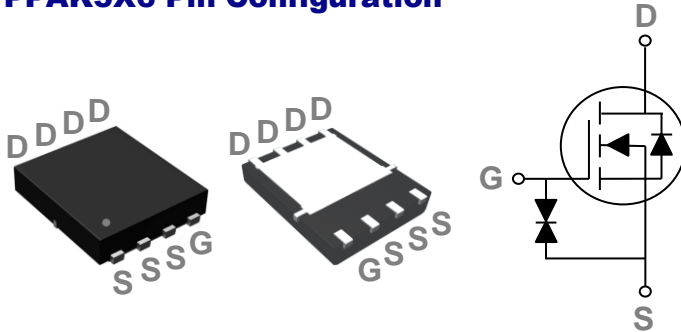## 30V N-Channel MOSFETs

PDEC3906X

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	5.5mΩ	80A

Features

- *30V,80A, RDS(ON) =5.5mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*
- *G-S ESD Protection Diode Embedded*

Applications

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

PPAK5X6 Pin Configuration

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℃)	80	A
	Drain Current – Continuous (T_C=100℃)	51	A
I_{DM}	Drain Current – Pulsed[1]	320	A
EAS	Single Pulse Avalanche Energy[2]	88	mJ
IAS	Single Pulse Avalanche Current[2]	42	A
P_D	Power Dissipation (T_C=25℃)	74	W
	Power Dissipation – Derate above 25℃	0.59	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
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	1.7	℃/W

Electrical Characteristics (T$_J$=25 ℃, 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
△BV$_{DSS}$/△T$_J$	BV$_{DSS}$ Temperature Coefficient	Reference to 25℃ , I$_D$=1mA	---	0.04	---	V/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=30V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=24V , V$_{GS}$=0V , T$_J$=125℃	---	---	10	uA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±10	uA
R$_{DS(ON)}$	Static Drain-Source On-Resistance[3]	V$_{GS}$=10V , I$_D$=20A	---	4.6	5.5	mΩ
		V$_{GS}$=4.5V , I$_D$=10A	---	6.5	8.5	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	1	1.6	2.5	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	-4	---	mV/℃
gfs	Forward Transconductance	V$_{DS}$=10V , I$_D$=10A	---	18	---	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	---	11.1	---	nC
Q$_{gs}$	Gate-Source Charge[3,4]		---	1.85	---	
Q$_{gd}$	Gate-Drain Charge[3,4]		---	6.8	---	
T$_{d(on)}$	Turn-On Delay Time[3,4]	V$_{DD}$=15V , V$_{GS}$=10V , R$_G$=3.3Ω I$_D$=15A	---	7.5	---	ns
T$_r$	Rise Time[3,4]		---	14.5	---	
T$_{d(off)}$	Turn-Off Delay Time[3,4]		---	35.2	---	
T$_f$	Fall Time[3,4]		---	9.6	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=25V , V$_{GS}$=0V , F=1MHz	---	1160	---	pF
C$_{oss}$	Output Capacitance		---	200	---	
C$_{rss}$	Reverse Transfer Capacitance		---	180	---	
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz	---	2.5	---	Ω

Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	V$_{DD}$=25V, L=0.1mH, IAS=20A	20	---	---	mJ

Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I$_S$	Continuous Source Current	V$_G$=V$_D$=0V , Force Current	---	---	80	A
I$_{SM}$	Pulsed Source Current[3]		---	---	160	A
V$_{SD}$	Diode Forward Voltage[3]	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	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℃	---	---	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=42A.,R$_G$=25Ω,Starting T$_J$=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
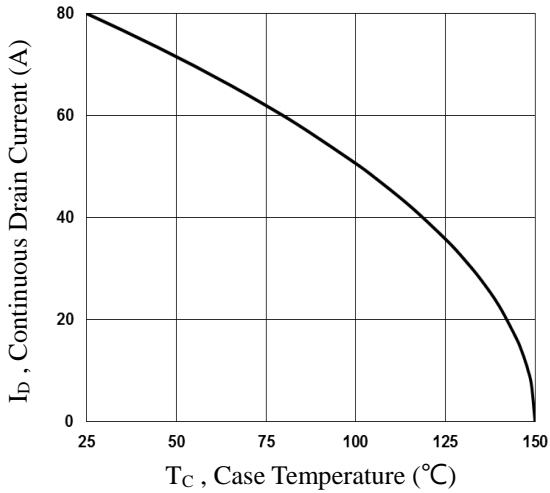4. Essentially independent of operating temperature.
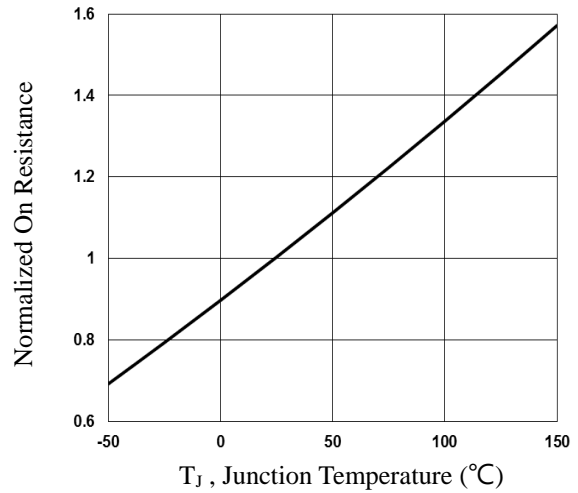
Fig.1   **Continuous Drain Current vs. T$_C$**
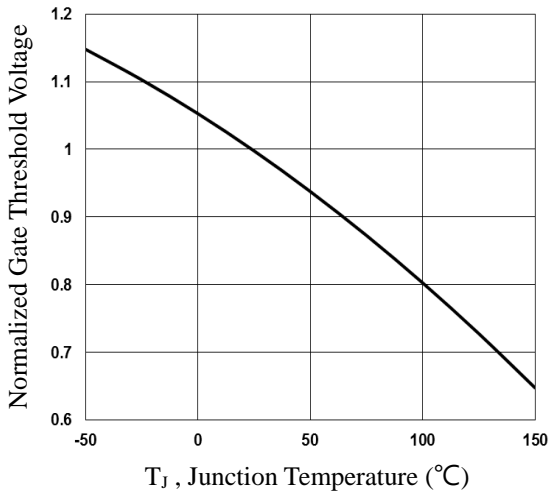
Fig.2   **Normalized RDSON vs. T$_J$**

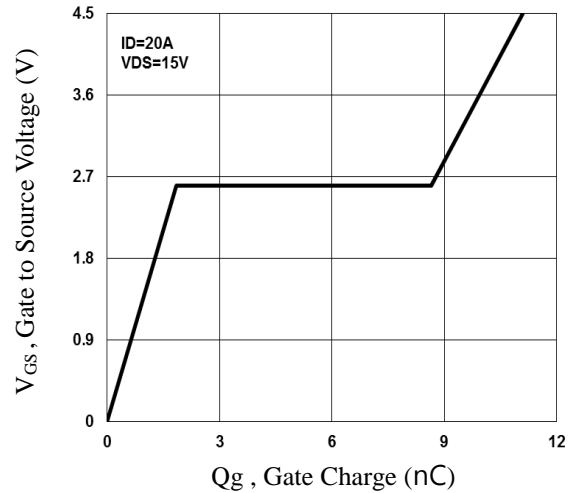Fig.3   **Normalized V$_{th}$ vs. T$_J$**
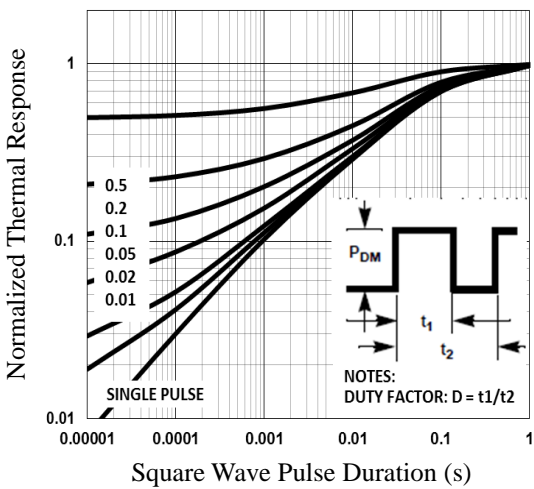
Fig.4   **Gate Charge Waveform**

Fig.5   **Normalized Transient Impedance**
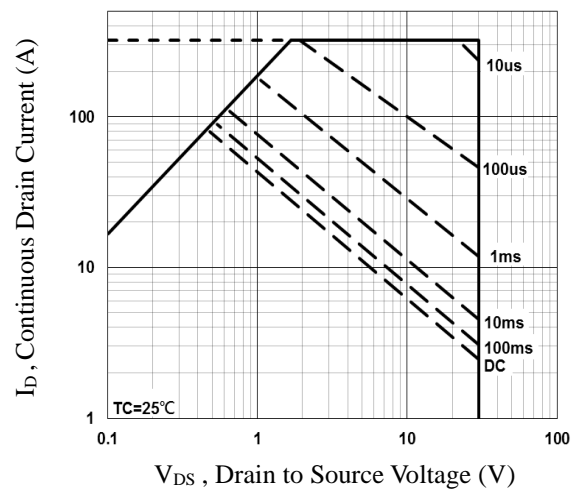
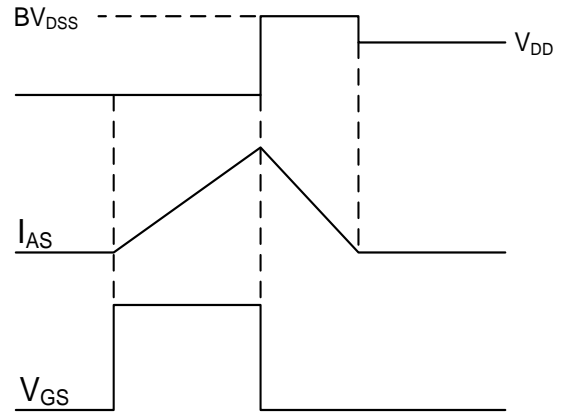Fig.6   **Maximum Safe Operation Area**

Fig.7   Switching Time Waveform

Fig.8   EAS Waveform

PPAK5x6 PACKAGE INFORMATION

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.200	0.850	0.047	0.031
b	0.510	0.300	0.020	0.012
C	0.300	0.200	0.012	0.008
D1	5.400	4.800	0.212	0.189
D2	4.310	3.610	0.170	0.142
E	6.300	5.850	0.248	0.230
E1	5.960	5.450	0.235	0.215
E2	3.920	3.300	0.154	0.130
e	1.27BSC		0.05BSC	
H	0.650	0.380	0.026	0.015
K	---	1.100	---	0.043
L	0.710	0.380	0.028	0.015
L1	0.250	0.050	0.009	0.002
θ	12°	0°	12°	0°