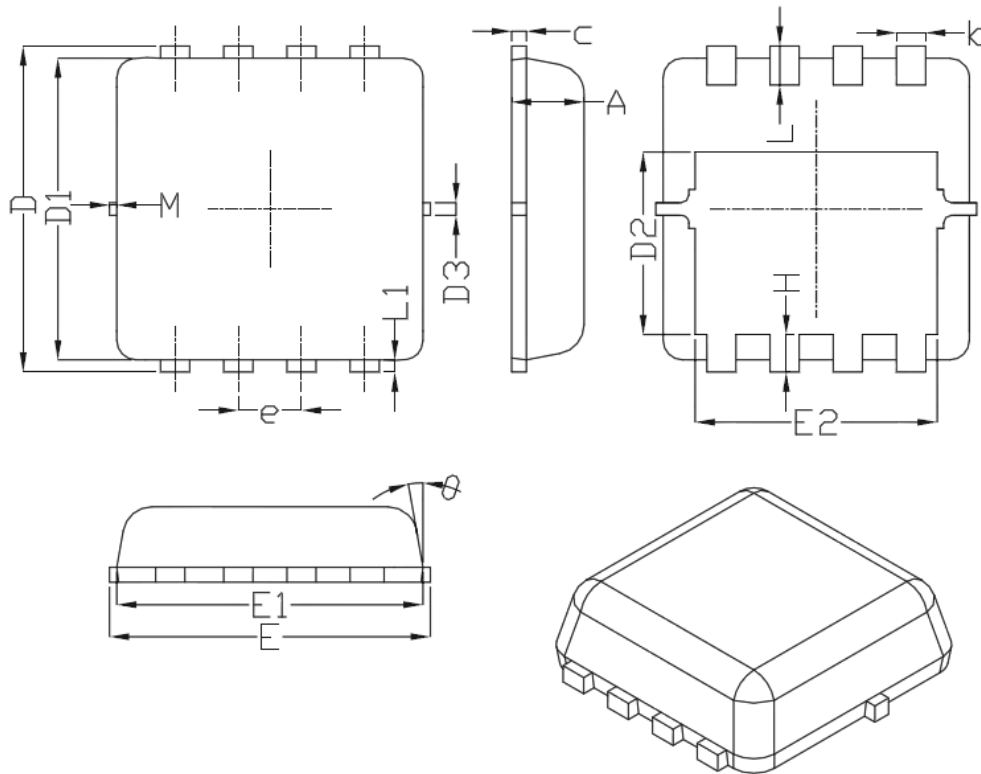


Fig11. Switching Time Test Circuit and waveforms

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							

Customer Service

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