PDC2306Z

20V N-Channel MOSFETs

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
20V	5.4mΩ	65A

Features

- *20V,65A, RDS(ON) =5.4mΩ @VGS = 4.5V*
- *Improved dv/dt capability*
- *Green Device Available*
- *Suit for 1.8V Gate Drive Applications*

PPAK3x3 Pin Configuration

Applications

- *Load Switch*
- *POL Applications*
- *SMPS 2nd SR*
- *Li-Battery Protection*

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±10	V
I_D	Drain Current – Continuous (T_C=25℃)	65	A
	Drain Current – Continuous (T_C=100℃)	41	A
I_{DM}	Drain Current – Pulsed[1]	260	A
P_D	Power Dissipation (T_C=25℃)	44.6	W
	Power Dissipation – Derate above 25℃	0.36	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	---	2.8	℃/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	20	---	---	V
△BV$_{DSS}$/△T$_J$	BV$_{DSS}$ Temperature Coefficient	Reference to 25℃ , I$_D$=1mA	---	0.01	---	V/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=20V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=16V , V$_{GS}$=0V , T$_J$=125℃	---	---	10	uA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±10V , V$_{DS}$=0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=4.5V , I$_D$=20A	---	4.5	5.4	mΩ
		V$_{GS}$=2.5V , I$_D$=15A	---	5.5	6.8	mΩ
		V$_{GS}$=1.8V , I$_D$=10A	---	6.8	8.8	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	0.3	0.6	1	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	2	---	mV/℃
gfs	Forward Transconductance	V$_{DS}$=10V , I$_S$=5A	---	20	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q$_g$	Total Gate Charge[2,3]	V$_{DS}$=10V , V$_{GS}$=4.5V , I$_D$=6A	---	29.8	45	nC
Q$_{gs}$	Gate-Source Charge[2,3]		---	2.7	6	
Q$_{gd}$	Gate-Drain Charge[2,3]		---	9	14	
T$_{d(on)}$	Turn-On Delay Time[2,3]	V$_{DD}$=10V , V$_{GS}$=4.5V , R$_G$=25Ω I$_D$=1A	---	13.5	26	ns
T$_r$	Rise Time[2,3]		---	29	55	
T$_{d(off)}$	Turn-Off Delay Time[2,3]		---	66.9	127	
T$_f$	Fall Time[2,3]		---	19.2	36	
C$_{iss}$	Input Capacitance	V$_{DS}$=10V , V$_{GS}$=0V , F=1MHz	---	1920	2790	pF
C$_{oss}$	Output Capacitance		---	280	410	
C$_{rss}$	Reverse Transfer Capacitance		---	180	270	

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	---	---	65	A
I$_{SM}$	Pulsed Source Current		---	---	130	A
V$_{SD}$	Diode Forward Voltage	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	1	V

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. Essentially independent of operating temperature.
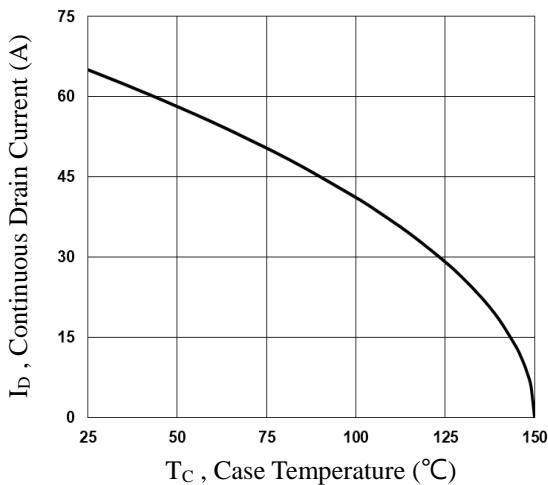
Fig.1   Continuous Drain Current vs. T_C
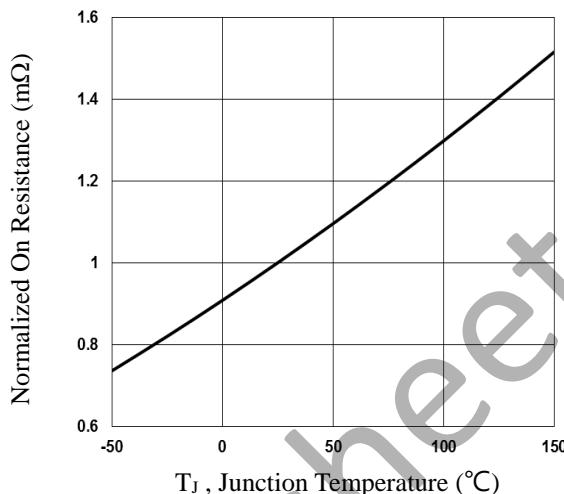
Fig.2   Normalized RDSON vs. T_J
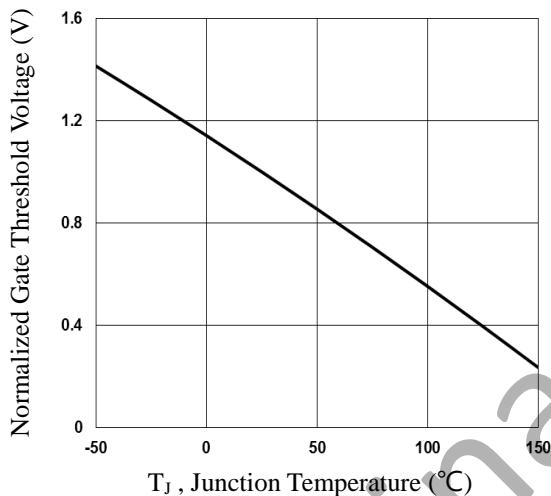
Fig.3   Normalized V_{th} vs. T_J
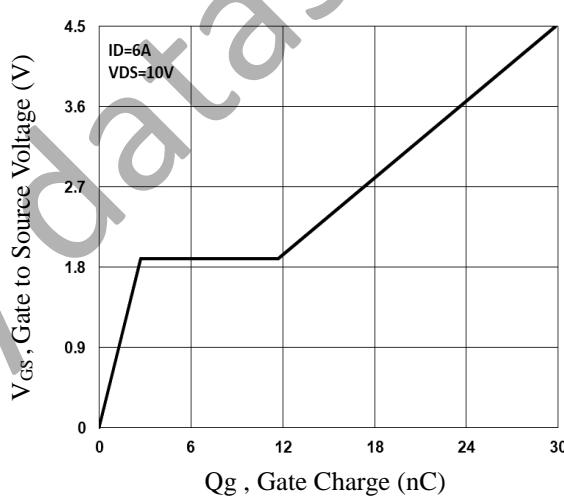
Fig.4   Gate Charge Waveform
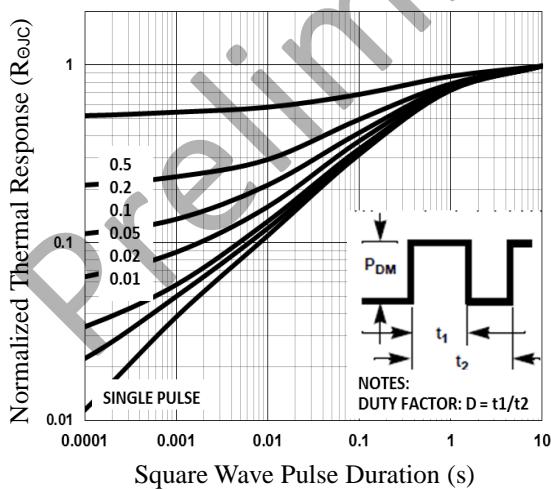
Fig.5   Normalized Transient Response
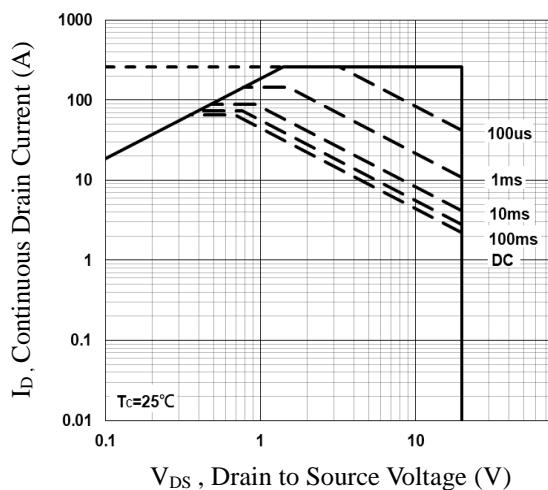
Fig.6   Maximum Safe Operation Area

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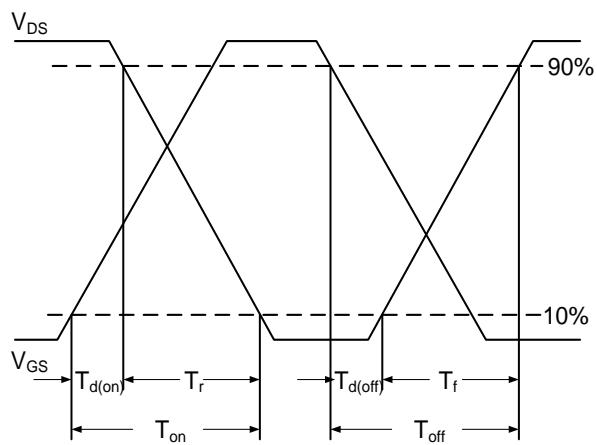
Fig.7   Switching Time Waveform
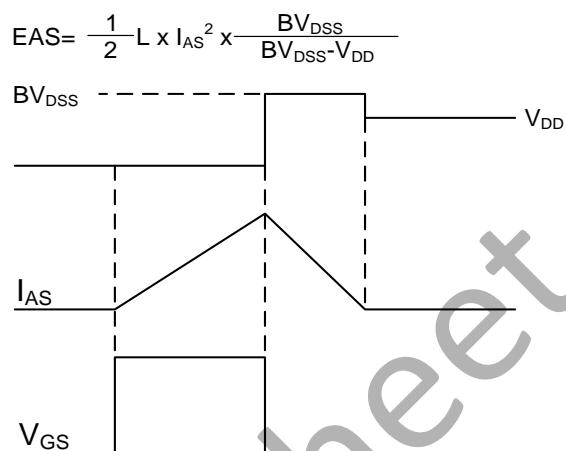
Fig.8   EAS Waveform

PPAK3x3 PACKAGE INFORMATION
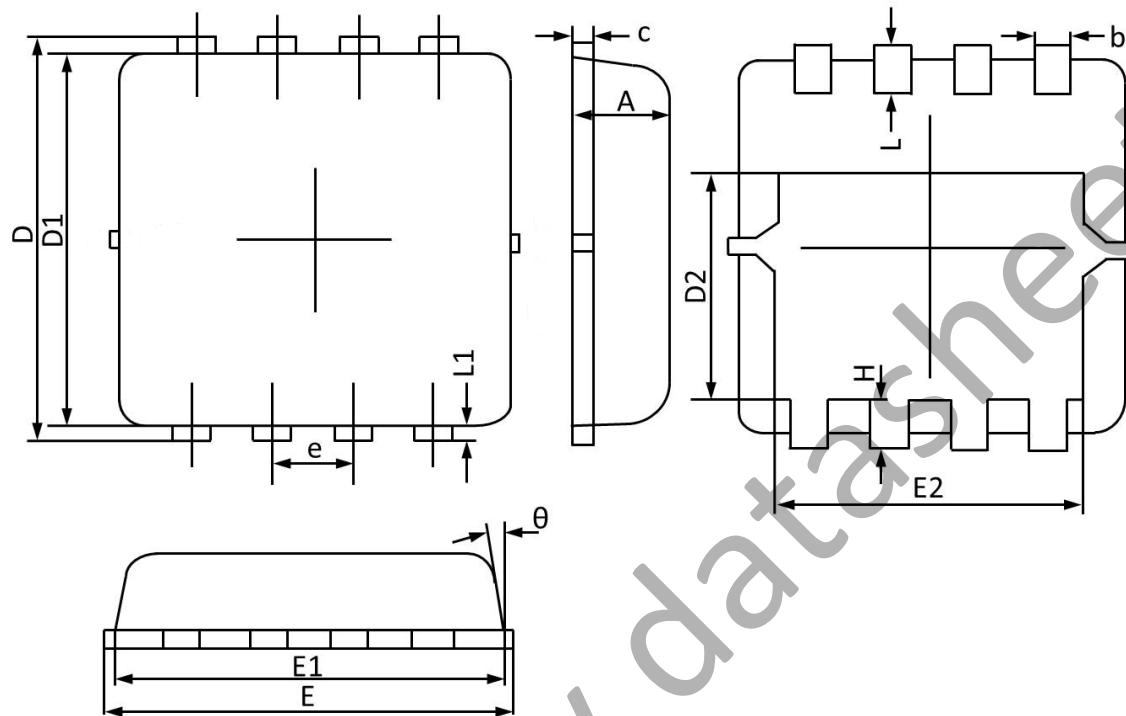
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.900	0.700	0.035	0.028
b	0.350	0.240	0.014	0.009
c	0.250	0.100	0.010	0.004
D	3.450	3.050	0.136	0.120
D1	3.200	2.900	0.126	0.114
D2	1.850	1.350	0.073	0.053
E	3.400	3.000	0.134	0.118
E1	3.250	2.900	0.128	0.114
E2	2.600	2.350	0.102	0.093
e	0.65BSC		0.026BSC	
H	0.500	0.300	0.020	0.012
L	0.500	0.300	0.020	0.012
L1	0.200	0.070	0.008	0.003
θ	12°	0°	12°	0°

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