



### Description

- Proprietary New Trench Technology
- $R_{DS(ON),typ.} = 43m\Omega @ V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

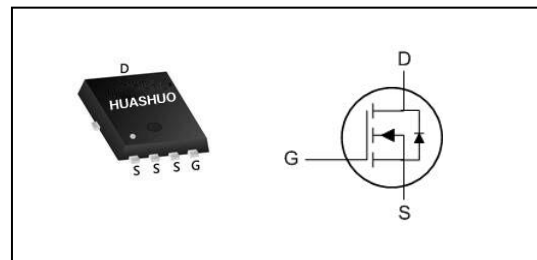
### Product Summary

$V_{DS}$	200	V
$R_{DS(ON),max}$	48	m $\Omega$
$I_D$	30	A

### Applications

- Synchronous Rectification in SMPS
- Motor Control
- Hard Switching and High Speed Circuit

### PRPAK5\*6 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	200	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	30	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	21	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	120	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	200	mJ
dv/dt	Peak Diode Recovery dv/dt	5	V/nS
$P_D @ T_C=25^\circ C$	Total Power Dissipation <sup>3</sup>	150	W
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 175	$^\circ C$

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	50	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	1.0	$^\circ C/W$



**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	200	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V , I <sub>D</sub> =20A	---	43	48	mΩ
	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =4.5V , I <sub>D</sub> =20A	---	50	60	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	---	3.0	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =200V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =160V , V <sub>GS</sub> =0V , T <sub>J</sub> =125°C	---	---	100	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ± 20V , V <sub>DS</sub> =0V	---	---	± 100	nA
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =100V , V <sub>GS</sub> =10V , I <sub>D</sub> =15A	---	49	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	11	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	8	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =100V , V <sub>GS</sub> =10V , R <sub>G</sub> =10Ω I <sub>D</sub> =15A	---	22	---	ns
T <sub>r</sub>	Rise Time		---	5.2	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	75	---	
T <sub>f</sub>	Fall Time		---	11	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =100V , V <sub>GS</sub> =0V , f=1MHz	---	3490	---	pF
C <sub>oss</sub>	Output Capacitance		---	13	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	86	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	30	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	120	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> =15A , dI/dt=100A/μs , T <sub>J</sub> =25°C	---	117	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	333	---	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 power dissipation is limited by 150°C junction temperature
- 4.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.



### Typical Characteristics

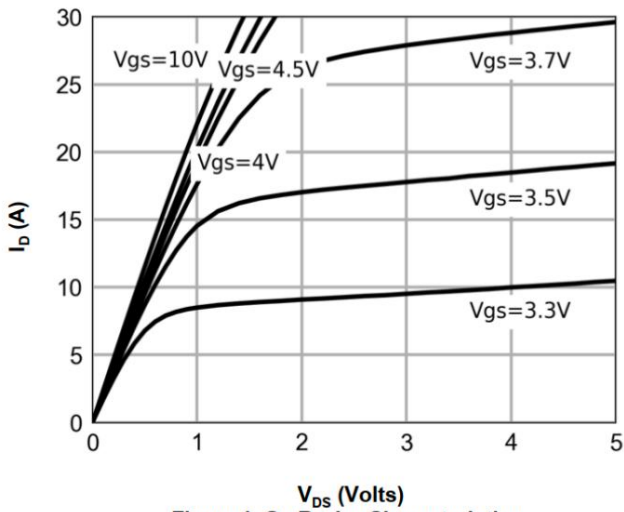


Figure 1: On-Region Characteristics

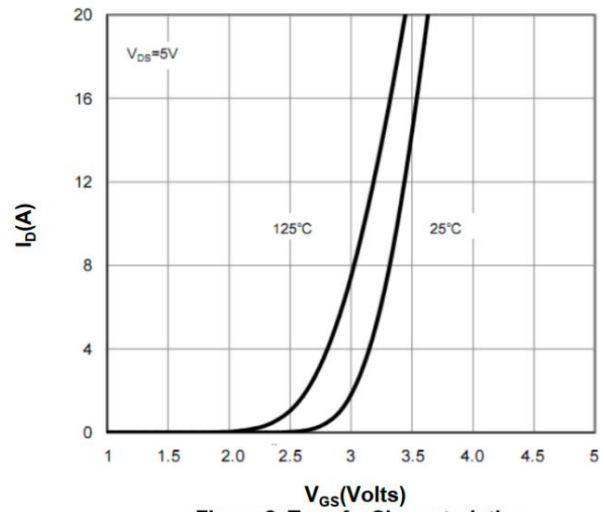


Figure 2: Transfer Characteristics

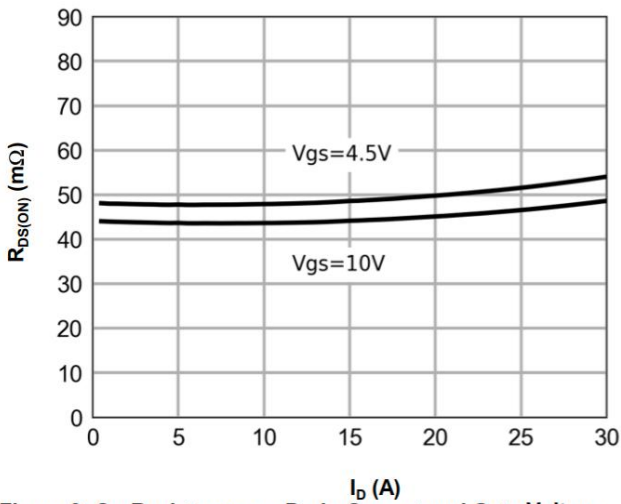


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

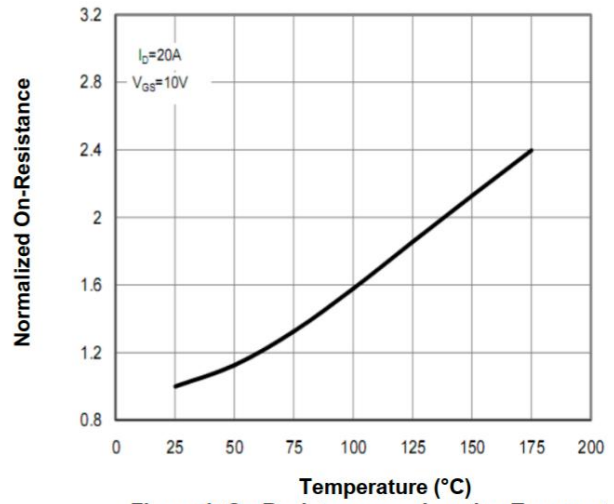


Figure 4: On-Resistance vs. Junction Temperature

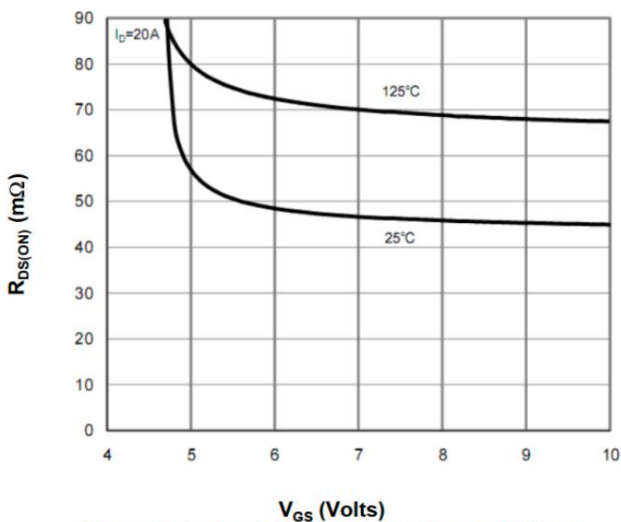


Figure 5: On-Resistance vs. Gate-Source Voltage

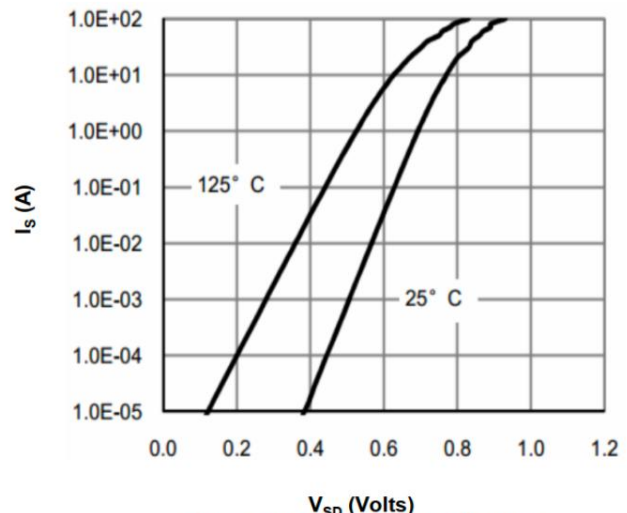
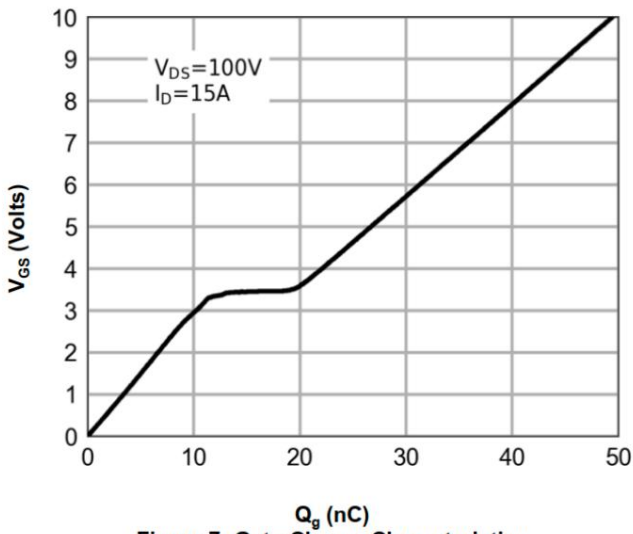
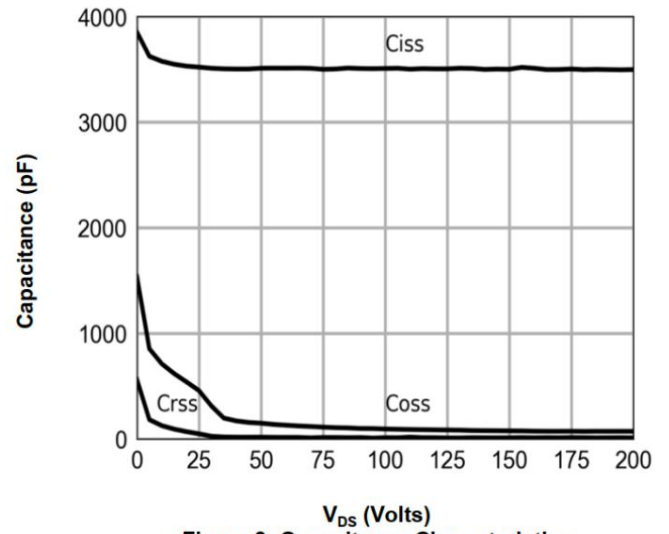


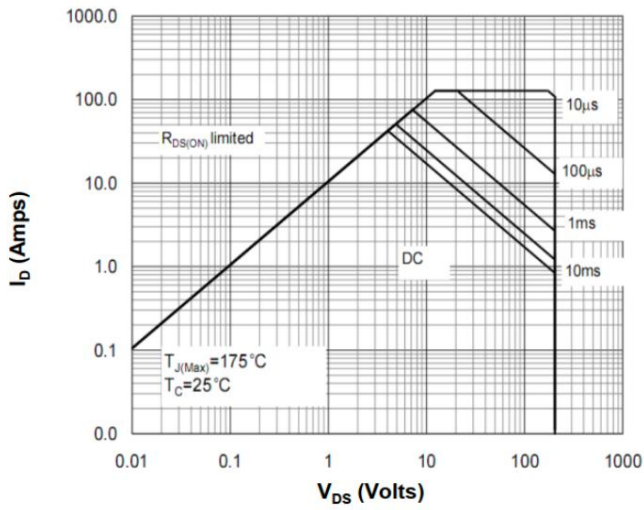
Figure 6: Body-Diode Characteristics



**Figure 7: Gate-Charge Characteristics**



**Figure 8: Capacitance Characteristics**



**Figure 9: Maximum Forward Biased Safe Operating Area**



Test Circuits and Waveforms

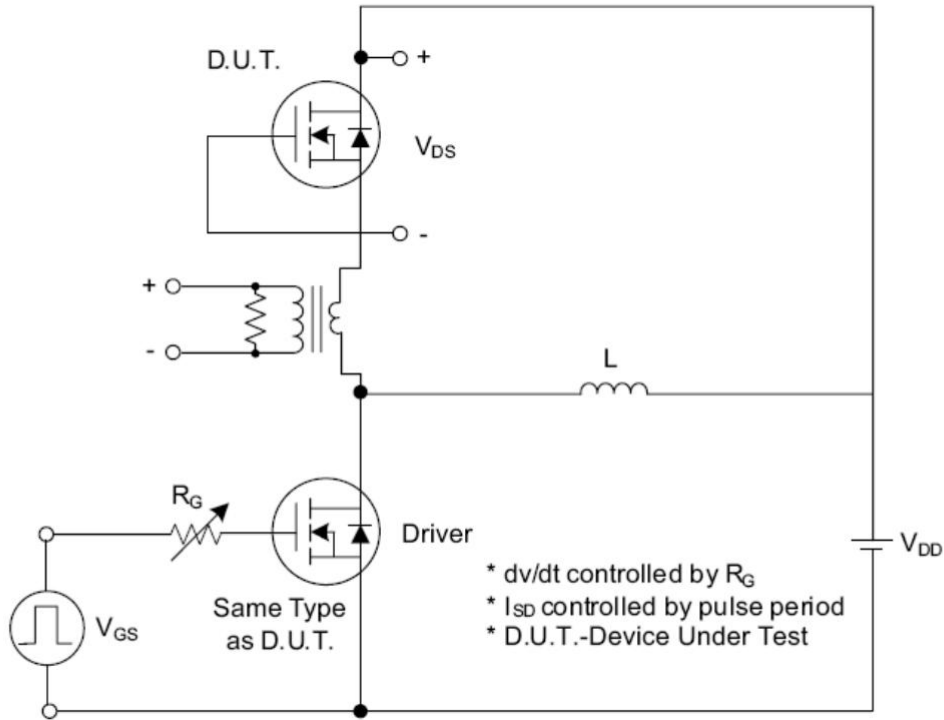


Fig. 1.1 Peak Diode Recovery  $dv/dt$  Test Circuit

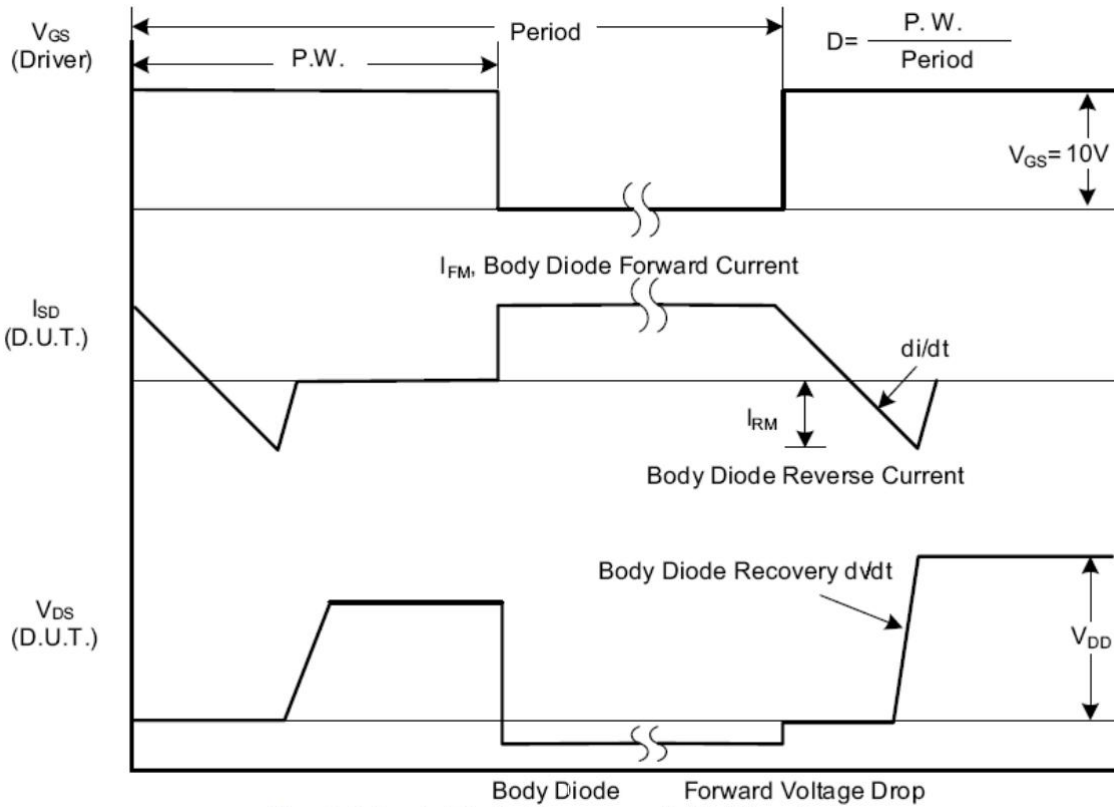


Fig. 1.2 Peak Diode Recovery  $dv/dt$  Waveforms



### Test Circuits and Waveforms (Cont.)

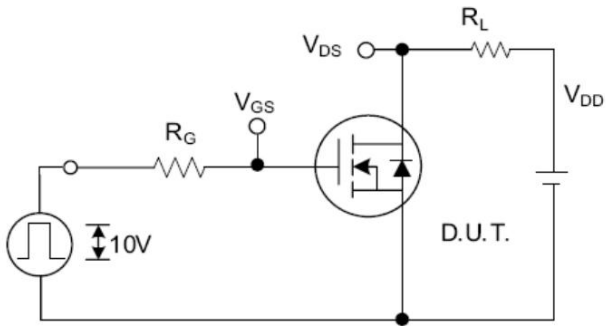


Fig. 2.1 Switching Test Circuit

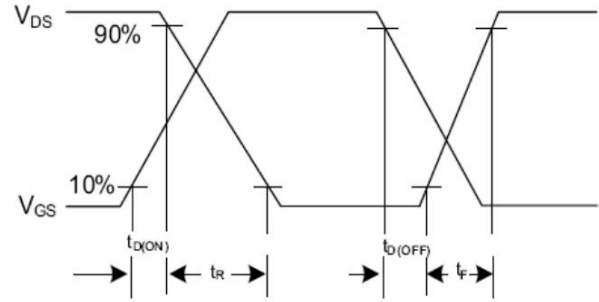


Fig. 2.2 Switching Waveforms

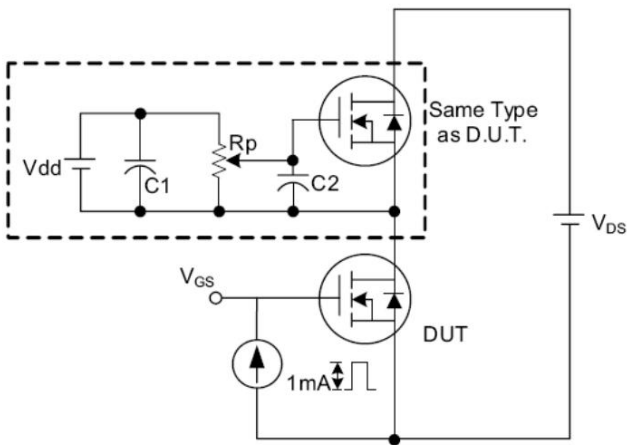


Fig. 3.1 Gate Charge Test Circuit

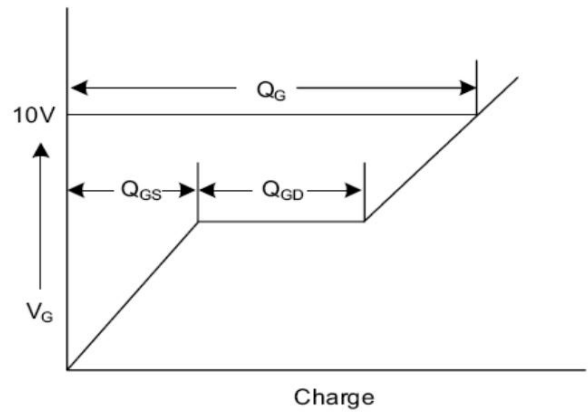


Fig. 3.2 Gate Charge Waveform

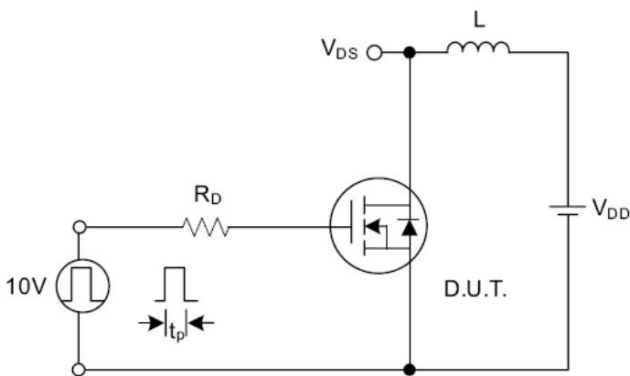


Fig. 4.1 Unclamped Inductive Switching Test Circuit

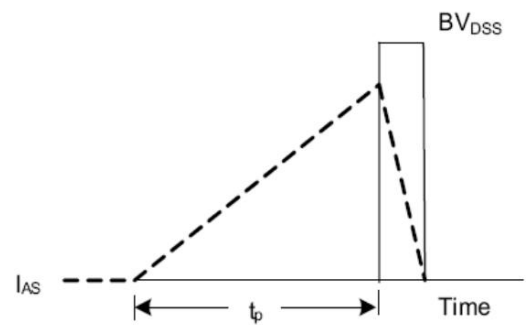
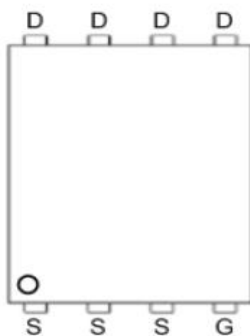
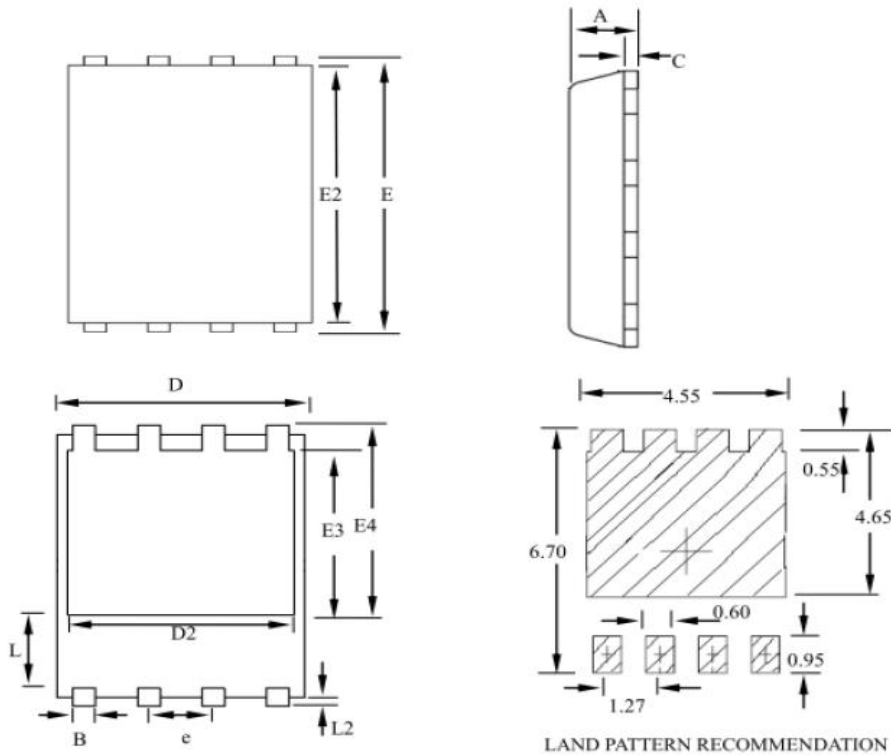


Fig. 4.2 Unclamped Inductive Switching Waveforms



## Ordering Information

Part Number	Package code	Packaging
HSBA30N20	PRPAK5*6	3000/Tape&Reel



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	--