30V P-Channel MOSFETs

PDC3907X

General Description

These P-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	19mΩ	-35A

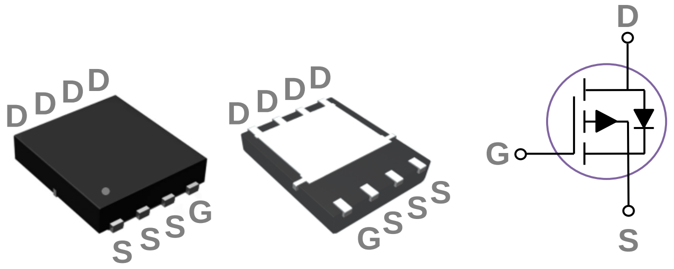
Features

- *-30V,-35A, RDS(ON) 19mΩ @VGS = -10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

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℃)	-35	A
	Drain Current – Continuous (T_C=100℃)	-22	A
I_{DM}	Drain Current – Pulsed[1]	-140	A
EAS	Single Pulse Avalanche Energy[2]	54	mJ
IAS	Single Pulse Avalanche Current[2]	-33	A
P_D	Power Dissipation (T_C=25℃)	53	W
	Power Dissipation – Derate above 25℃	0.427	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	---	2.34	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	---	---	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	---	---	±100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V , I_D=-8A	---	16.5	19	mΩ
		V_{GS}=-4.5V , I_D=-5A	---	26	31	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.6	-2.5	V
gfs	Forward Transconductance	V_{DS}=-10V , I_S=-3A	---	12	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=-15V , V_{GS}=-10V , I_D=-20A	---	17	26	nC
Q_{gs}	Gate-Source Charge[2,3]		---	3	4.5	
Q_{gd}	Gate-Drain Charge[2,3]		---	4	6.5	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=-15V , V_{GS}=-10V , R_G=25Ω I_D=-20A	---	7.2	11	ns
T_r	Rise Time[2,3]		---	38	57	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	34	51	
T_f	Fall Time[2,3]		---	8.2	12	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , F=1MHz	---	1100	1650	pF
C_{oss}	Output Capacitance		---	170	255	
C_{rss}	Reverse Transfer Capacitance		---	120	180	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	11	---	Ω

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-35	A
I_{SM}	Pulsed Source Current		---	---	-70	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V
t_{rr}	Reverse Recovery Time	V_R=-30V, I_S=-10A di/dt=100A/µs, T_J=25℃	---	150	---	ns
Q_{rr}	Reverse Recovery Charge		---	250	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=-25V,V_{GS}=-10V,L=0.1mH,I_{AS}=-33A.,Starting T_J=25℃
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

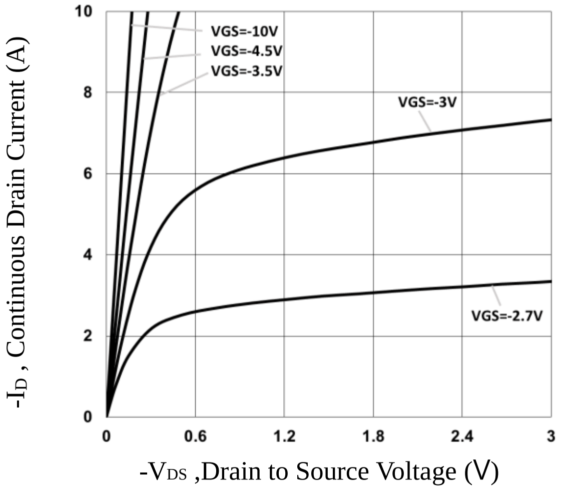


Fig.1 Typical Output Characteristics

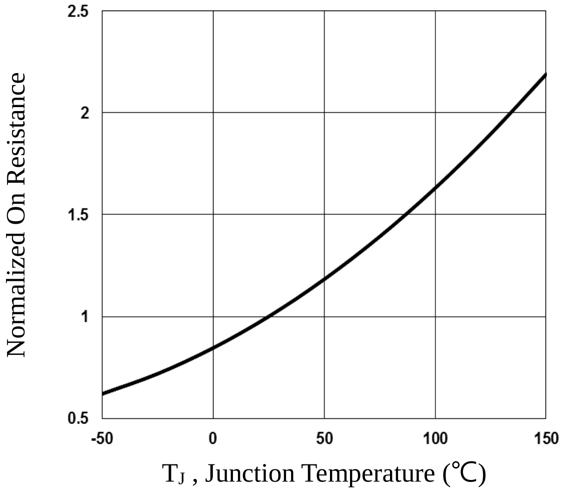


Fig.2 Normalized RDSON vs. T$_J$

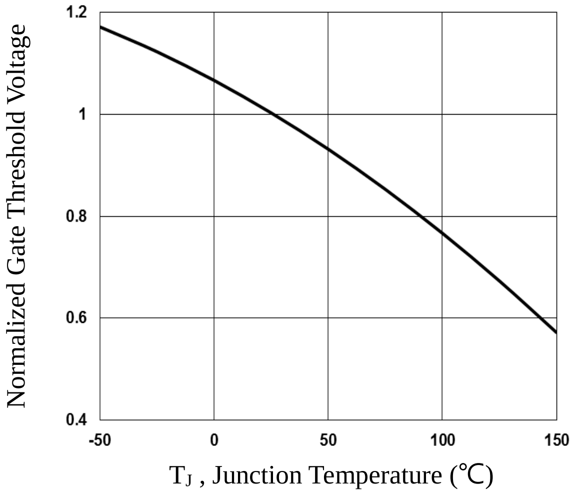


Fig.3 Normalized V$_{th}$ vs. T$_J$

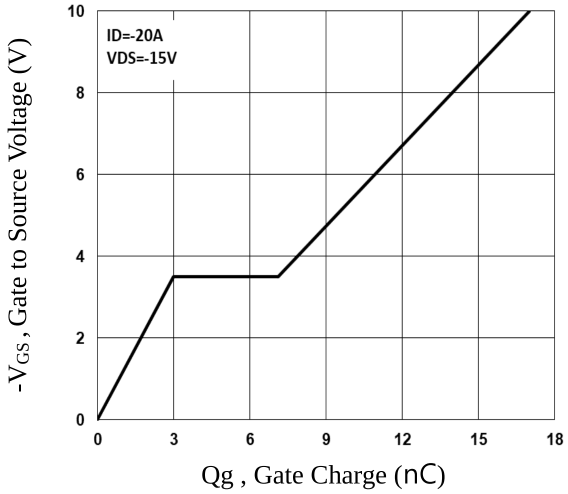


Fig.4 Gate Charge Waveform

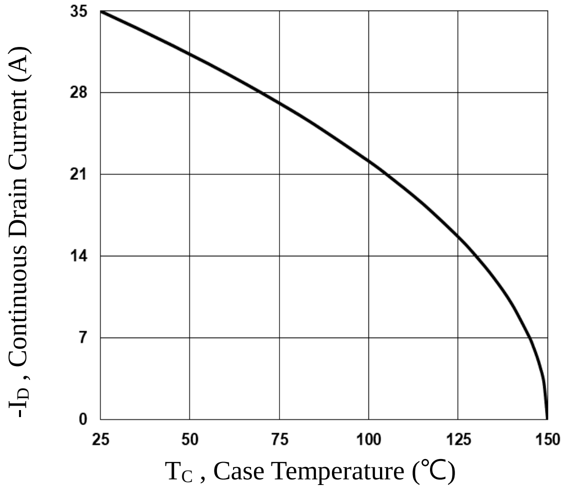


Fig.5 Continuous Drain Current vs. T$_C$

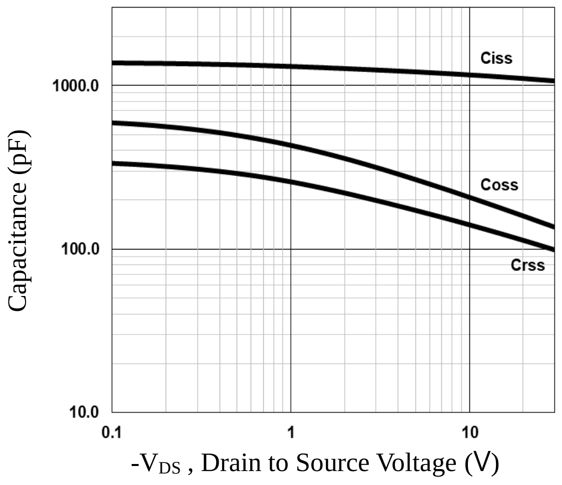


Fig.6 Capacitance Characteristics

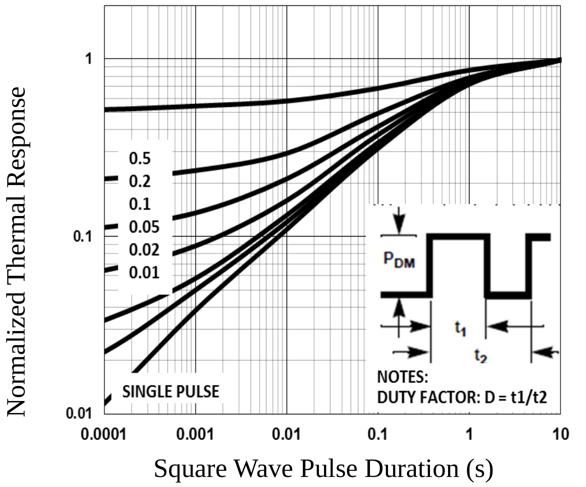


Fig.7 Normalized Transient Impedance

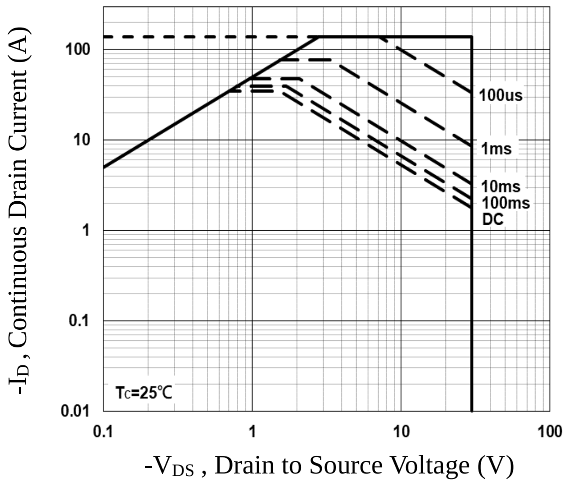


Fig.8 Maximum Safe Operation Area

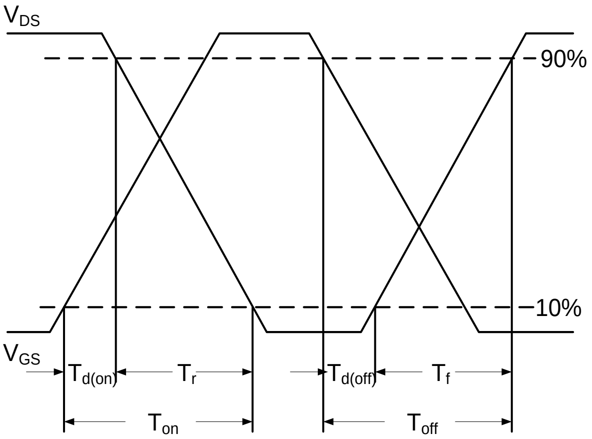


Fig.9 Switching Time Waveform

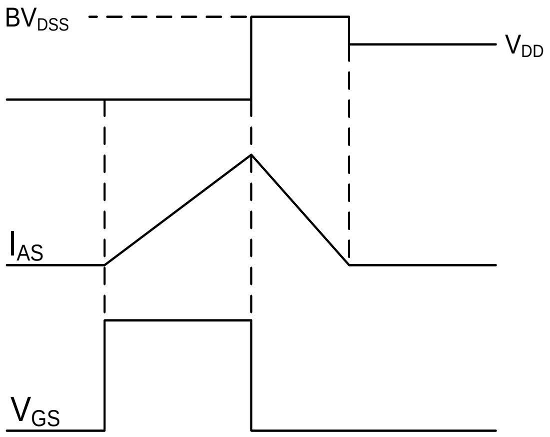
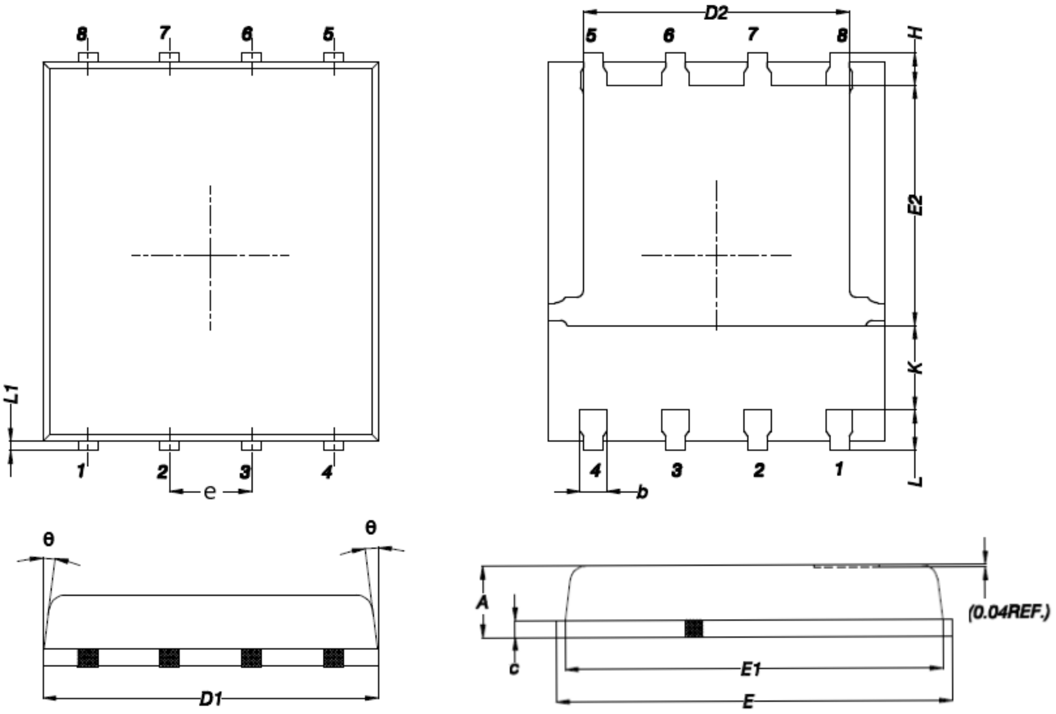


Fig.10 EAS Waveform

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°