Vanguard Semiconductor

Features

- N-Channel，5V Logic Level Control

- Enhancement mode

- Low on-resistance $R_{DS(on)}$ @ V_{GS}=4.5 V

- Fast Switching

- 100% Avalanche test

- Pb-free lead plating; RoHS compliant

Pb-Free RoHS (HF) Halogen-Free

V_{DS}	40	V
$R_{DS(on),TYP}$ @ V_{GS}=10 V	10	mΩ
$R_{DS(on),TYP}$ @ V_{GS}=4.5 V	15	mΩ
I_D	43	A

PDFN3333

Drain Pin 5-8
Gate Pin 4
Source Pin 1-3

Part ID	Package Type	Marking	Tape and reel information
VS4618AE	PDFN3333	4618AE	5000PCS/Reel
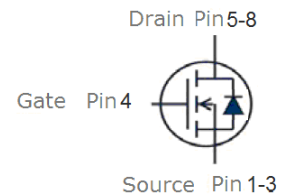
Maximum ratings, at T_A =25°C, unless otherwise specified

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		40	V
I_S	Diode continuous forward current	T_C =25°C	43	A
I_D	Continuous drain current@VGS=10V	T_C =25°C	43	A
		T_C =100°C	27	A
I_{DM}	Pulse drain current tested ①	T_C =25°C	172	A
EAS	Avalanche energy, single pulsed ②		32	mJ
P_D	Maximum power dissipation	T_C =25°C	30	W
V_{GS}	Gate-Source voltage		±20	V
T_{STG} T_J	Storage and operating temperature range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	4.1	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	35	°C/W

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
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V,V_{GS}=0V	--	--	1	µA
	Zero Gate Voltage Drain Current(T_j=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	1.3	1.9	2.4	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=10V, I_D=15A	--	10	13	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=4.5V, I_D=10A	--	15	19	mΩ
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	1100	1295	1500	pF
C_{oss}	Output Capacitance		50	100	150	pF
C_{rss}	Reverse Transfer Capacitance		40	80	120	pF
R_g	Gate Resistance	f=1MHz	--	4.1	--	Ω
Q_g	Total Gate Charge	V_{DS}=20V,I_D=15A, V_{GS}=10V	--	22	--	nC
Q_{gs}	Gate-Source Charge		--	4.5	--	nC
Q_{gd}	Gate-Drain Charge		--	4.2	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=15A, R_G=3.0Ω, V_{GS}=10V	--	7.5	--	nS
t_r	Turn-on Rise Time		--	3.8	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	24	--	nS
t_f	Turn-Off Fall Time		--	5.5	--	nS
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=15A,V_{GS}=0V	--	0.8	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=15A, V_{GS}=0V di/dt=500A/µs	--	8.5	--	nS
Q_{rr}	Reverse Recovery Charge			8		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} = 9A, V_{GS} =10V. Part not recommended for use above this value

③ Pulse width ≤ 300µs; duty cycle≤ 2%.
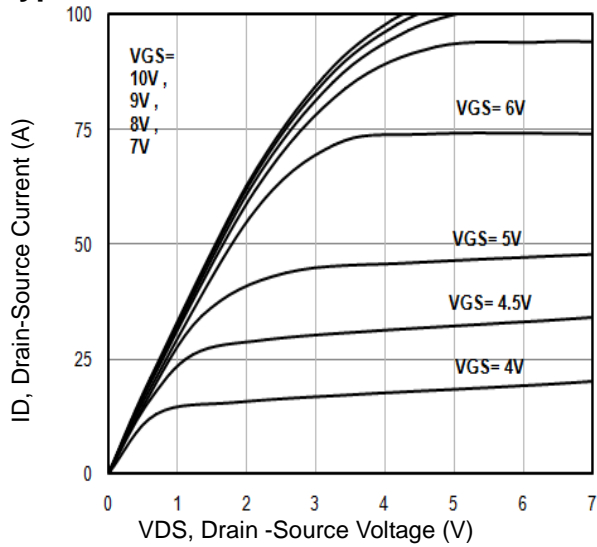
Typical Characteristics
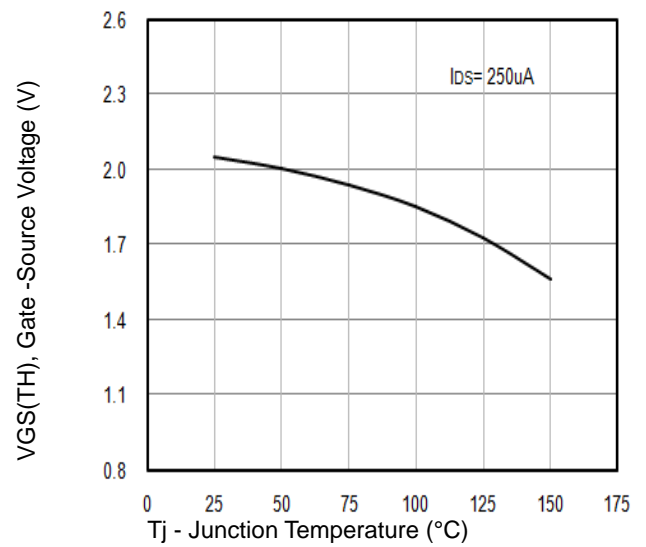
Fig1. Typical Output Characteristics

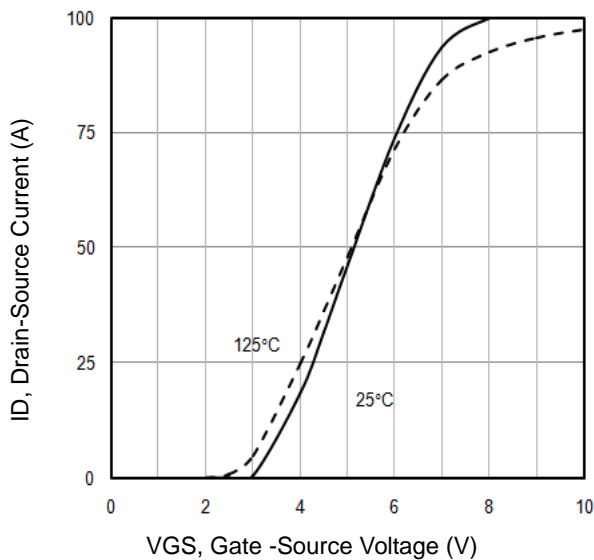**Fig2.** $V_{GS(TH)}$ Gate -Source Voltage Vs.Tj

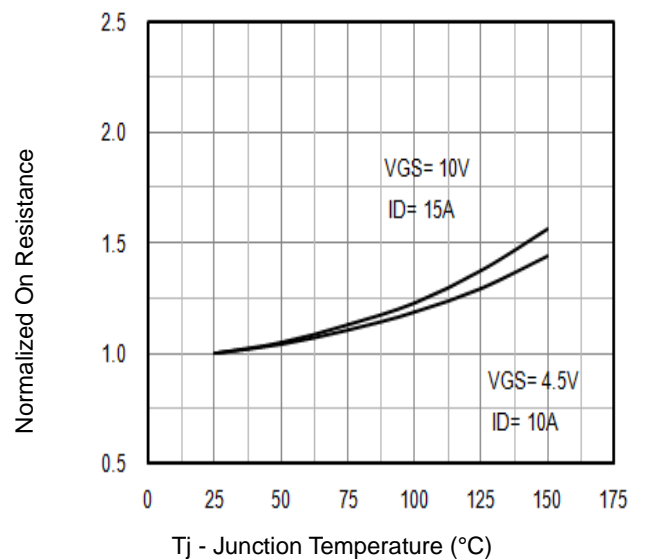**Fig3.** Typical Transfer Characteristics

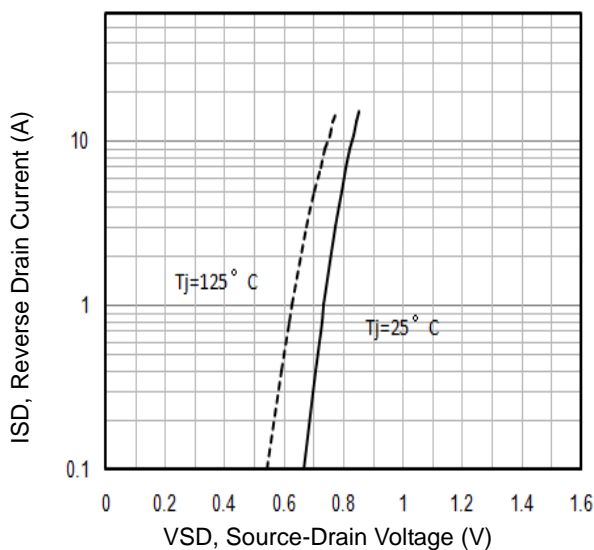**Fig4.** Normalized On-Resistance Vs. Tj

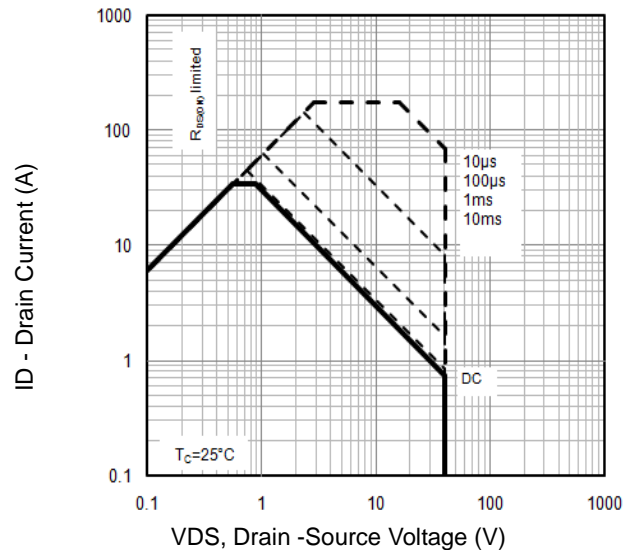**Fig5.** Typical Source-Drain Diode Forward Voltage

Fig6. Maximum Safe Operating Area
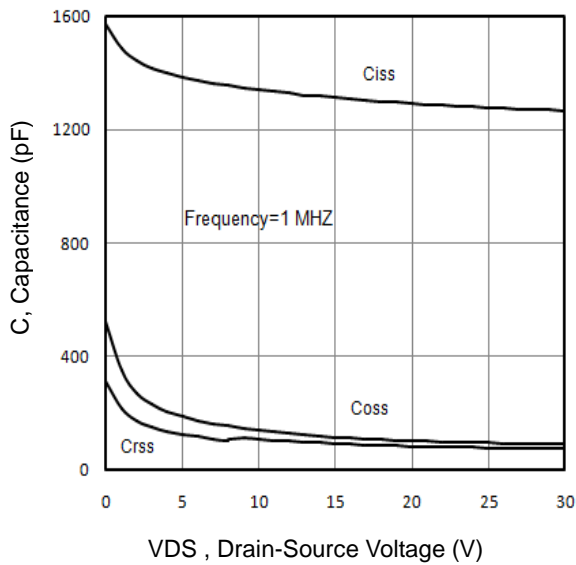
Typical Characteristics

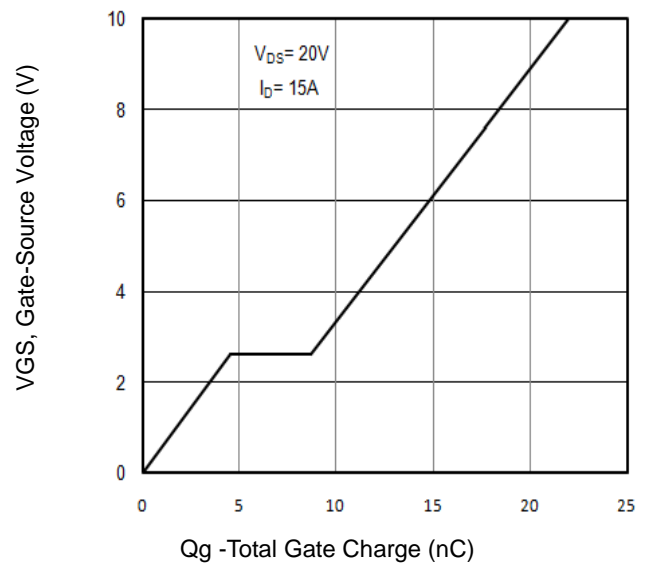**Fig7.** Typical Capacitance Vs.Drain-Source Voltage

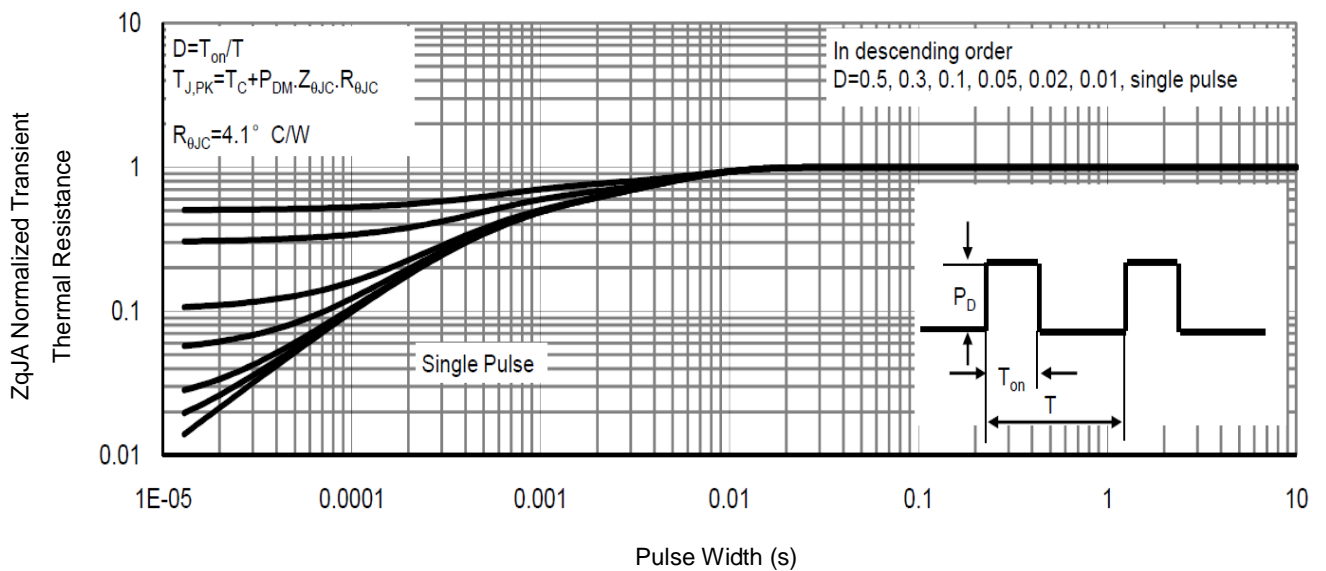**Fig8.** Typical Gate Charge Vs.Gate-Source Voltage

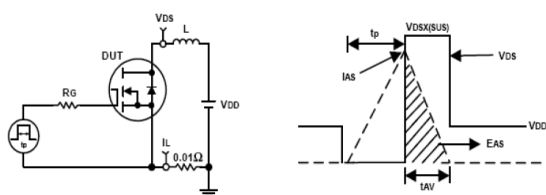**Fig9.** Normalized Maximum Transient Thermal Impedance

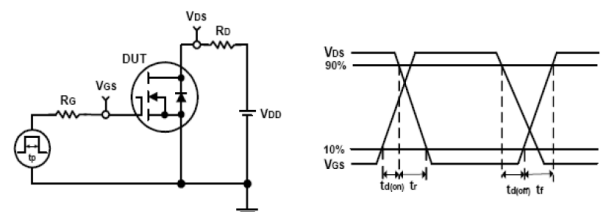**Fig10.** Unclamped Inductive Test Circuit and waveforms

Fig11. Switching Time Test Circuit and waveforms

PDFN3333 Package Outline Data
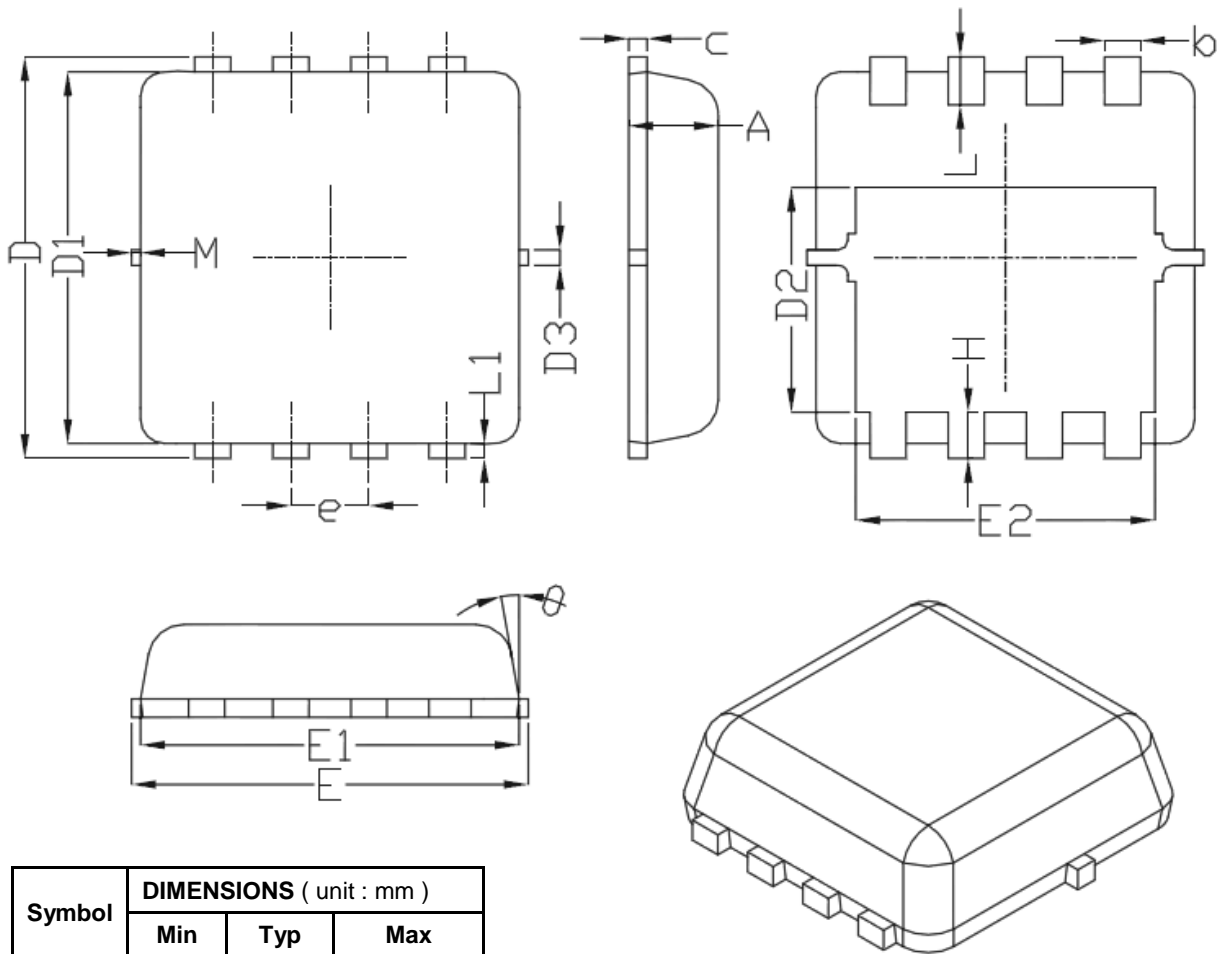
Symbol	DIMENSIONS (unit : mm)		
	Min	Typ	Max
A	0.7	0.75	0.8
b	0.25	0.3	0.35
C	0.1	0.15	0.25
D	3.25	3.35	3.45
D1	3	3.1	3.2
D2	1.78	1.88	1.98
D3	--	0.13	--
E	3.2	3.3	3.4
E1	3	3.15	3.2
E2	2.39	2.49	2.59
e	0.65 BSC		
H	0.3	0.39	0.5
L	0.3	0.4	0.5
L1	--	0.13	--
θ	--	10°	12°
M	*	*	0.15
* Not specified			

Notes:

1. Follow JEDEC MO-240 variation CA.

2. Dimensions "D1" and "E1" do NOT include mold flash protrusions or gate burrs.

3. Dimensions "D1" and "E1" include interterminal flash or protrusion. Interterminal flash or protrusion shall not exceed 0.25mm per side.

Customer Service

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