

### General Description

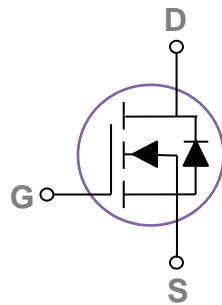
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BVDSS	R <sub>DS(ON)</sub>	I <sub>D</sub>
40V	2.2mΩ	140A

### Features

- 40V, 140A, R<sub>DS(ON)</sub> = 2.2mΩ @ V<sub>GS</sub> = 10V
- Improved dv/dt capability
- Fast switching
- Green Device Available

### PPAK5X6 Pin Configuration



### Applications

- PowerTools
- Load Switch
- LED applications
- Motor Drive Applications

### Absolute Maximum Ratings T<sub>C</sub>=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	40	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current – Continuous (T <sub>C</sub> =25°C) (Chip Limitation)	140	A
	Drain Current – Continuous (T <sub>C</sub> =100°C) (Chip Limitation)	90	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	400	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	200	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	20	A
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> =25°C)	73.5	W
	Power Dissipation – Derate above 25°C	0.588	W/°C
T <sub>STG</sub>	Storage Temperature Range	-50 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-50 to 150	°C

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	62	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction to Case	---	1.7	°C/W

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	μA
		V <sub>DS</sub> =32V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	10	μA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA

**On Characteristics**

R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =40A	---	1.6	2.2	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	1	---	3	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =40A	---	60	---	S

**Dynamic and switching Characteristics**

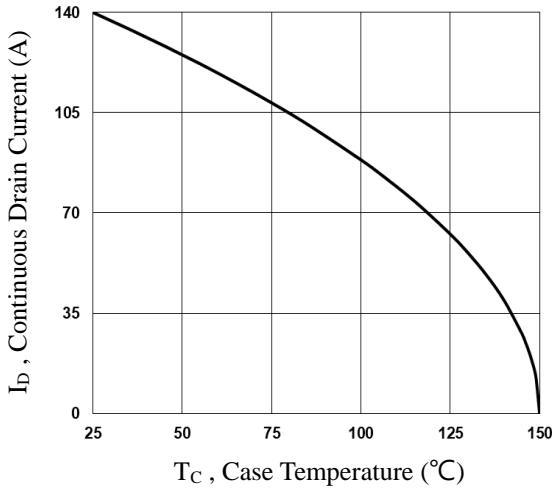
Q <sub>g</sub>	Total Gate Charge <sup>3,4</sup>	V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =40A	---	62	120	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>3,4</sup>		---	12	24	
Q <sub>gd</sub>	Gate-Drain Charge <sup>3,4</sup>		---	10	20	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>3,4</sup>	V <sub>DD</sub> =20V, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω I <sub>D</sub> =40A	---	15	30	ns
T <sub>r</sub>	Rise Time <sup>3,4</sup>		---	25	50	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>3,4</sup>		---	68	140	
T <sub>f</sub>	Fall Time <sup>3,4</sup>		---	26	52	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, F=1MHz	---	4000	6000	pF
C <sub>oss</sub>	Output Capacitance		---	150	235	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	2.5	10	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	2	4	Ω

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

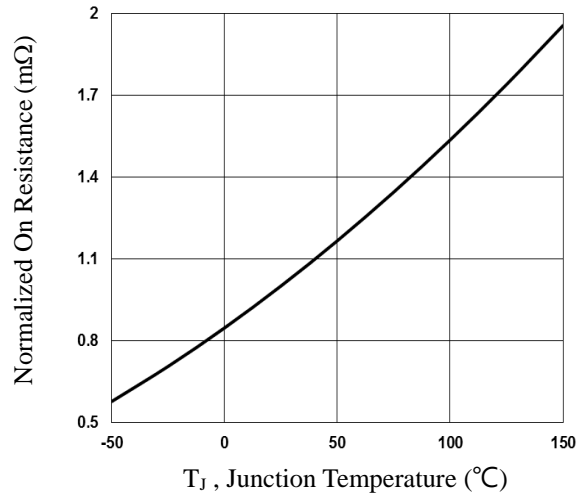
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	140	A
I <sub>SM</sub>	Pulsed Source Current		---	---	280	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =40A, di/dt=100A/μs	---	48	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25°C	---	55	---	nC

**Note :**

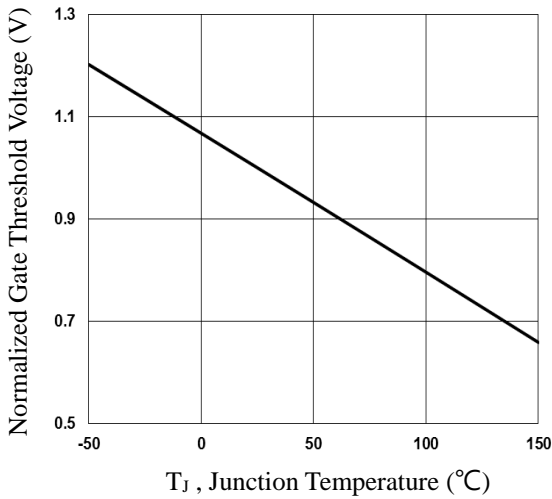
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=1mH, I<sub>AS</sub>=20A., Starting T<sub>J</sub>=25°C
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



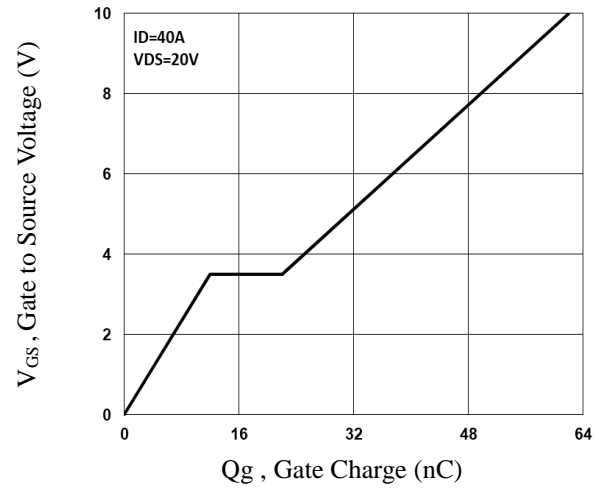
**Fig.1 Continuous Drain Current vs. T<sub>c</sub>**



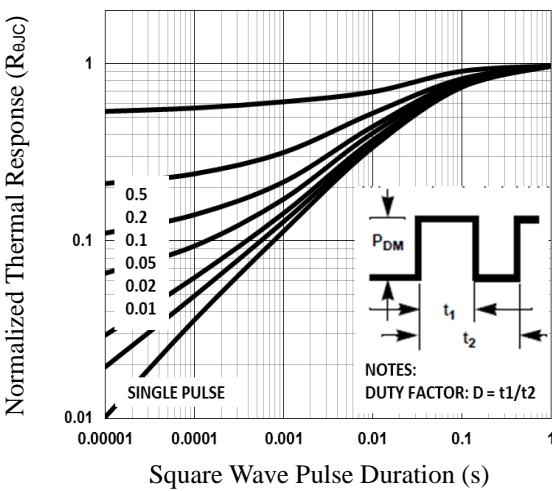
**Fig.2 Normalized RD<sub>SON</sub> vs. T<sub>j</sub>**



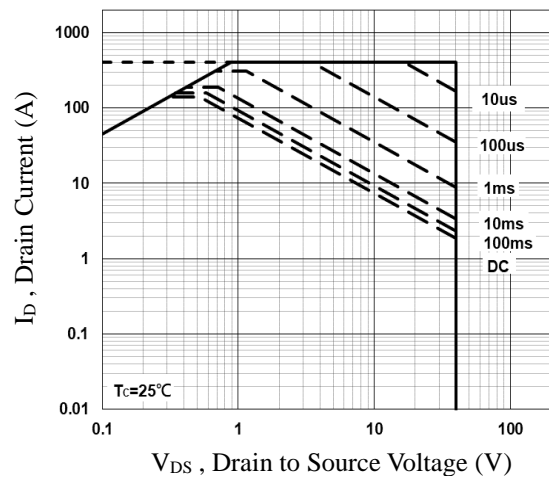
**Fig.3 Normalized V<sub>th</sub> vs. T<sub>j</sub>**



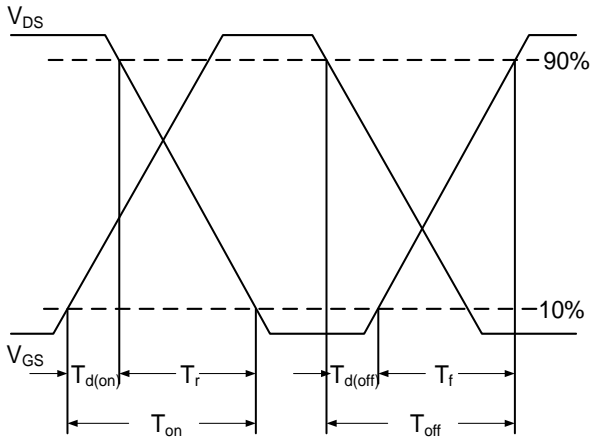
**Fig.4 Gate Charge Characteristics**



**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

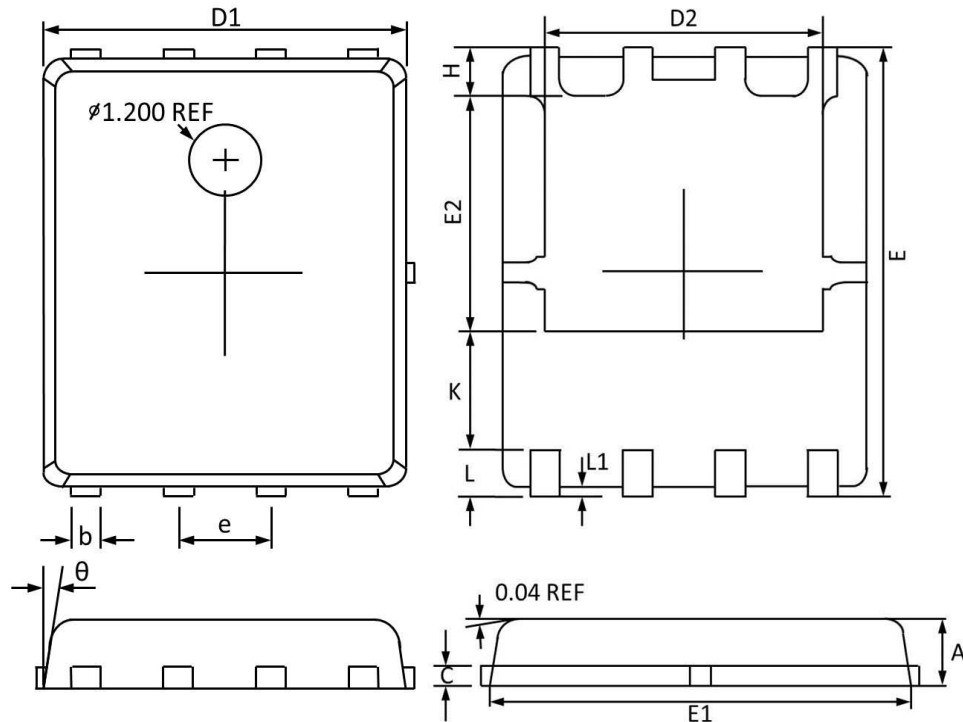


**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

## PPAK5x6 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	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°