40V N-Channel MOSFETs

PDC4984X
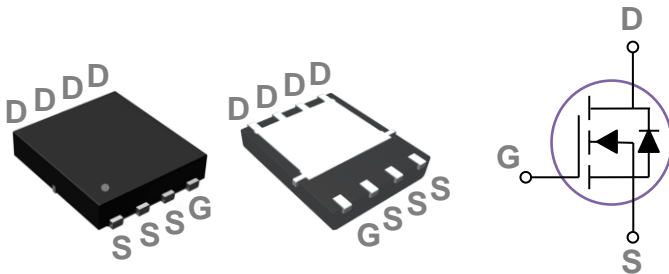
General Description

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
40V	3.2mΩ	135A

Features

- *40V,135A, RDS(ON) =3.2mΩ @VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

PPAK5X6 Pin Configuration

Applications

- *Motor Drive*
- *Power Tools*
- *LED Lighting*
- *Quick Charger*

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±20	V
I_{D}	Drain Current – Continuous (T_C=25℃)	135	A
	Drain Current – Continuous (T_C=100℃)	85.4	A
I_{DM}	Drain Current – Pulsed[1]	540	A
EAS	Single Pulse Avalanche Energy[2]	205	mJ
IAS	Single Pulse Avalanche Current[2]	64	A
P_{D}	Power Dissipation (T_C=25℃)	121	W
	Power Dissipation – Derate above 25℃	0.97	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	---	1.03	℃/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	40	---	---	V
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=40V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=32V , V$_{GS}$=0V , T$_J$=85℃	---	---	10	uA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V , I$_D$=30A	---	2.7	3.2	mΩ
		V$_{GS}$=4.5V , I$_D$=20A	---	3.5	4.5	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$_D$=3A	---	15	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q$_g$	Total Gate Charge[3],[4]	V$_{DS}$=20V , V$_{GS}$=10V , I$_D$=50A	---	69.5	105	nC
Q$_{gs}$	Gate-Source Charge[3],[4]		---	10	15	
Q$_{gd}$	Gate-Drain Charge[3],[4]		---	16.3	21	
T$_{d(on)}$	Turn-On Delay Time[3],[4]	V$_{DD}$=20V , V$_{GS}$=10V , R$_G$=3.3Ω I$_D$=1A	---	35	---	ns
T$_r$	Rise Time[3],[4]		---	14	---	
T$_{d(off)}$	Turn-Off Delay Time[3],[4]		---	235	---	
T$_f$	Fall Time[3],[4]		---	85	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=20V , V$_{GS}$=0V , F=1MHz	---	3880	5820	pF
C$_{oss}$	Output Capacitance		---	400	600	
C$_{rss}$	Reverse Transfer Capacitance		---	338	510	
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz	---	1.7	---	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	---	---	135	A
I$_{SM}$	Pulsed Source Current[3]		---	---	270	A
V$_{SD}$	Diode Forward Voltage[3]	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	1	V
t$_{rr}$	Reverse Recovery Time	V$_R$=30V, I$_S$=10A ,	---	52	---	ns
Q$_{rr}$	Reverse Recovery Charge	di/dt=100A/μs , T$_J$=25℃	---	37	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=64A.,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
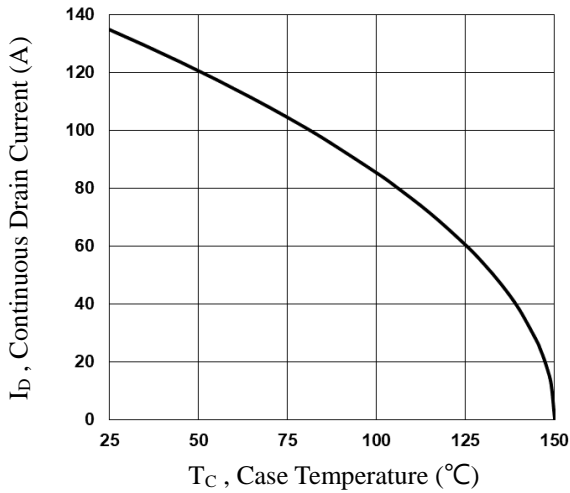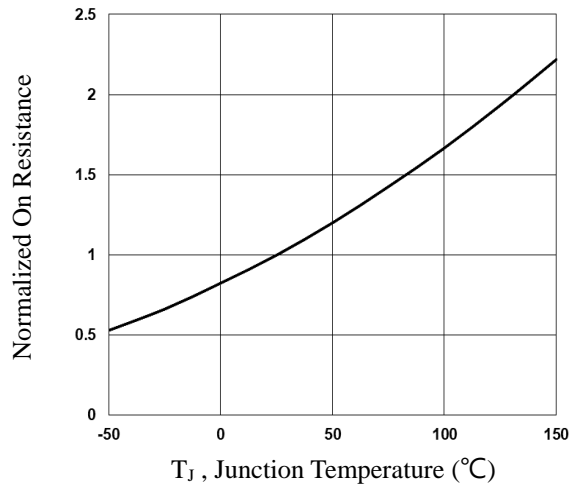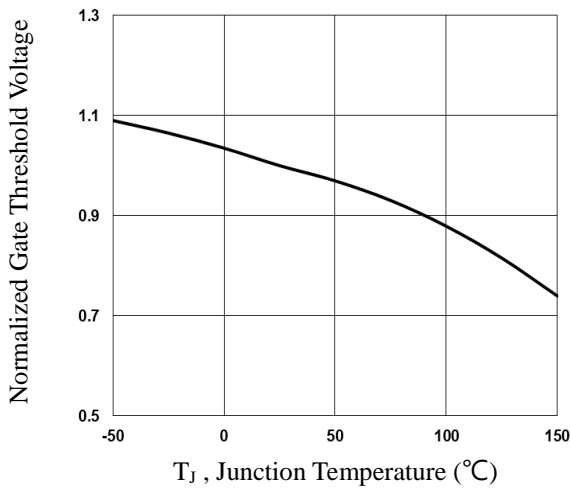
Fig.2　Normalized RDSON vs. T_J

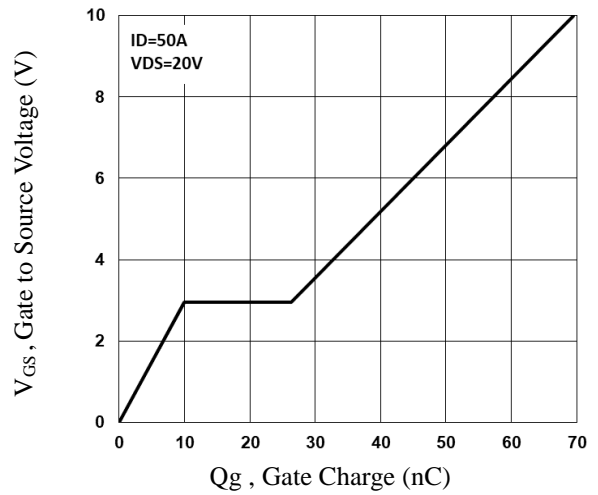**Fig.3　Normalized V_{th} vs. T_J**

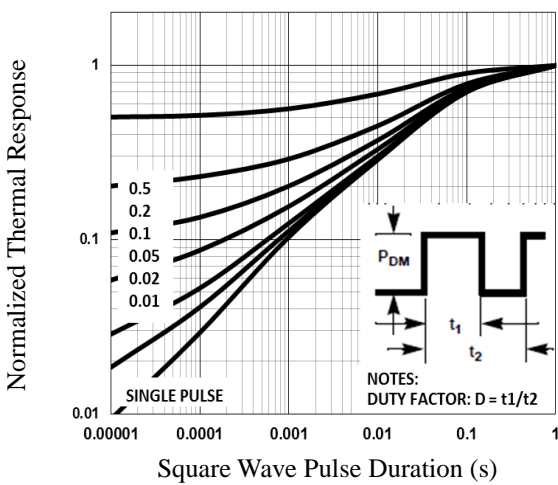**Fig.4　Gate Charge Waveform**

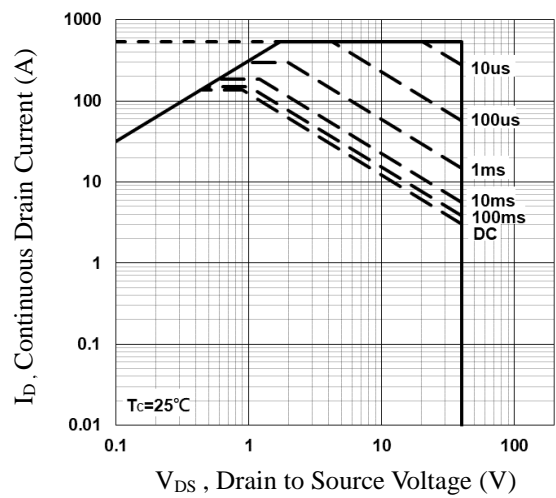**Fig.5　Normalized Transient Response**

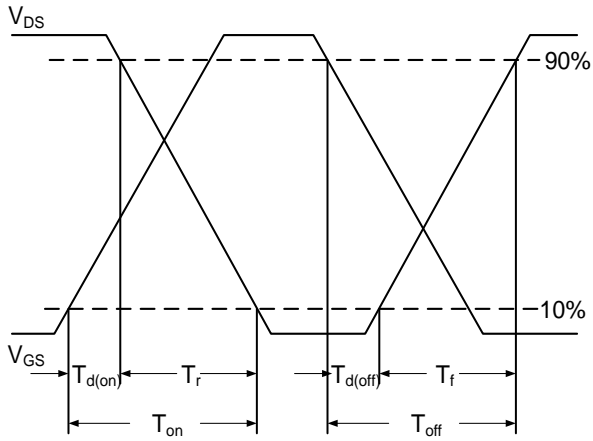**Fig.6　Maximum Safe Operation Area**

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°