20V N-Channel MOSFETs

PDC2602X

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	1.4mΩ	210A

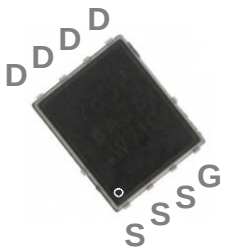
Features

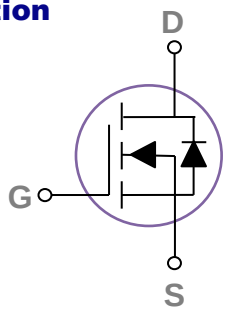
- *20V,210A, RDS(ON) =1.4mΩ@VGS = 4.5V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

Applications

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

PPAK5X6 Pin Configuration





Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D	Drain Current – Continuous (T_C=25˚C) (Chip Limitation)	210	A
	Drain Current – Continuous (T_C=100˚C) (Chip Limitation)	130	A
I_{DM}	Drain Current – Pulsed[1]	840	A
EAS	Single Pulse Avalanche Energy[2]	605	mJ
IAS	Single Pulse Avalanche Current[2]	110	A
P_D	Power Dissipation (T_C=25˚C)	142	W
	Power Dissipation – Derate above 25˚C	1.14	W/˚C
T_{STG}	Storage Temperature Range	-50 to 150	˚C
T_J	Operating Junction Temperature Range	-50 to 150	˚C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	˚C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.88	˚C/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
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.013	---	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}=±12V , V_{DS}=0V	---	---	100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V , I_D=15A	---	1.1	1.4	mΩ
		V_{GS}=2.5V , I_D=10A	---	1.24	1.7	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.4	0.6	1.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-3.5	---	mV/℃
gfs	Forward Transconductance	V_{DS}=10V , I_D=3A	---	30	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[3,4]	V_{DS}=16V , V_{GS}=4.5V , I_D=10A	---	173	260	nC
Q_{gs}	Gate-Source Charge[3,4]		---	35	53	
Q_{gd}	Gate-Drain Charge[3,4]		---	34	51	
$T_{d(on)}$	Turn-On Delay Time[3,4]	V_{DD}=10V , V_{GS}=4.5V , R_G=3.3Ω I_D=1A	---	30	60	ns
T_r	Rise Time[3,4]		---	80	160	
$T_{d(off)}$	Turn-Off Delay Time[3,4]		---	180	360	
T_f	Fall Time[3,4]		---	60	120	
C_{iss}	Input Capacitance	V_{DS}=16V , V_{GS}=0V , F=1MHz	---	11950	17900	pF
C_{oss}	Output Capacitance		---	1347	2020	
C_{rss}	Reverse Transfer Capacitance		---	1008	1500	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	1.35	---	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	---	---	210	A
I_{SM}	Pulsed Source Current		---	---	420	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. V_{DD}=20V,V_{GS}=10V,L=0.1mH,I_{AS}=110A.,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.

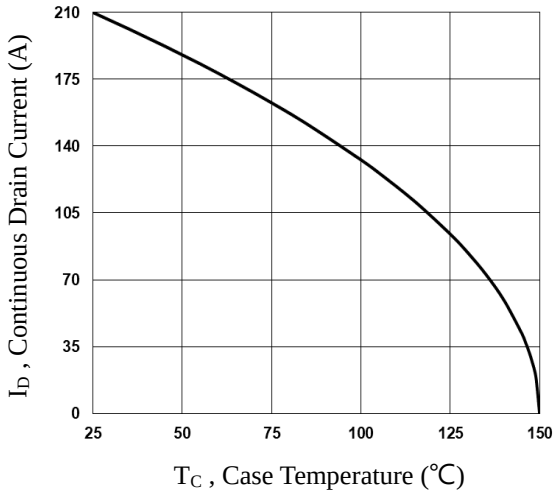


Fig.1 Continuous Drain Current vs. T_C

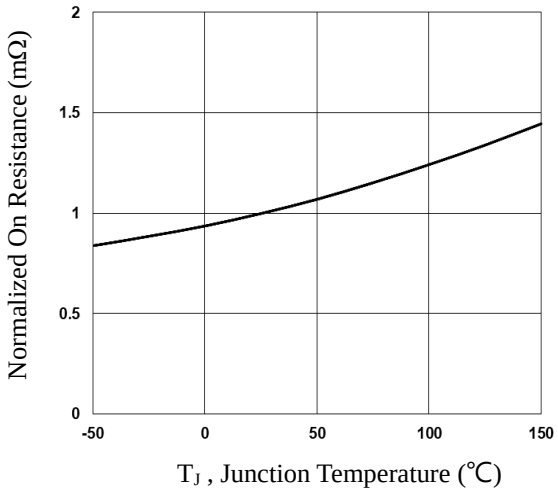


Fig.2 Normalized RDSON vs. T_J

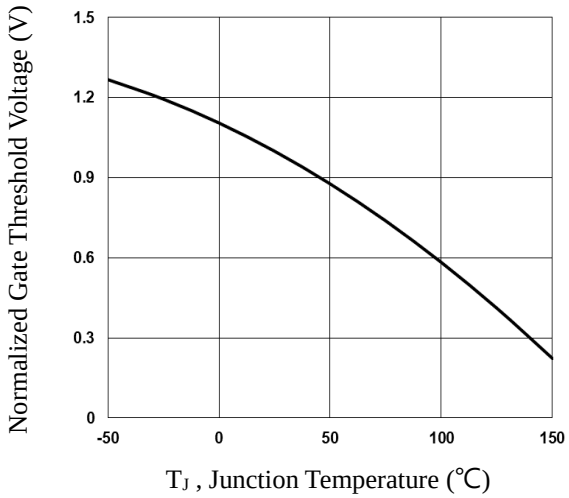


Fig.3 Normalized Vth vs. T_J

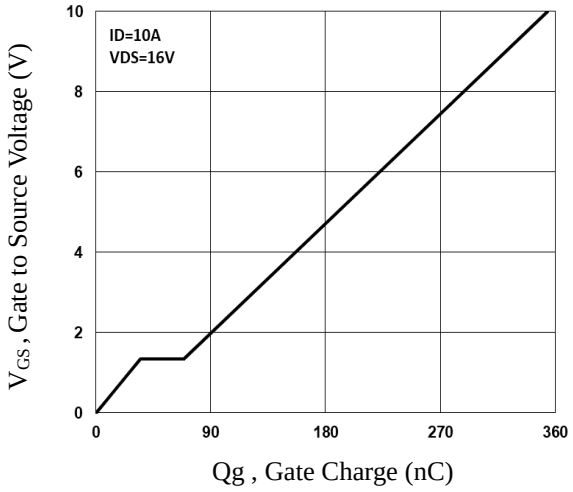


Fig.4 Gate Charge Characteristics

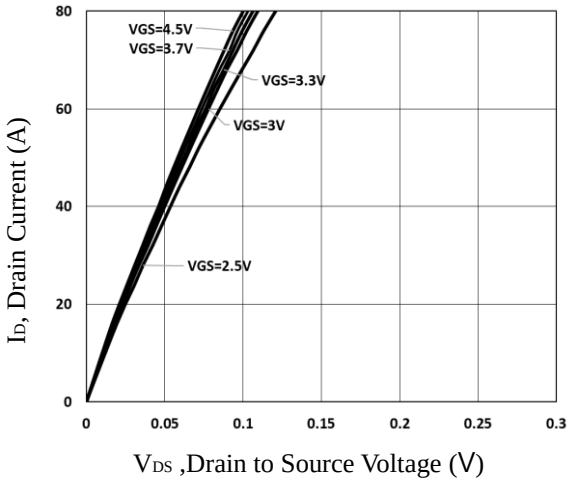


Fig.5 Typical Output Characteristics

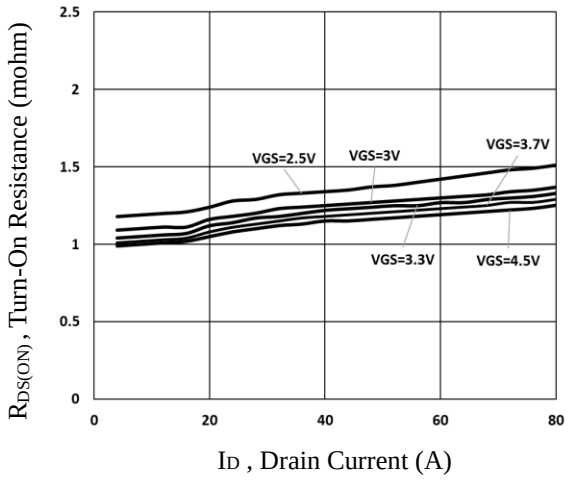


Fig.6 Turn-On Resistance vs. I_D

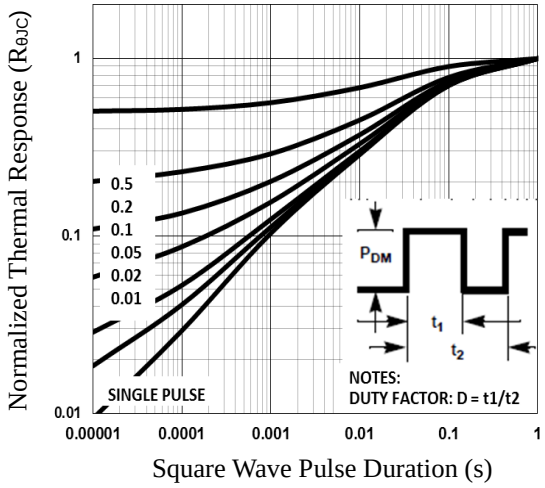


Fig.7 Normalized Transient Impedance

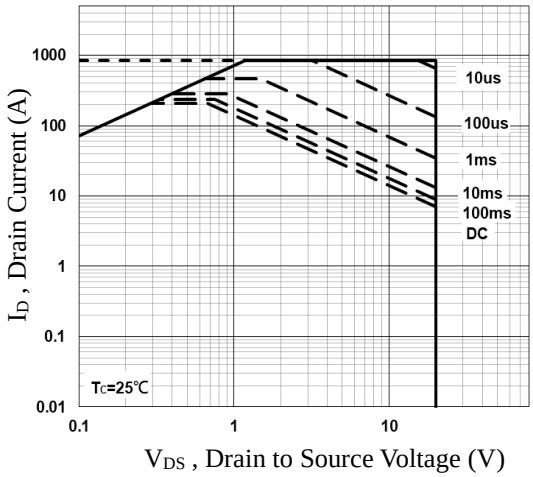


Fig.8 Maximum Safe Operation Area

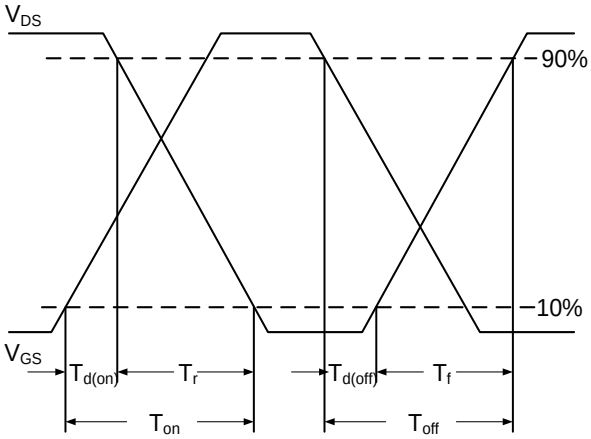


Fig.9 Switching Time Waveform

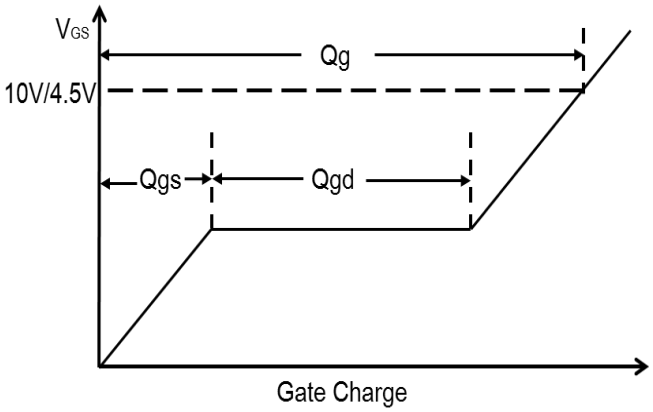
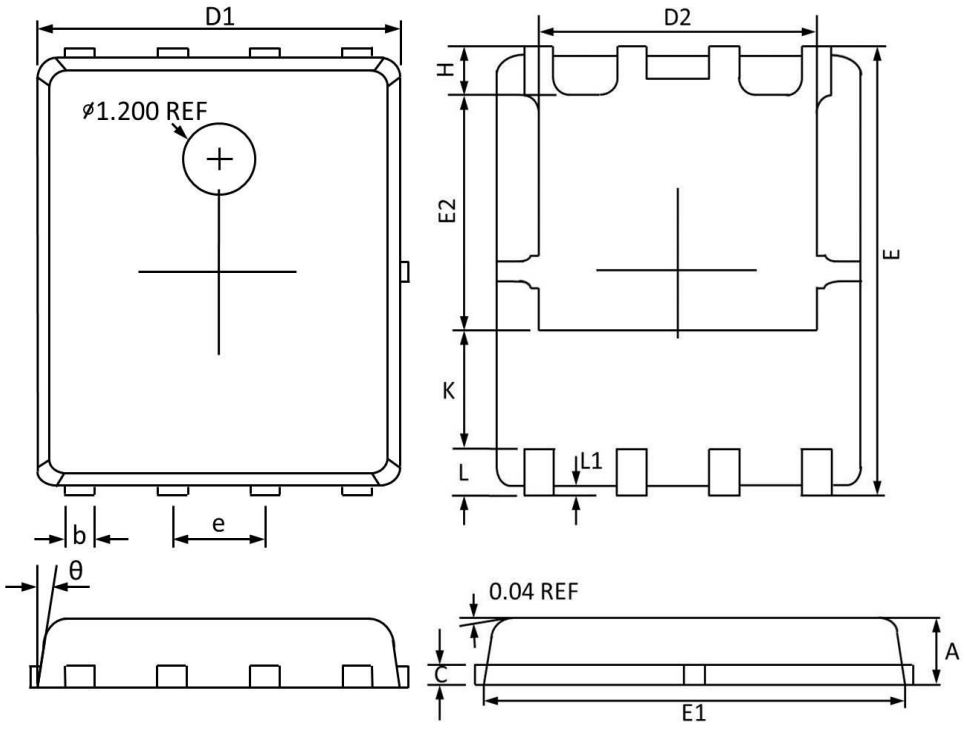


Fig.10 Gate Charge Waveform

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°