PDC3902X

30V N-Channel MOSFETs

BVDSS	RDSON	ID
30V	1.6mΩ	130A

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.

Features

- *30V, 130A, RDS(ON) =1.6mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

PPAK5x6 Pin Configuration

Applications

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

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℃)	130	A
	Drain Current – Continuous (T_C=100℃)	82	A
I_{DM}	Drain Current – Pulsed[1]	520	A
EAS	Single Pulse Avalanche Energy[2]	245	mJ
IAS	Single Pulse Avalanche Current[2]	70	A
P_D	Power Dissipation (T_C=25℃)	166	W
	Power Dissipation – Derate above 25℃	1.33	W/℃
T_{STG}	Storage Temperature Range	-55 to 175	℃
T_J	Operating Junction Temperature Range	-55 to 175	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{θJC}$	Thermal Resistance Junction to Case	---	0.9	℃/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
I_{DSS}	Drain-Source Leakage Current	V_{DS}=27V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=85℃	---	---	10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
$R_{DS(ON)}$	Static Drain-Source On-Resistance[3]	V_{GS}=10V , I_D=30A	---	1.2	1.6	mΩ
		V_{GS}=4.5V , I_D=15A	---	1.8	2.4	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1	1.6	2.5	V
gfs	Forward Transconductance	V_{DS}=10V , I_D=15A	---	30	---	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=10A	---	65	120	nC
Q_{gs}	Gate-Source Charge[3,4]		---	16	30	
Q_{gd}	Gate-Drain Charge[3,4]		---	21	40	
$T_{d(on)}$	Turn-On Delay Time[3,4]	V_{DD}=15V , V_{GS}=10V , R_G=3.3Ω I_D=1A	---	28	56	ns
T_r	Rise Time[3,4]		---	45	90	
$T_{d(off)}$	Turn-Off Delay Time[3,4]		---	105	200	
T_f	Fall Time[3,4]		---	40	80	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	7720	11000	pF
C_{oss}	Output Capacitance		---	945	1400	
C_{rss}	Reverse Transfer Capacitance		---	435	650	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	1.2	2.4	Ω

Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	V_{DD}=25V, L=0.1mH, IAS=30A	45	---	---	mJ

Drain-Source Diode Characteristics

| Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	130	A
I_{SM}	Pulsed Source Current[3]		---	---	260	A
V_{SD}	Diode Forward Voltage[3]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=70A.,R_G=25Ω,Starting T_J=25℃.
3. The data tested by pulsed , pulse width $\leqq$ 300us , duty cycle $\leqq$ 2%.
4. Essentially independent of operating temperature.
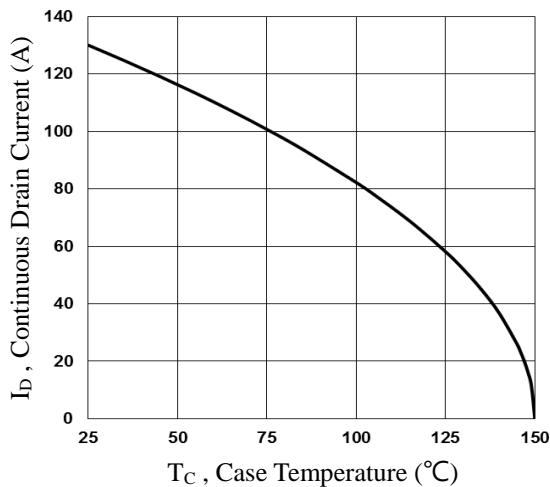
Fig.1   Continuous Drain Current vs. T$_C$
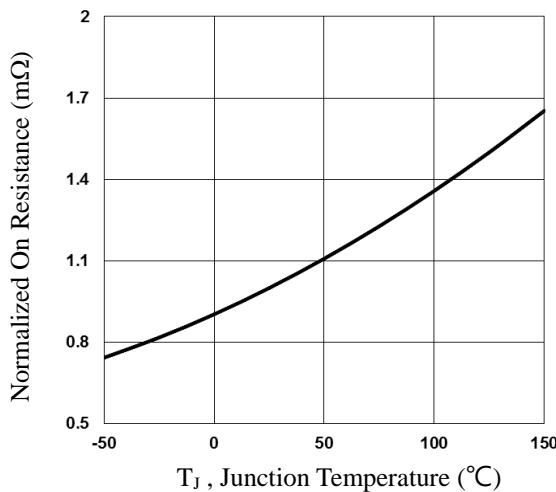

Fig.2   Normalized RDSON vs. T$_J$
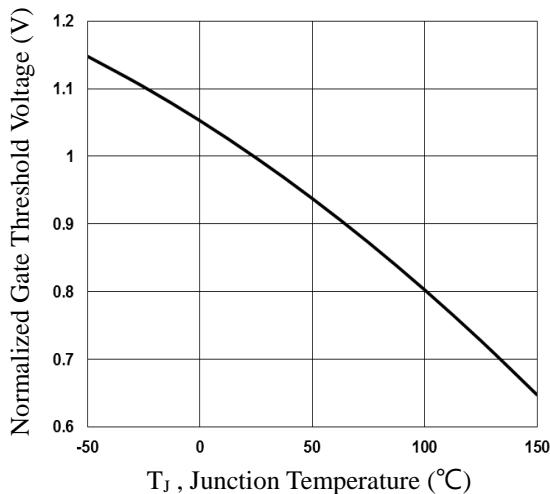

**Fig.3   Normalized V$_{th}$ vs. T$_J$**
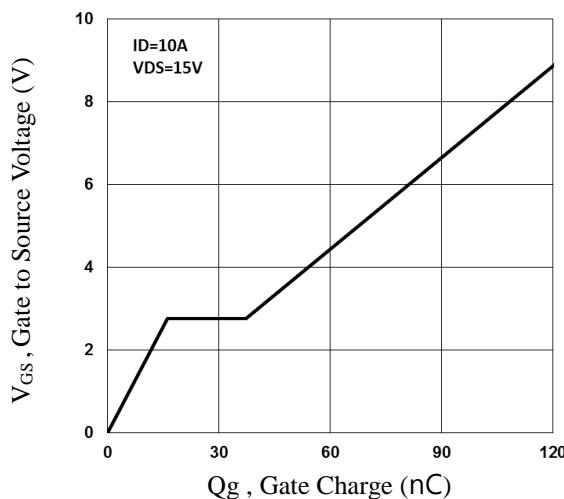
Fig.4   Gate Charge Waveform
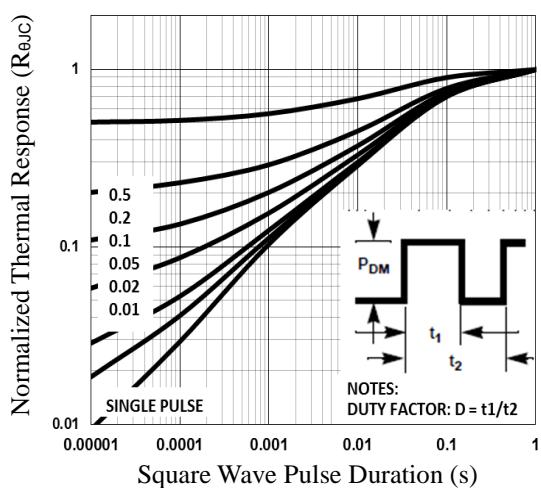
Fig.5   Normalized Transient Impedance
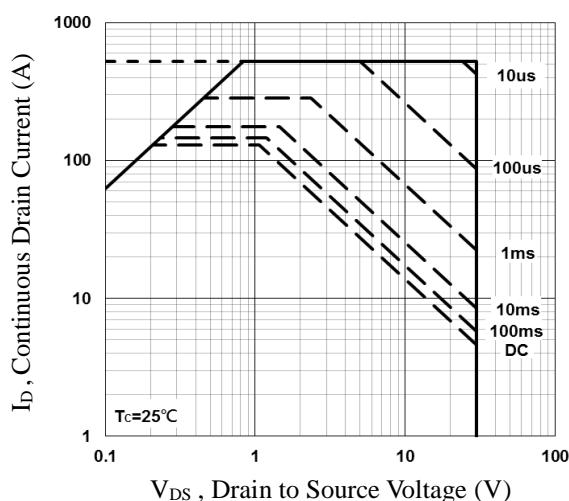


Fig.6   Maximum Safe Operation Area
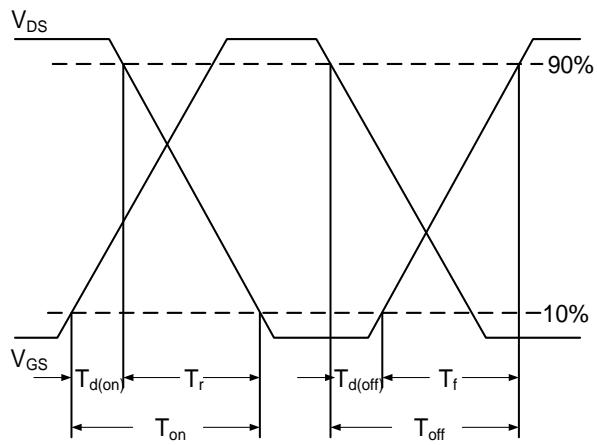
Fig.7   Switching Time Waveform

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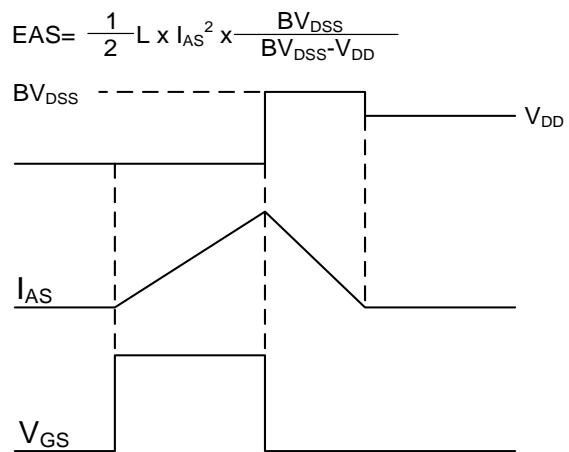
Fig.8   EAS Waveform

PPAK5x6 PACKAGE INFORMATION
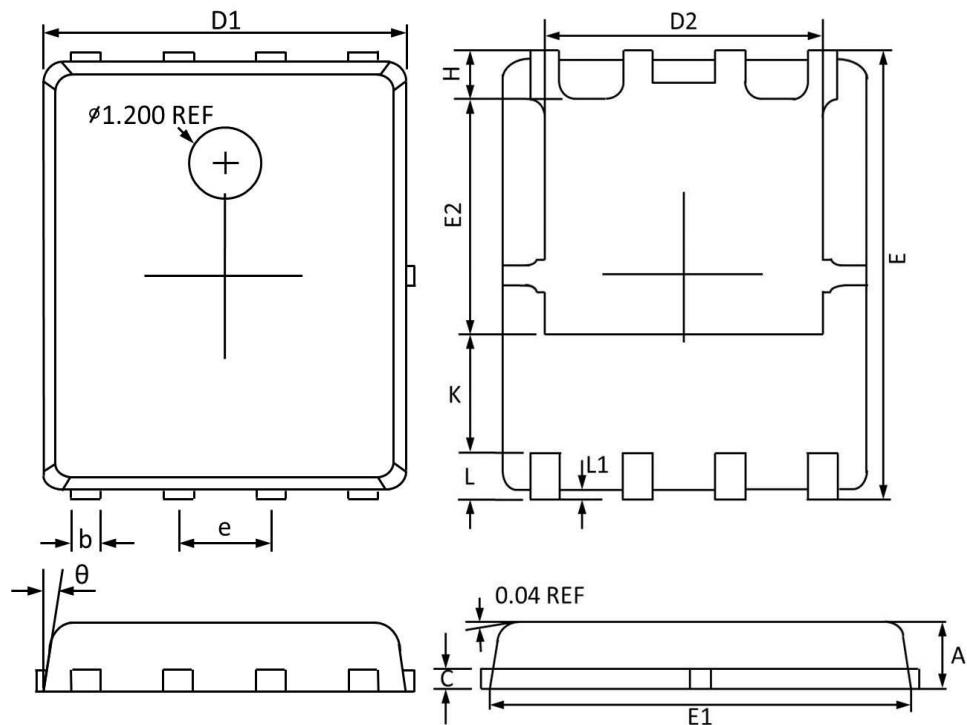
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	0.800	0.043	0.031
b	0.510	0.330	0.020	0.013
C	0.300	0.200	0.012	0.008
D1	5.100	4.800	0.201	0.189
D2	4.100	3.610	0.161	0.142
E	6.200	5.900	0.244	0.232
E1	5.900	5.700	0.232	0.224
E2	3.780	3.350	0.149	0.132
e	1.27BSC		0.05BSC	
H	0.700	0.410	0.028	0.016
K	1.500	1.100	0.059	0.043
L	0.710	0.510	0.028	0.020
L1	0.200	0.060	0.008	0.002
θ	12°	0°	12°	0°

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