



# 40V P-Channel MOSFETs

## General Description

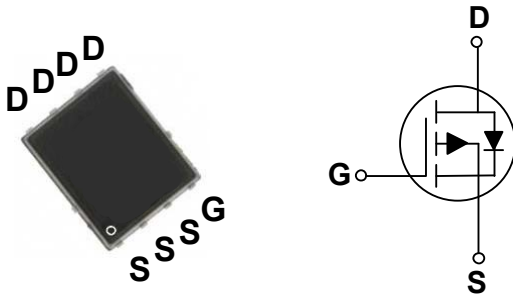
These P-Channel enhancement mode power field effect transistors are using trench MOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BV <sub>DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub>
-40 V	5.8 mΩ	-85 A

## Features

- $R_{DS(ON)} \leq 5.8m\Omega @ V_{GS} = -10V$
- Fast Switching
- Green Device Available
- Improved dv/dt Capability

PPAK5X6 Pin Configuration



## Applications

- Motor Drive
- Power Tools
- LED Lighting

## 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)	-85	A
I <sub>DM</sub>	Drain Current - Pulsed (NOTE 1)	-340	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	245	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	-70	A
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> =25°C)	135	W
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
Marking Code		PD5P8	

## 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	---	0.92	°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> = -250uA	-40	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> = -40V, V <sub>GS</sub> =0V	---	---	-1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = -10V, I <sub>D</sub> = -25A	---	---	5.8	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -12A	---	---	8.5	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> = -250uA	-1.2	---	-2.5	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> = -10V, I <sub>D</sub> = -3A	---	15	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -32V, V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A (NOTE 3 & 4)	---	106	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	13.1	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	24.9	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = -32V, V <sub>GS</sub> = -10V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = -1A (NOTE 3 & 4)	---	41.6	---	nS
T <sub>r</sub>	Rise Time		---	12.7	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	308	---	
T <sub>f</sub>	Fall Time		---	70	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, F= 1MHz	---	5720	---	pF
C <sub>oss</sub>	Output Capacitance		---	527	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	352	---	
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, F= 1MHz	---	4.2	---	Ω

Drain-Source Diode Characteristics and 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	---	---	-85	A
I <sub>SM</sub>	Pulsed Source Current		---	---	-170	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A	---	---	-1	V

NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH, I<sub>AS</sub>=-70A, R<sub>G</sub>=25Ω.
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



Characteristics Curves

FIG. 1- $I_D$  vs  $T_C$

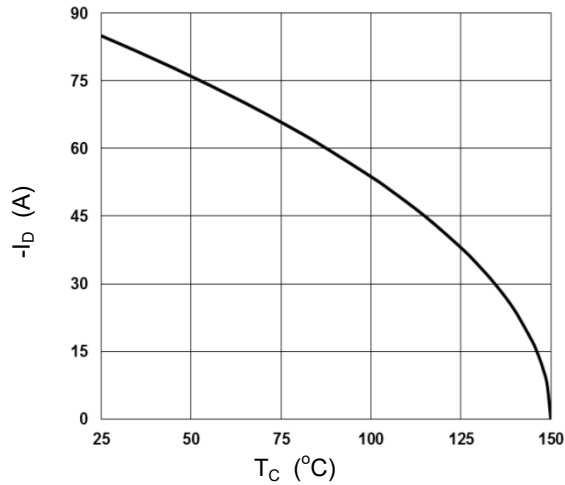


FIG. 2-Normalized  $R_{DS(ON)}$  vs  $T_J$

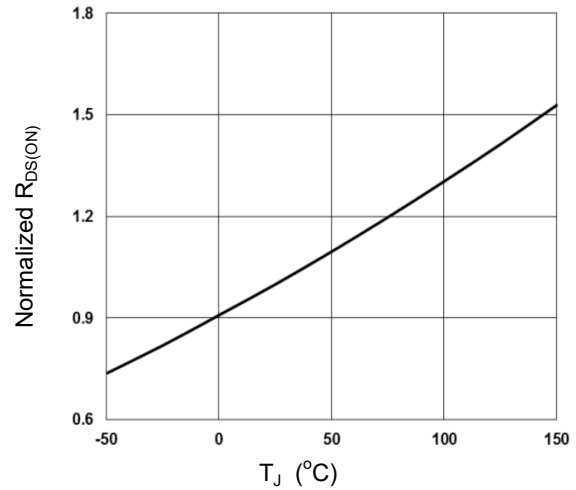


FIG. 3-Normalized  $V_{GS(th)}$  vs  $T_J$

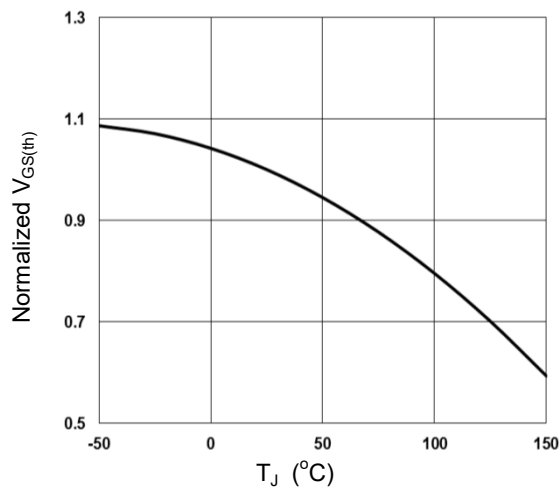


FIG. 4-Gate Charge Characteristics

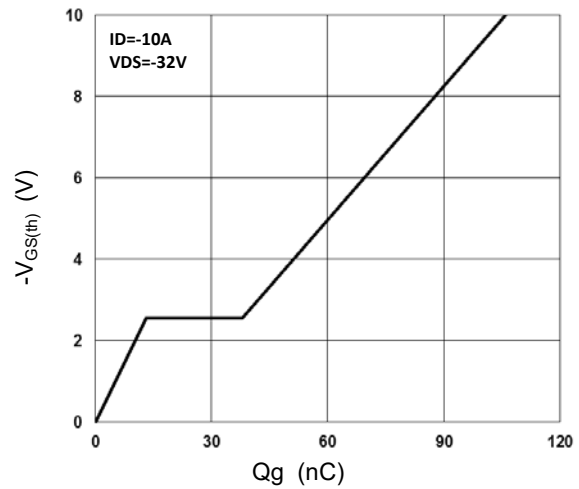


FIG. 5-Normalized Transient Impedance

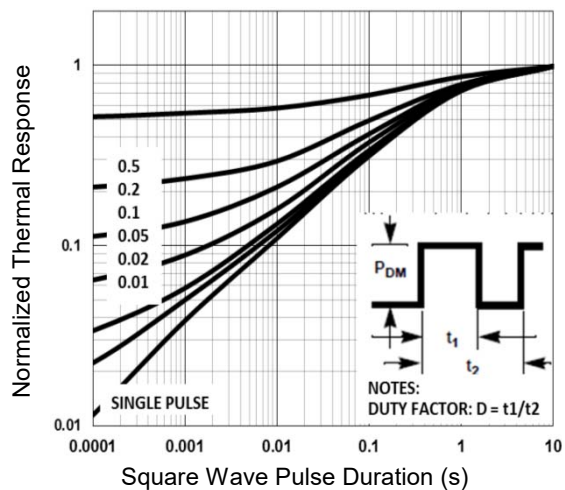
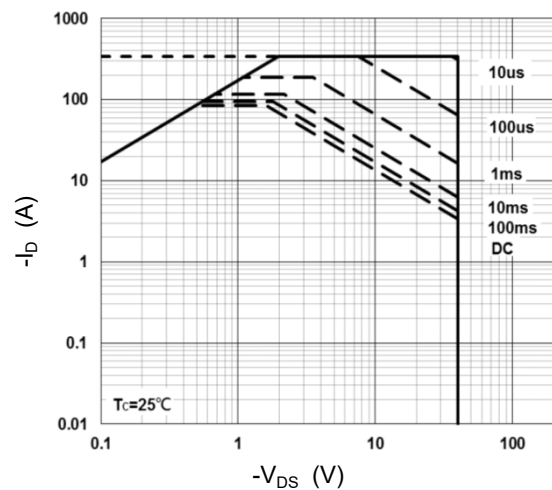


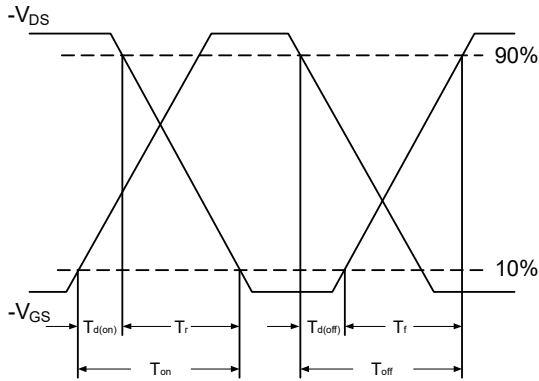
FIG. 6-Safe Operation Area



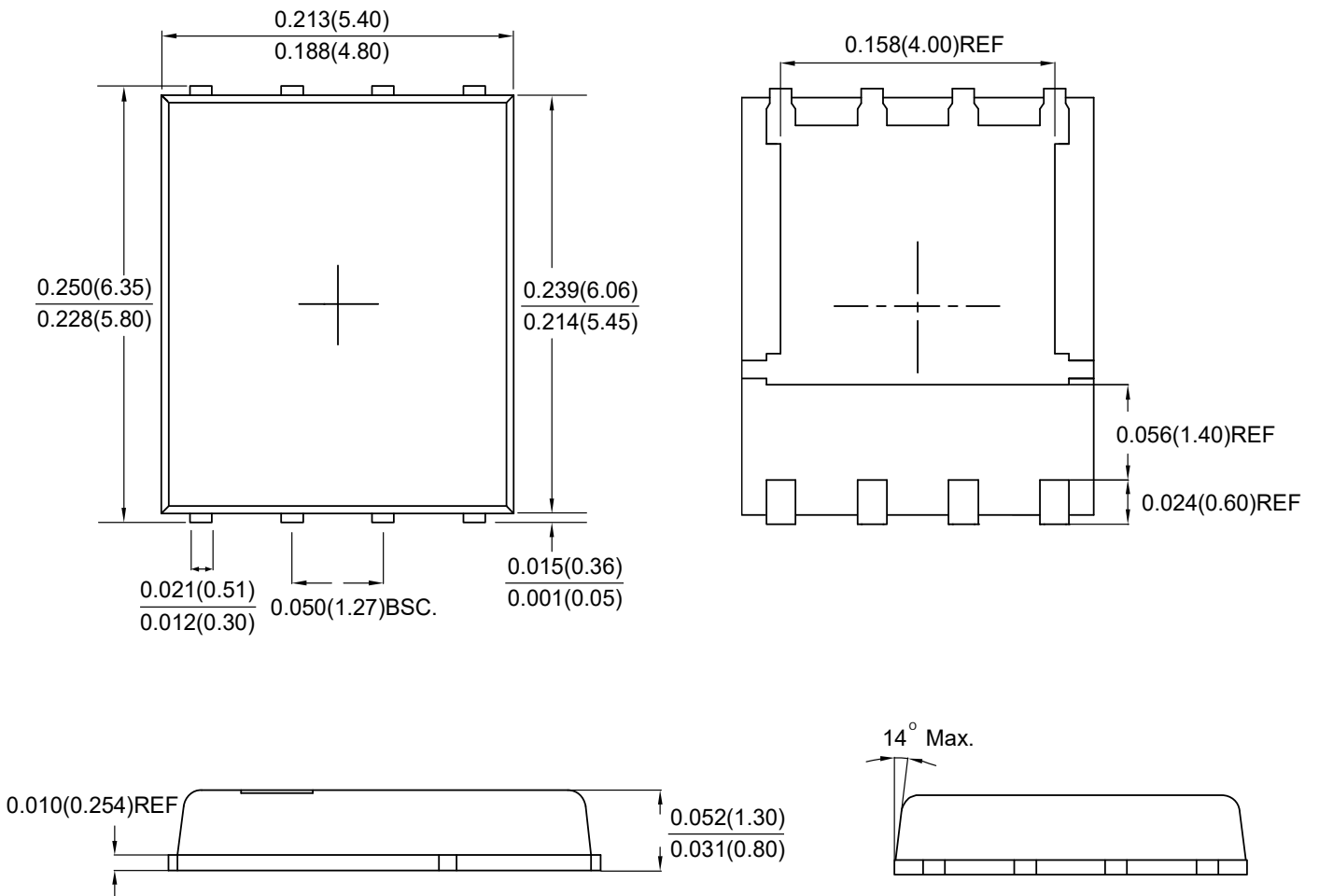


Characteristics Curves

FIG. 7-Switching Time Waveform



Package Outline Dimensions



PPAK5X6

Dimensions in inches and (millimeters)



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