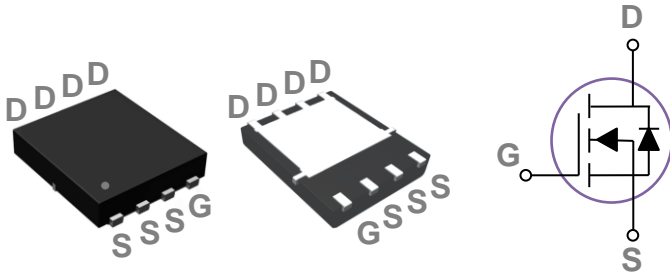


## General Description

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.

## PPAK5X6 Pin Configuration



BVDSS	RDSON	ID
150V	26mΩ	60A

## Features

- 150V,60A,  $R_{DS(ON)} = 26m\Omega$  @  $V_{GS} = 10V$
- Improved  $dv/dt$  capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

## Applications

- Motor Drive
- Power Tools
- LED Lighting

## Absolute Maximum Ratings $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	150	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $T_C=25^\circ C$ )	60	A
	Drain Current – Continuous ( $T_C=100^\circ C$ )	38	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	240	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	88	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	42	A
$P_D$	Power Dissipation ( $T_C=25^\circ C$ )	205	W
	Power Dissipation – Derate above $25^\circ C$	1.64	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

## Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	0.61	$^\circ C/W$

**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**
**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	150	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=120V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=120V, V_{GS}=0V, T_J=85^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

**On Characteristics**

$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>3, 4</sup>	$V_{GS}=10V, I_D=20A$	---	22	26	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	2	2.6	4	V
gfs	Forward Transconductance	$V_{DS}=10V, I_D=3A$	---	13	---	S

**Dynamic and switching Characteristics**

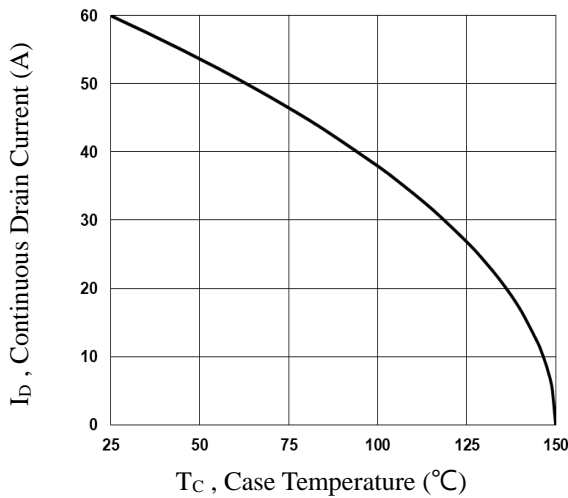
$Q_g$	Total Gate Charge <sup>3, 4</sup>	$V_{DS}=80V, V_{GS}=10V, I_D=30A$	---	35	50	nC
$Q_{gs}$	Gate-Source Charge <sup>3, 4</sup>		---	7.5	11	
$Q_{gd}$	Gate-Drain Charge <sup>3, 4</sup>		---	10.5	16	
$T_{d(on)}$	Turn-On Delay Time <sup>3, 4</sup>	$V_{DD}=80V, V_{GS}=10V, R_G=6\Omega$ $I_D=30A$	---	15	20	ns
$T_r$	Rise Time <sup>3, 4</sup>		---	28	42	
$T_{d(off)}$	Turn-Off Delay Time <sup>3, 4</sup>		---	45	65	
$T_f$	Fall Time <sup>3, 4</sup>		---	32	45	
$C_{iss}$	Input Capacitance	$V_{DS}=80V, V_{GS}=0V, F=1\text{MHz}$	---	2100	3150	pF
$C_{oss}$	Output Capacitance		---	160	240	
$C_{rss}$	Reverse Transfer Capacitance		---	7.5	11	
$R_g$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	0.5	---	$\Omega$

**Drain-Source Diode Characteristics and Maximum Ratings**

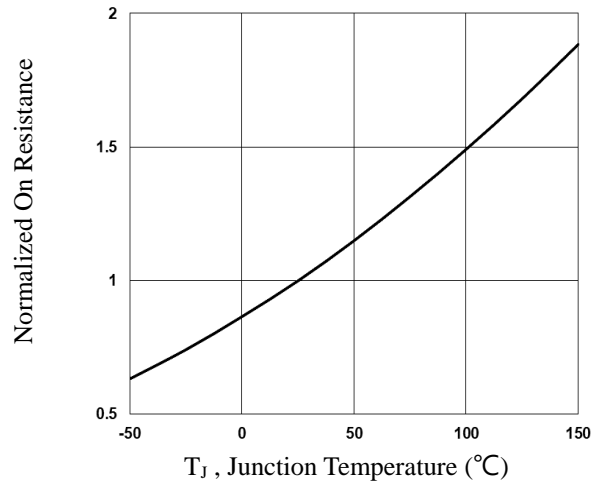
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	60	A
$I_{SM}$	Pulsed Source Current		---	---	120	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V
$t_{rr}$	Reverse Recovery Time <sup>3</sup>	$V_R=100V, I_S=10A,$ $di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	80	---	ns
$Q_{rr}$	Reverse Recovery Charge <sup>3</sup>		---	360	---	nC

Note :

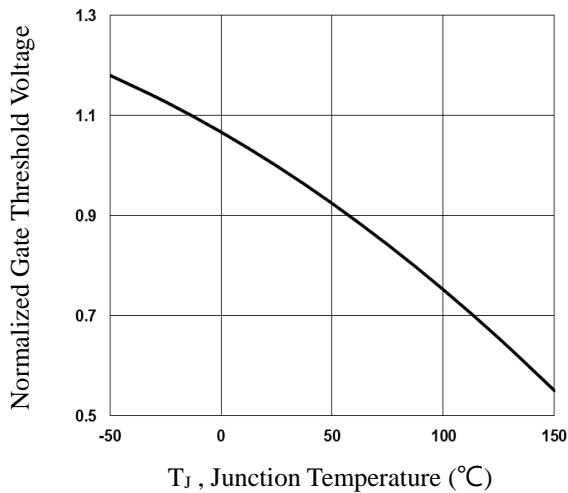
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, L=0.1\text{mH}, I_{AS}=42A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$ .
3. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.



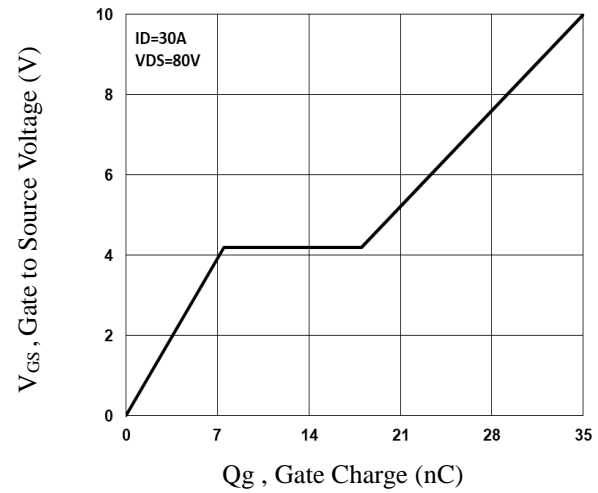
**Fig.1 Continuous Drain Current vs.  $T_c$**



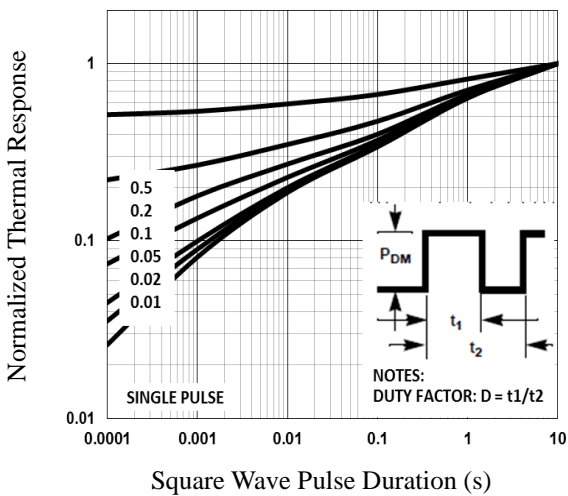
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



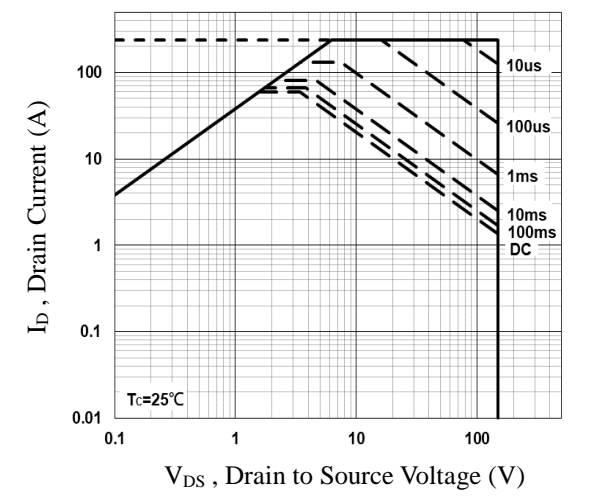
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.4 Gate Charge Characteristics**



**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**



**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge 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°