

**General Description**

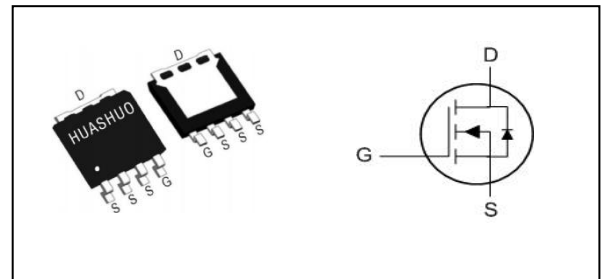
- 100% UIS Tested
- Advanced Trench Technology
- Low Gate Charge
- High Current Capability
- RoHS and Halogen-Free Compliant

**Product Summary**

$V_{DS}$	40	V
$R_{DS(ON),TYP}$	0.68	m $\Omega$
$I_D$	325	A

**Applications**

- SMPS Synchronous Rectification
- DC/DC Converters
- Or-ing

**LFPAK5X6 Pin Configuration**

**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	325	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	195	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	950	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	810	mJ
$I_{AS}$	Avalanche Current	112	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation <sup>4</sup>	140	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	50	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	0.9	$^\circ\text{C/W}$



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

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
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	0.68	0.9	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2.0	---	4.0	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =32V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =32V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	2.1	---	Ω
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A	---	66	---	S
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	101	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	17	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	17.9	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =20V, V <sub>GS</sub> =10V, R <sub>G</sub> =1.5Ω, I <sub>D</sub> =20A	---	22	---	ns
T <sub>r</sub>	Rise Time		---	29	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	85	---	
T <sub>f</sub>	Fall Time		---	31	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1MHz	---	6110	---	pF
C <sub>oss</sub>	Output Capacitance		---	2133	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	130	---	

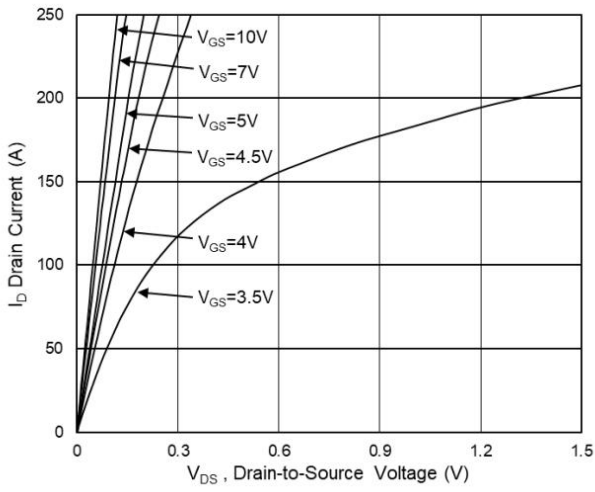
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	325	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =20A, di/dt=100A/μs,	---	65	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25°C	---	75	---	nC

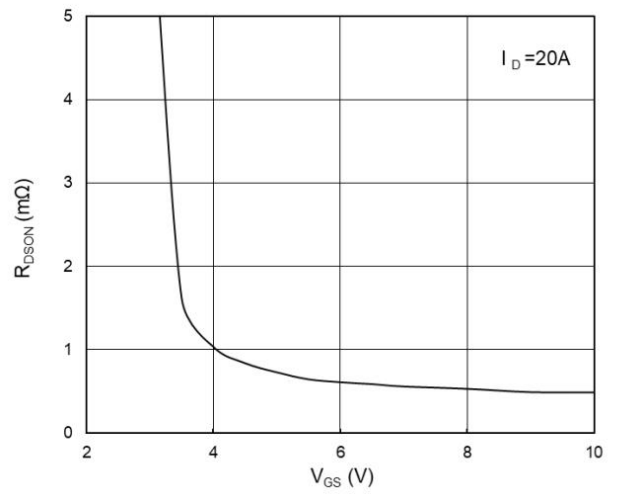
Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup>FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=112A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.
- 6.Package limitation current is 100A.

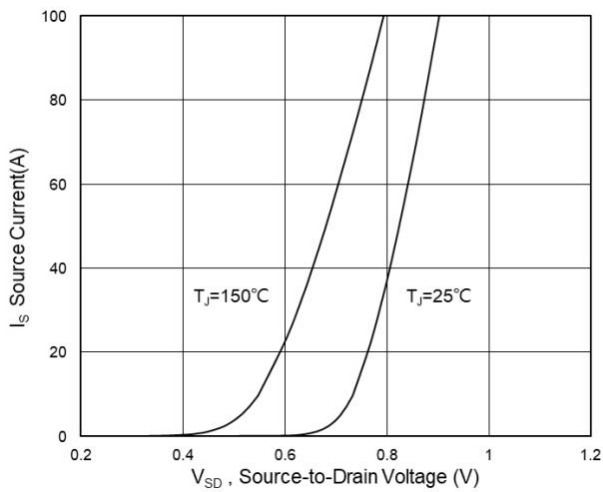
**Typical Characteristics**



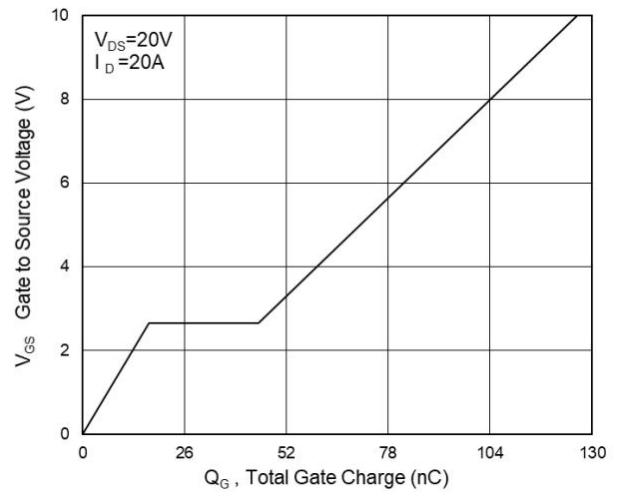
**Fig.1 Typical Output Characteristics**



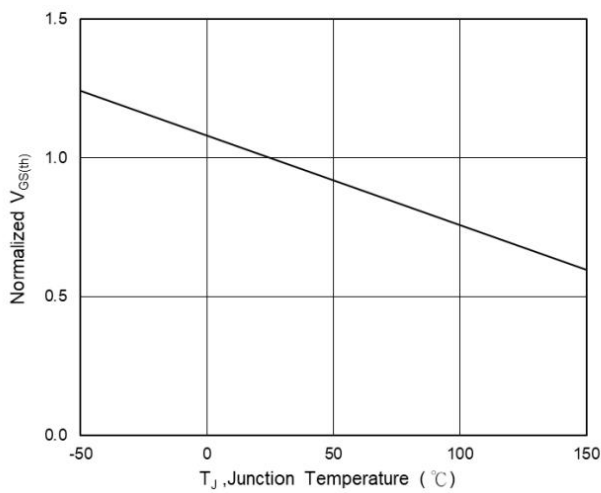
**Fig.2 On-Resistance vs G-S Voltage**



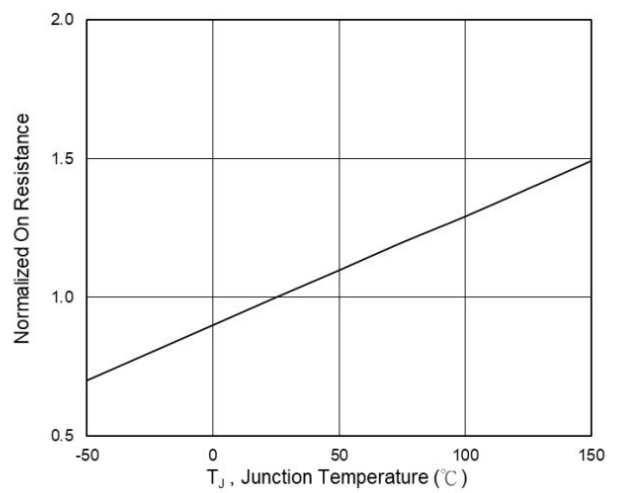
**Fig.3 Source Drain Forward Characteristics**



**Fig.4 Gate-Charge Characteristics**

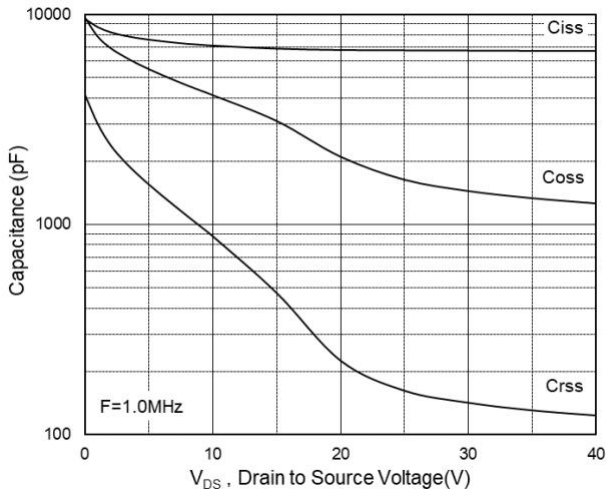


**Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$**

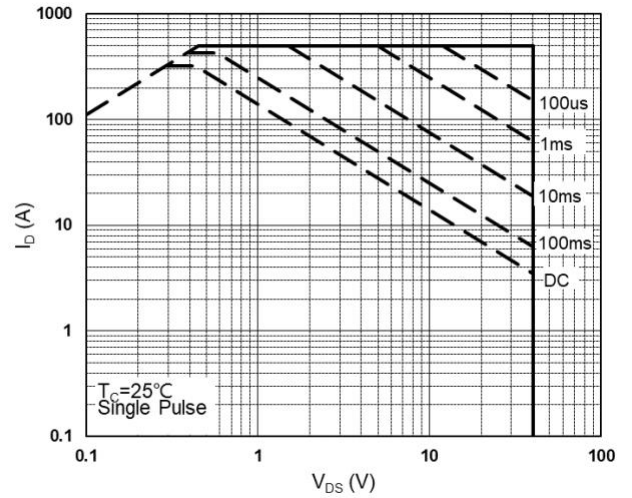


**Fig.6 Normalized  $R_{DS(on)}$  vs  $T_J$**

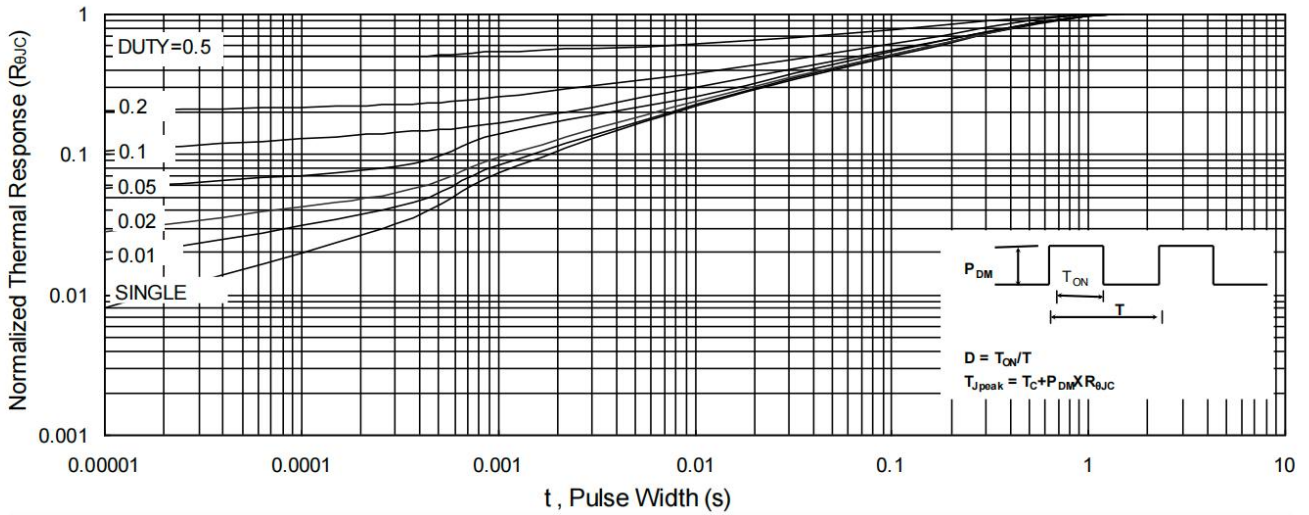
**N-Ch 40V Fast Switching MOSFETs**



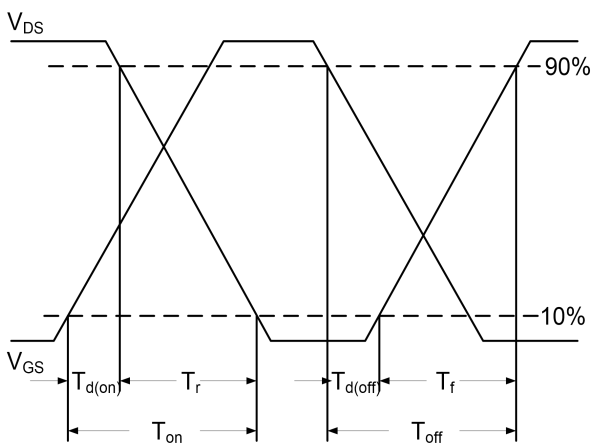
**Fig.7 Capacitance**



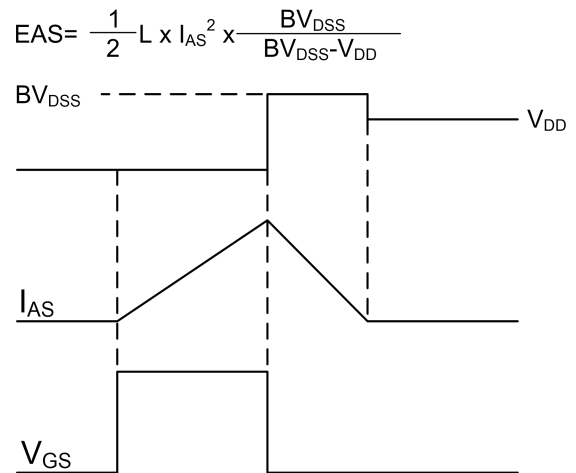
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



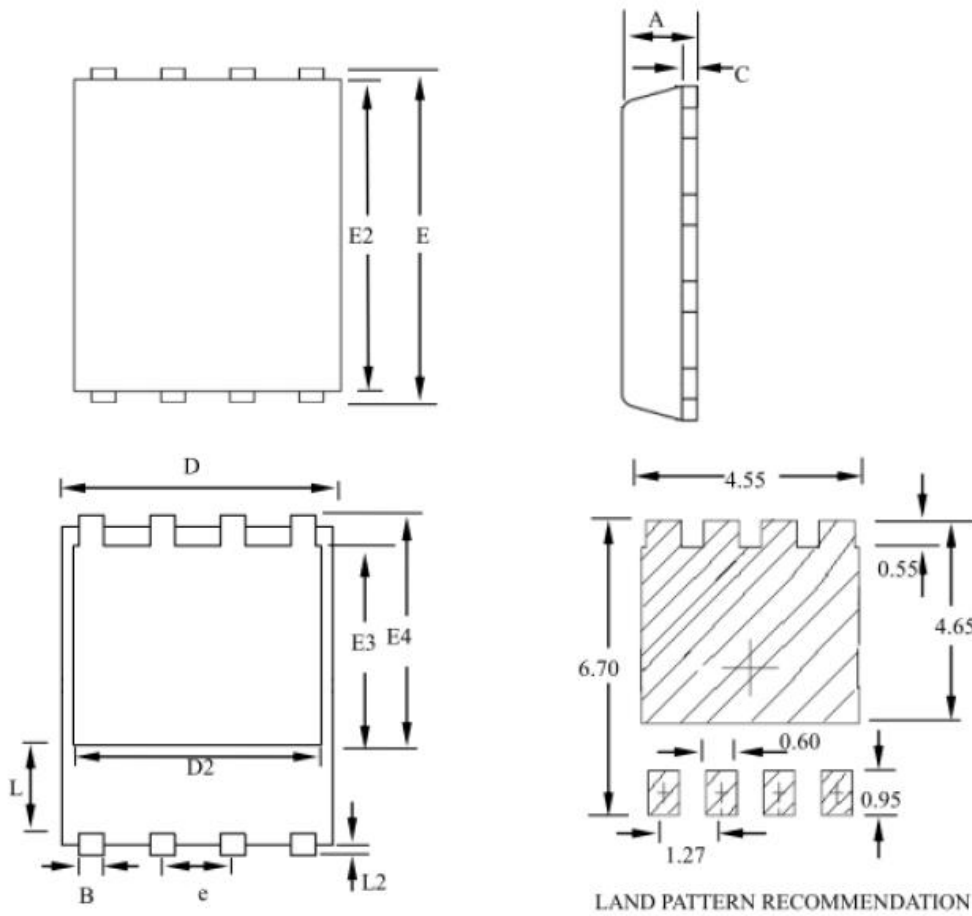
**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**



# PRPAK5X6 Package Outline Dimensions



SYMBOLS	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	--	1.20	0.031	--	0.047
B	0.30	--	0.51	0.012	--	0.020
C	0.15	--	0.35	0.006	--	0.014
D	4.80	--	5.30	0.189	--	0.209
D2	3.61	--	4.35	0.142	--	0.171
E	5.90	--	6.35	0.232	--	0.250
E2	5.42	--	5.90	0.213	--	0.232
E3	3.23	--	3.90	0.127	--	0.154
E4	3.69	--	4.55	0.145	--	0.179
L	0.61	--	1.80	0.024	--	0.071
L2	0.05	--	0.36	0.002	--	0.014
e	--	1.27	--	--	0.050	--