30V N-Channel MOSFETs

PDD3908

General Description

These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BVDSS	RDSON	ID
30V	9mΩ	55A

Features

- *30V,55A, RDS(ON) =9mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

TO252 Pin Configuration

Applications

- *MB / VGA / Vcore*
- *POL Applications*
- *SMPS 2nd SR*

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current – Continuous (T_C=25℃)	55	A
	Drain Current – Continuous (T_C=100℃)	35	A
I_{DM}	Drain Current – Pulsed[1]	220	A
EAS	Single Pulse Avalanche Energy[2]	45	mJ
IAS	Single Pulse Avalanche Current[2]	30	A
P_D	Power Dissipation (T_C=25℃)	40	W
	Power Dissipation – Derate above 25℃	0.32	W/℃
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{θJC}$	Thermal Resistance Junction to Case	---	3.1	℃/W

Electrical Characteristics (T$_J$=25 $^\circ$C, unless otherwise noted)

Static State Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V , I$_D$=250uA	30	---	---	V
$\triangle$BV$_{DSS}$/$\triangle$T$_J$	BV$_{DSS}$ Temperature Coefficient	Reference to 25°C , I$_D$=1mA	---	0.04	---	V/$^\circ$C
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=30V , V$_{GS}$=0V , T$_J$=25°C	---	---	1	uA
		V$_{DS}$=24V , V$_{GS}$=0V , T$_J$=125°C	---	---	10	uA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=$\pm$20V , V$_{DS}$=0V	---	---	$\pm$100	nA
R$_{DS(ON)}$	Static Drain-Source On-Resistance[3]	V$_{GS}$=10V , I$_D$=16A	---	7.5	9	mΩ
		V$_{GS}$=4.5V , I$_D$=8A	---	10	13	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	1	1.6	2.5	V
$\triangle$V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	-4	---	mV/$^\circ$C
gfs	Forward Transconductance	V$_{DS}$=10V , I$_D$=8A	---	14	---	S

Dynamic Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q$_g$	Total Gate Charge[3,4]	V$_{DS}$=15V , V$_{GS}$=4.5V , I$_D$=20A	---	7.5	---	nC
Q$_{gs}$	Gate-Source Charge[3,4]		---	1.3	---	
Q$_{gd}$	Gate-Drain Charge[3,4]		---	4.5	---	
T$_{d(on)}$	Turn-On Delay Time[3,4]	V$_{DD}$=15V , V$_{GS}$=10V , R$_G$=3.3Ω I$_D$=15A	---	4.8	---	ns
T$_r$	Rise Time[3,4]		---	12.5	---	
T$_{d(off)}$	Turn-Off Delay Time[3,4]		---	27.6	---	
T$_f$	Fall Time[3,4]		---	8.2	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=25V , V$_{GS}$=0V , F=1MHz	---	750	---	pF
C$_{oss}$	Output Capacitance		---	150	---	
C$_{rss}$	Reverse Transfer Capacitance		---	110	---	
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz	---	2.7	---	Ω

Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	V$_{DD}$=25V, L=0.1mH, IAS=15A	12	---	---	mJ

Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I$_S$	Continuous Source Current	V$_G$=V$_D$=0V , Force Current	---	---	55	A
I$_{SM}$	Pulsed Source Current[3]		---	---	220	A
V$_{SD}$	Diode Forward Voltage[3]	V$_{GS}$=0V , I$_S$=1A , T$_J$=25°C	---	---	1	V
t$_{rr}$	Reverse Recovery Time	V$_{GS}$=0V,I$_S$=1A , di/dt=100A/µs	---	---	---	ns
Q$_{rr}$	Reverse Recovery Charge	T$_J$=25°C	---	---	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=30A.,R$_G$=25Ω, Starting T$_J$=25°C.
3. The data tested by pulsed , pulse width $\leqq$ 300us , duty cycle $\leqq$ 2%.
4. Essentially independent of operating temperature.
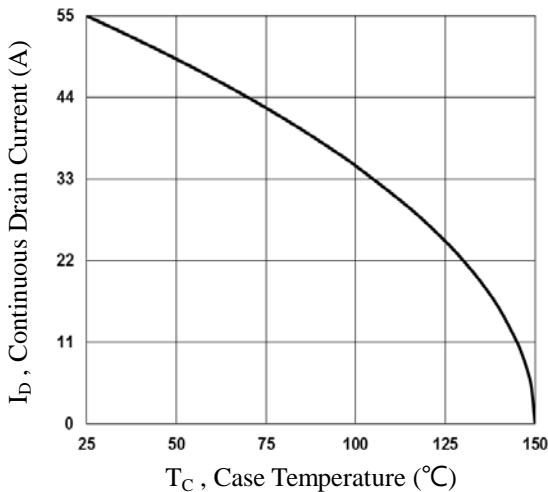
**Fig.1 Continuous Drain Current vs. T_C**
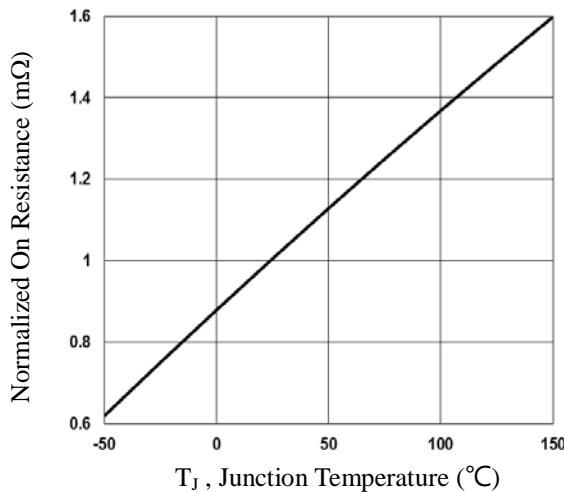
Fig.2 Normalized RDSON vs. T_J
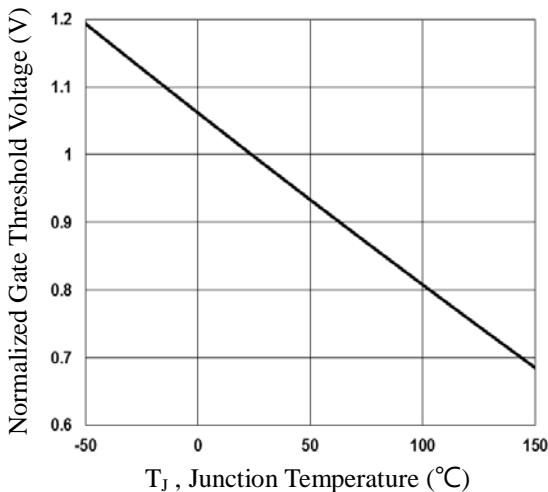

Fig.3 Normalized V_{th} vs. T_J
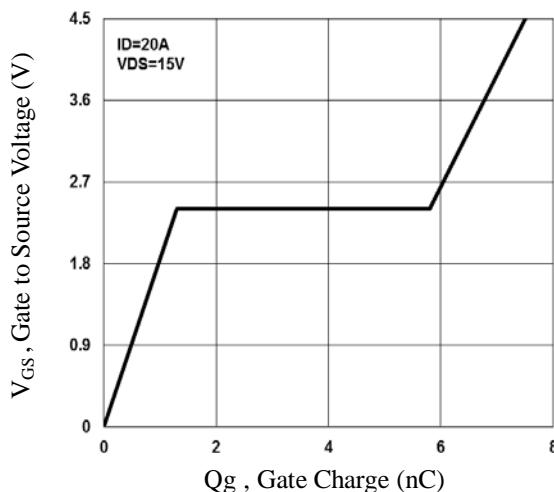
Fig.4 Gate Charge Waveform
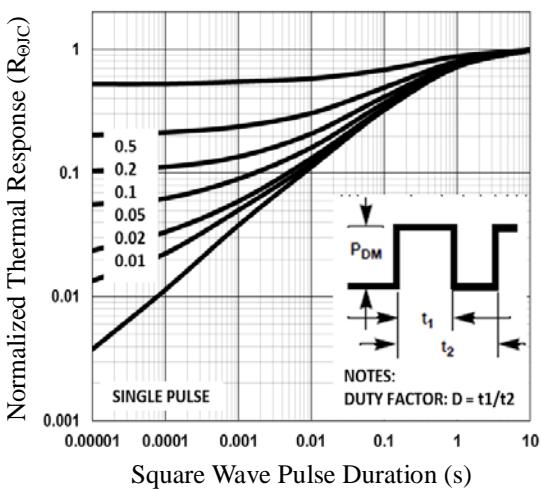
Fig.5 Normalized Transient Impedance
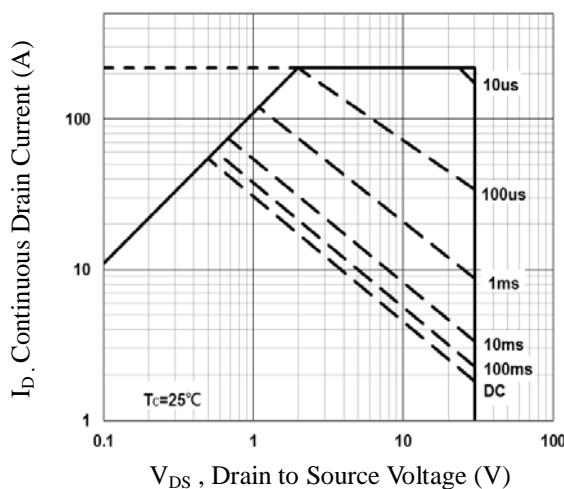
Fig.6 Maximum Safe Operation Area

$$EAS = \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$
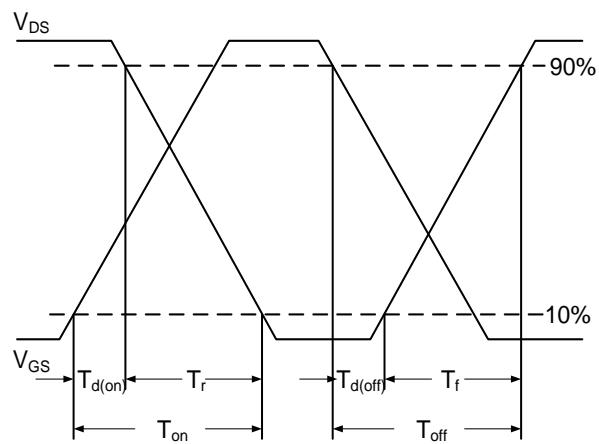
Fig.7 Switching Time Waveform
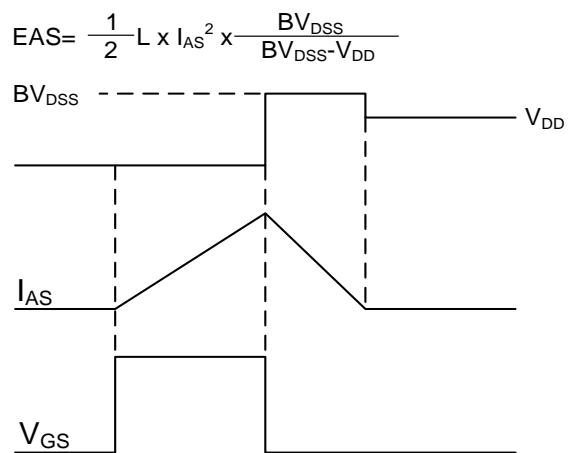
Fig.8 EAS Waveform

TO252 PACKAGE INFORMATION
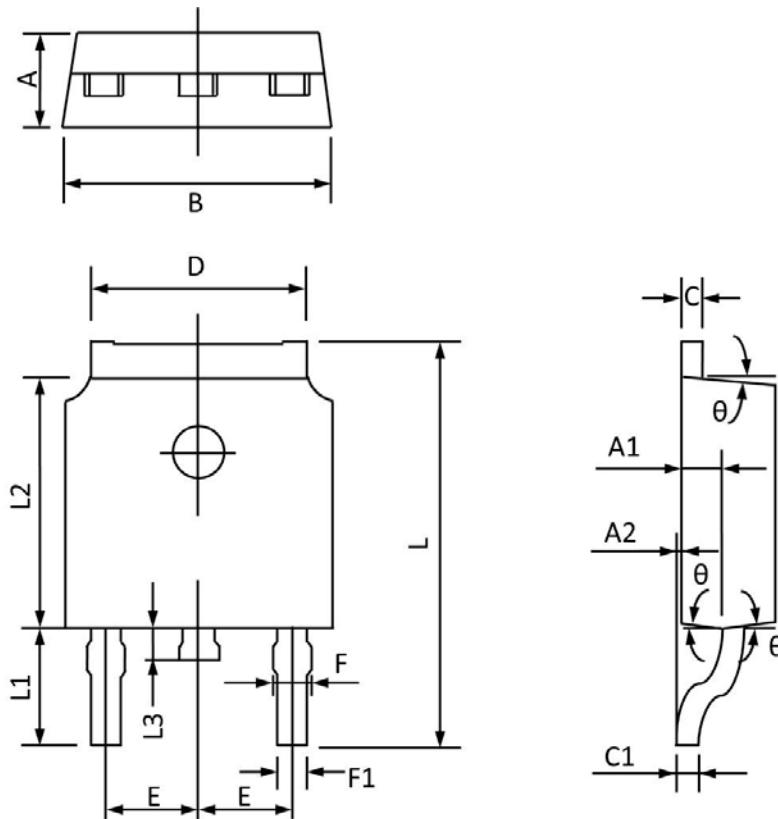
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.50	6.70	0.256	0.264
C	0.46	0.580	0.018	0.230
C1	0.46	0.580	0.018	0.030
D	5.10	5.46	0.201	0.215
E	2.186	2.386	0.086	0.094
F	0.74	0.94	0.029	0.037
F1	0.660	0.860	0.026	0.034
L	9.80	10.40	0.386	0.409
L1	2.9REF		0.114REF	
L2	6.00	6.20	0.236	0.244
L3	0.60	1.00	0.024	0.039
θ	3°	9°	3°	9°