

**General Description**

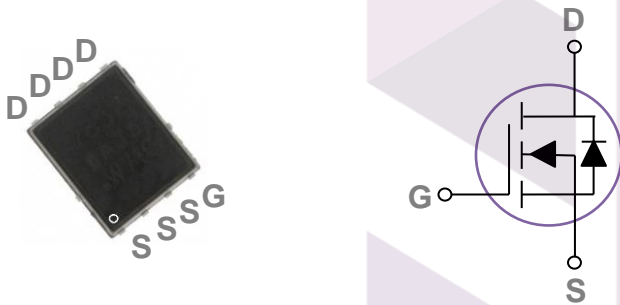
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
40V	2.2mΩ	140A

**Features**

- 40V, 140A, RDS(ON) = 2.2mΩ@VGS = 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** Tc=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 ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**
**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=32V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

**On Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=40A$	---	1.6	2.2	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1	---	3	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=40A$	---	60	---	S

**Dynamic and switching Characteristics**

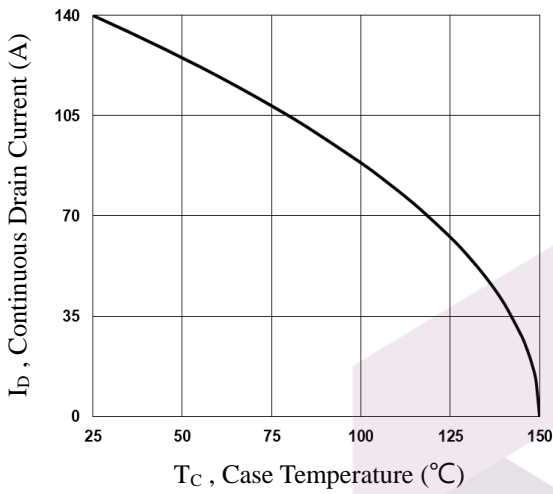
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$Q_g$	Total Gate Charge <sup>3,4</sup>	$V_{DS}=20V, V_{GS}=10V, I_D=40A$	---	62	120	nC
$Q_{gs}$	Gate-Source Charge <sup>3,4</sup>		---	12	24	
$Q_{gd}$	Gate-Drain Charge <sup>3,4</sup>		---	10	20	
$T_{d(on)}$	Turn-On Delay Time <sup>3,4</sup>	$V_{DD}=20V, V_{GS}=10V, R_G=3\Omega$ $I_D=40A$	---	15	30	ns
$T_r$	Rise Time <sup>3,4</sup>		---	25	50	
$T_{d(off)}$	Turn-Off Delay Time <sup>3,4</sup>		---	68	140	
$T_f$	Fall Time <sup>3,4</sup>		---	26	52	
$C_{iss}$	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, F=1\text{MHz}$	---	4000	6000	pF
$C_{oss}$	Output Capacitance		---	150	235	
$C_{rss}$	Reverse Transfer Capacitance		---	2.5	10	
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2	4	$\Omega$

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

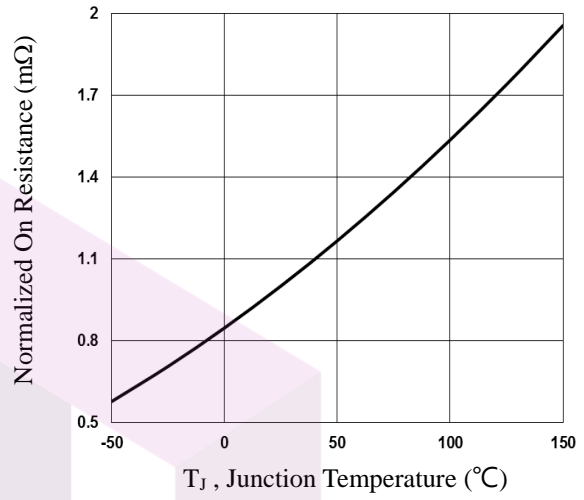
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	140	A
$I_{SM}$	Pulsed Source Current		---	---	280	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V
$t_{rr}$	Reverse Recovery Time	$V_{GS}=0V, I_S=40A, di/dt=100A/\mu s$	---	48	---	ns
$Q_{rr}$	Reverse Recovery Charge	$T_J=25^\circ\text{C}$	---	55	---	nC

**Note :**

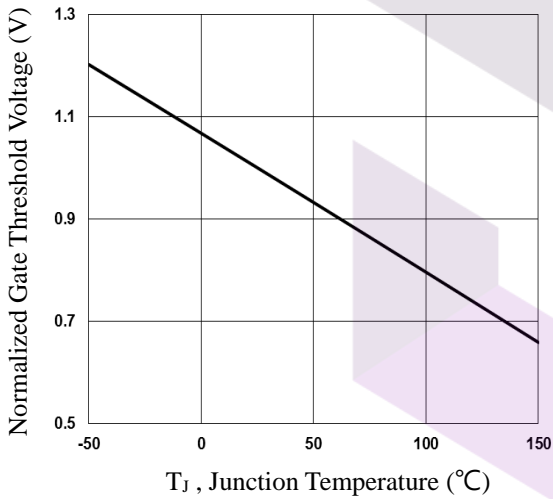
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=1mH, I_{AS}=20A.$ , Starting  $T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.



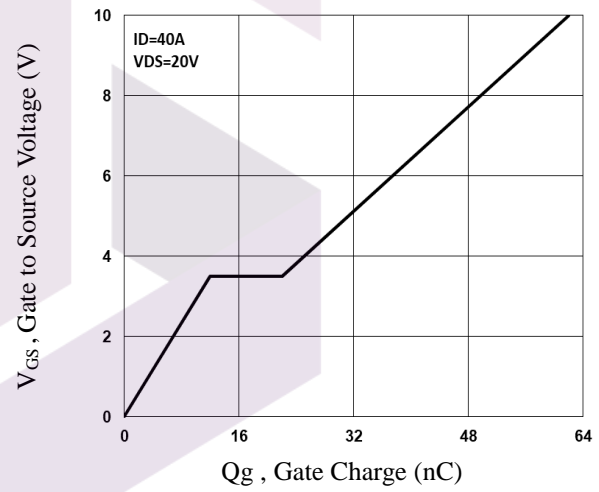
**Fig.1 Continuous Drain Current vs.  $T_c$**



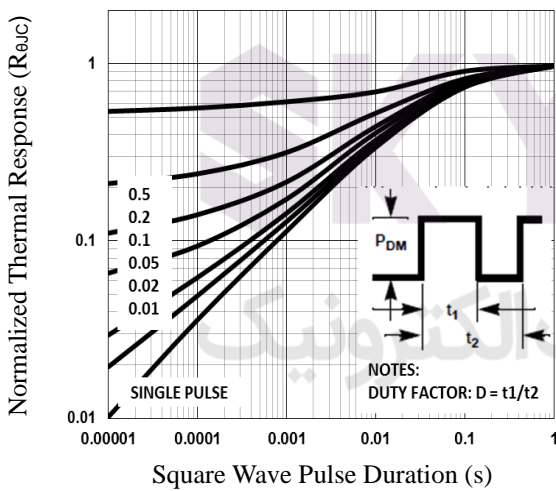
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



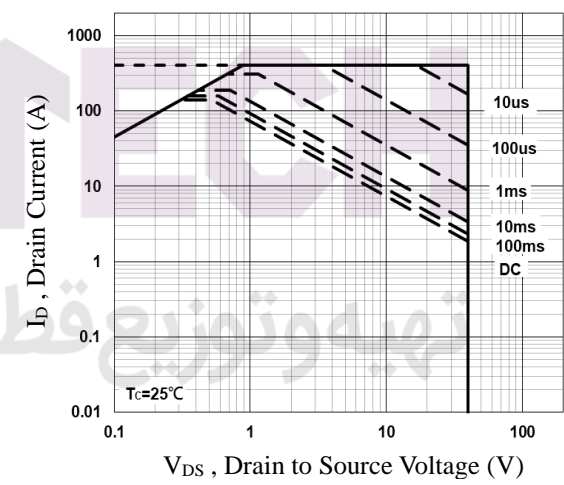
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



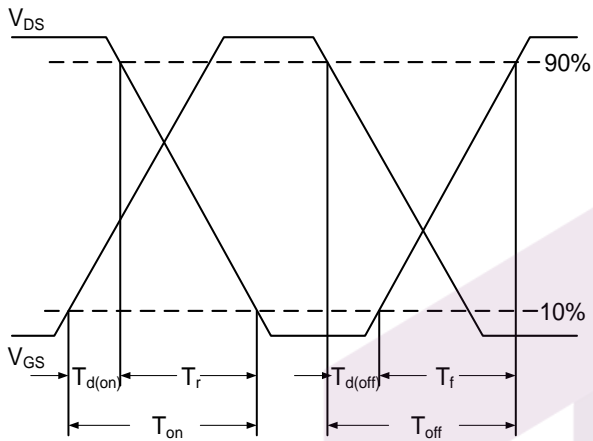
**Fig.4 Gate Charge Characteristics**



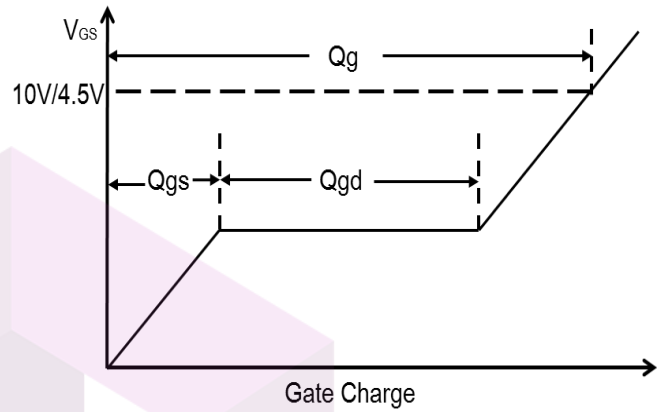
**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**



**Fig.7 Switching Time Waveform**

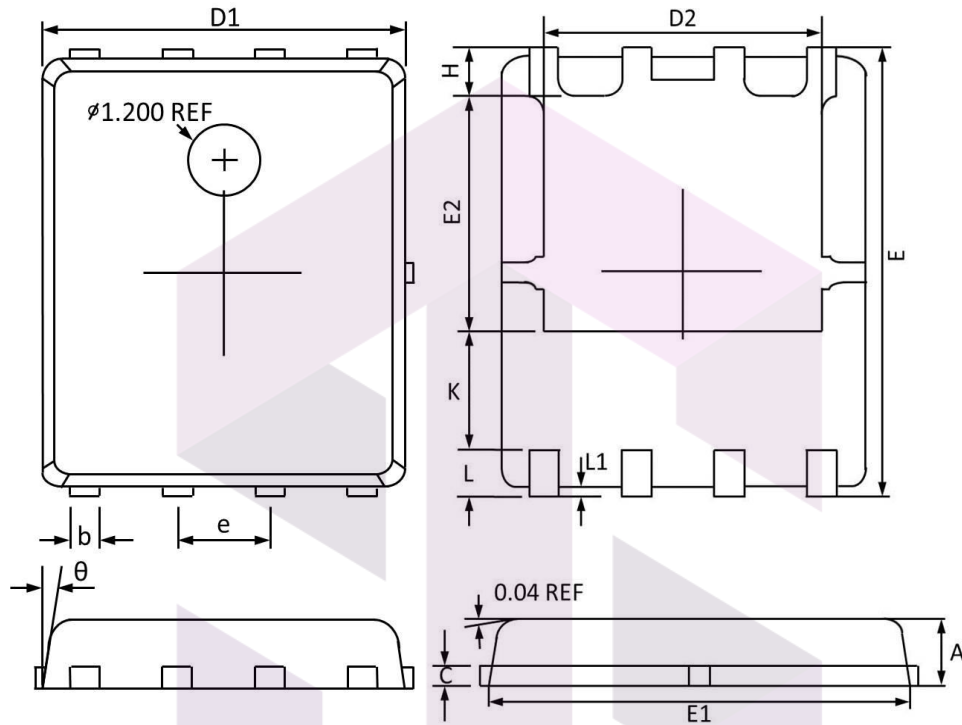


**Fig.8 Gate Charge Waveform**

SKYTECH

تهیه و توزیع قطعات الکترونیک

## 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
$\theta$	12°	0°	12°	0°