

Features <ul style="list-style-type: none"> ➤ Split Gate Trench MOSFET technology ➤ Excellent package for heat dissipation ➤ High density cell design for low $R_{DS(ON)}$ 	<i>Bvdss</i>	<i>Rdson</i>	<i>ID</i>
	60V	2.4mΩ	125A
Application <ul style="list-style-type: none"> ➤ DC-DC converter ➤ Power management functions ➤ Synchronous-rectification applications 			
Package <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> Marking and pin assignment </div> <div style="text-align: center;"> PDFN5*6 top view </div> <div style="text-align: center;"> Schematic diagram </div> </div>			

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
125N06F	S125N06F	PDFN5*6	5000

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	125	A
Continuous Drain Current	I_D	101	A
	($T_C = 25^\circ\text{C}$)		
	($T_C = 100^\circ\text{C}$)		
Pulsed Drain Current (1)	I_{DM}	641	A
Single Pulsed Avalanche Energy (2)	E_{AS}	189	mJ
Power Dissipation	P_d	113	W
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 ~ 150	$^\circ\text{C}$
Maximum Temperature for Soldering	TL	260	$^\circ\text{C}$



Thermal Resistance Ratings

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	--	1.11	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	--	39.4	$^{\circ}C/W$

Ordering Information

Ordering Number	Package	Pin Assignment			Packing
		G	D	S	
Halogen Free					
HLS125N06F	PDFN5*6	4	5,6,7,8	1,2,3	Tape Reel

Electrical Characteristics ($T_J=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate- Source Forward Leakage	$I_{GSS (F)}$	$V_{GS}=+20V$	-	-	100	nA
Gate- Source Reverse Leakage	$I_{GSS (R)}$	$V_{GS}=-20V$	-	-	-100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	-	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	2.4	2.9	m Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V,$ $F=1.0MHz$	-	4610	6915	pF
Output Capacitance	C_{oss}		-	2188	3282	pF
Reverse Transfer Capacitance	C_{rss}		-	66	132	pF
Gate resistance	R_g		-	0.93	18.8	Ω
Resistive Switching Characteristics						
Turn-on Delay Time	$T_{d(on)}$	$V_{DS}=30V, I_D=40A$ $V_{GS}=10V, R_{GEN}=2.7\Omega$	-	14.13	-	nS
Turn-on Rise Time	t_r		-	63.73	-	nS
Turn-Off Delay Time	$T_{d(off)}$		-	46.8	-	nS
Turn-Off Fall Time	T_f		-	105.07	-	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=40A,$ $V_{GS}=10V$	-	74.37	111.56	nC
Gate-Source Charge	Q_{gs}		-	17.26	-	nC
Gate-Drain Charge	Q_{gd}		-	9.44	18.88	nC
Source-Drain Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=40A$	-	0.83	1.2	V
Diode Forward Current	I_S	$T_C=25^{\circ}C$	-	-	125	A
Reverse Recovery Time	t_{rr}	$I_S=40A$ $di/dt=300A/\mu s$	-	52.78	105.56	nS
Reverse Recovery Charge	Q_{rr}		-	56.31	112.62	nC

Notes:

1. Repetitive rating; pulse width limited by maximum junction temperature
2. $V_{DD}=30V, L=0.3mH, R_g=25\Omega$, Starting $T_J=25^{\circ}C$



Typical Performance Characteristics

Fig 1: Output Characteristics

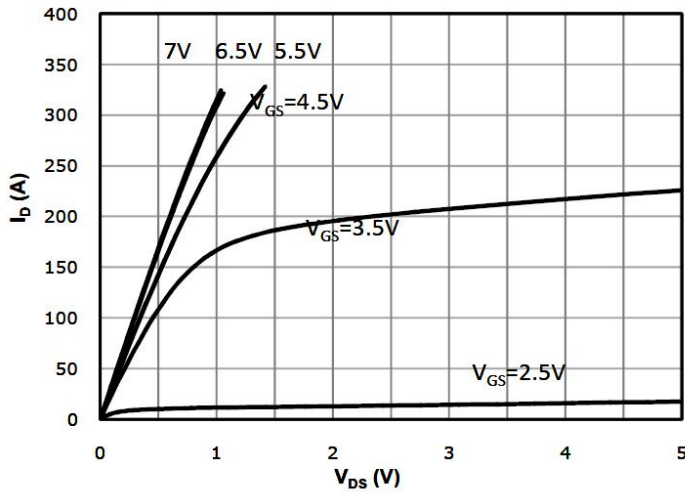


Fig 2: Transfer Characteristics

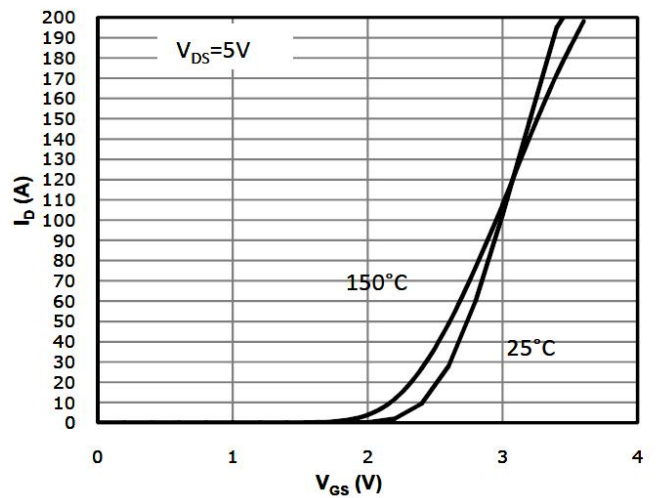


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

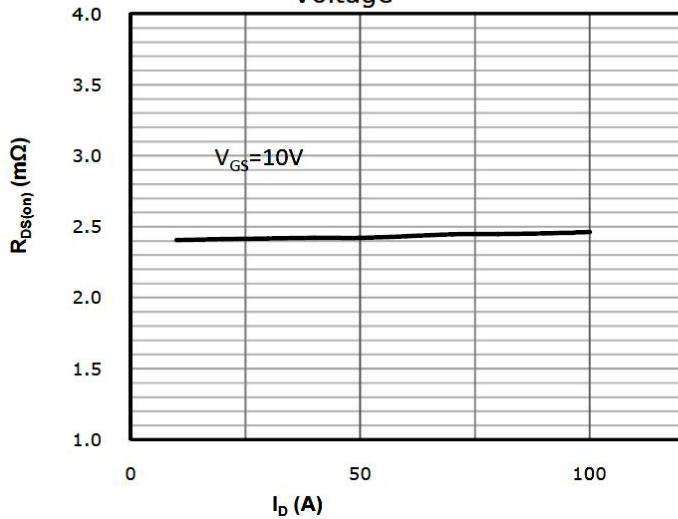


Fig 4: $R_{DS(on)}$ vs Gate Voltage

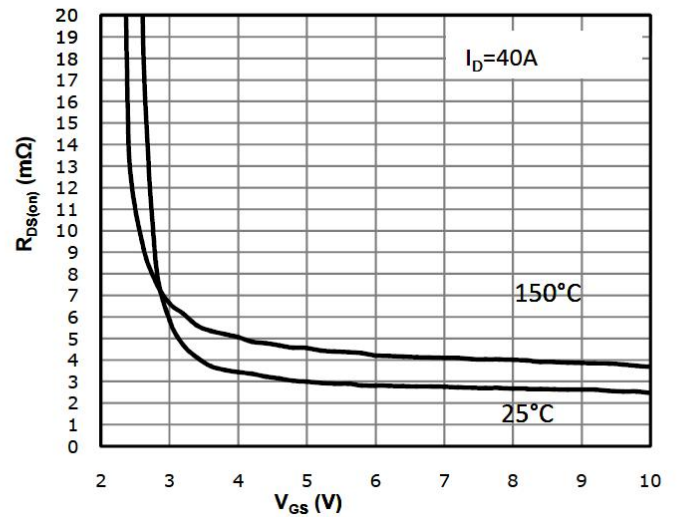


Fig 5: $R_{DS(on)}$ vs. Temperature

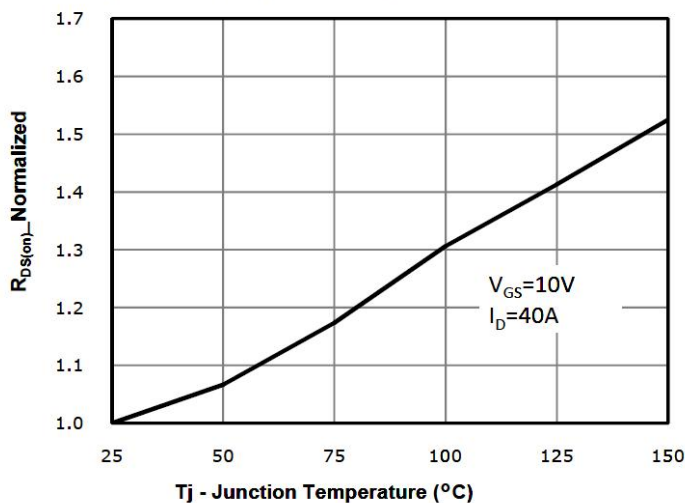


Fig 6: Capacitance Characteristics

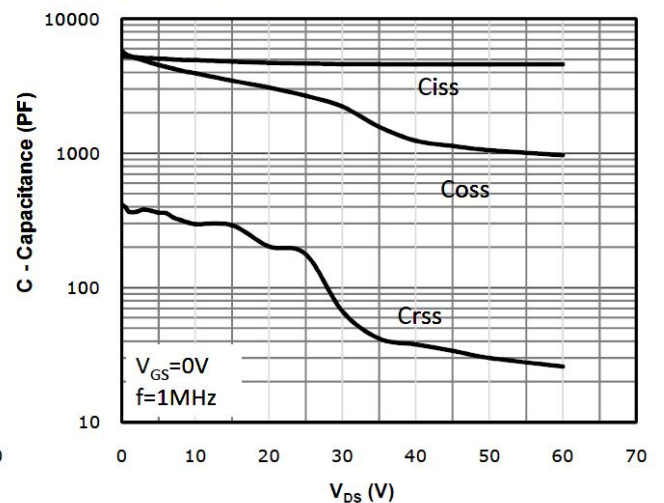




Fig 7: Gate Charge Characteristics

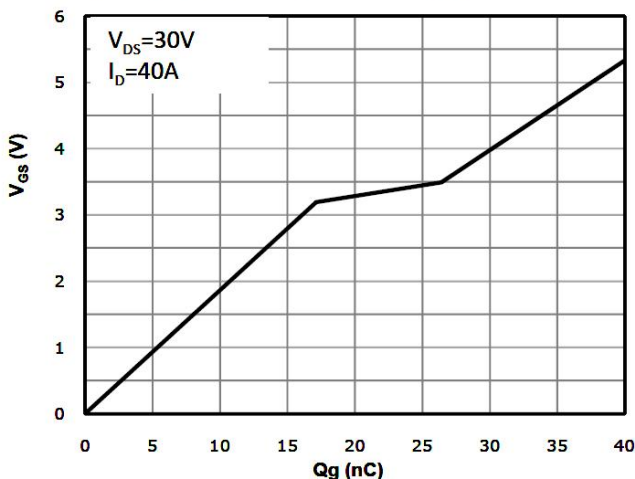


Fig 8: Body-diode Forward Characteristics

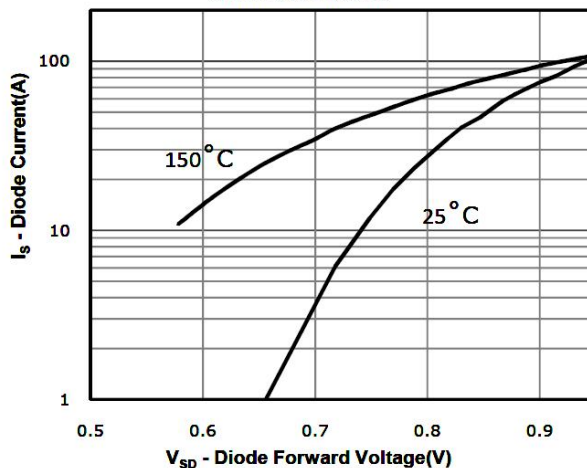


Fig 9: Power Dissipation

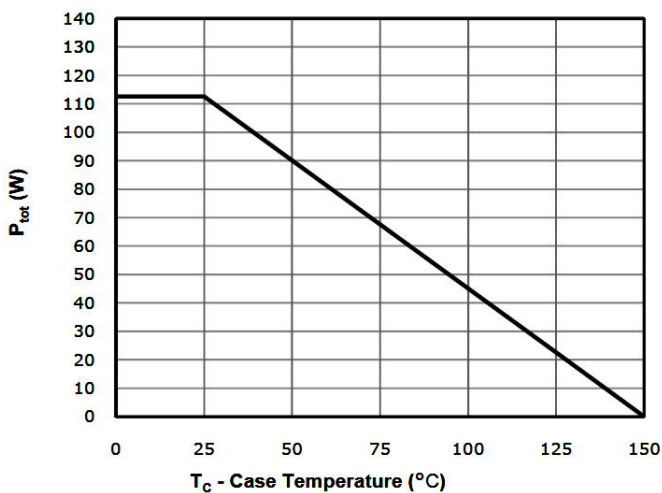


Fig 10: Drain Current Derating

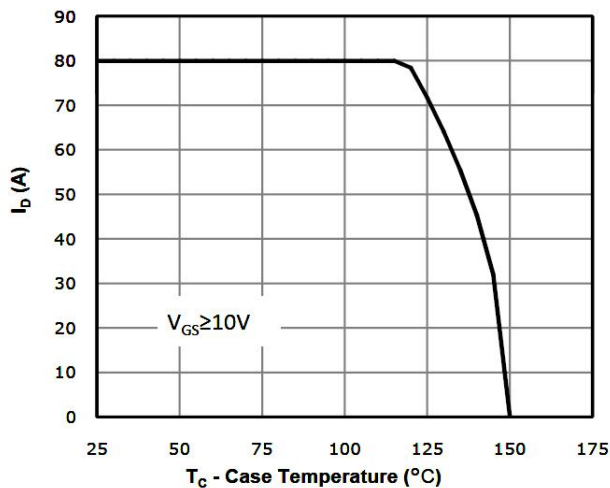


Fig 11: Safe Operating Area

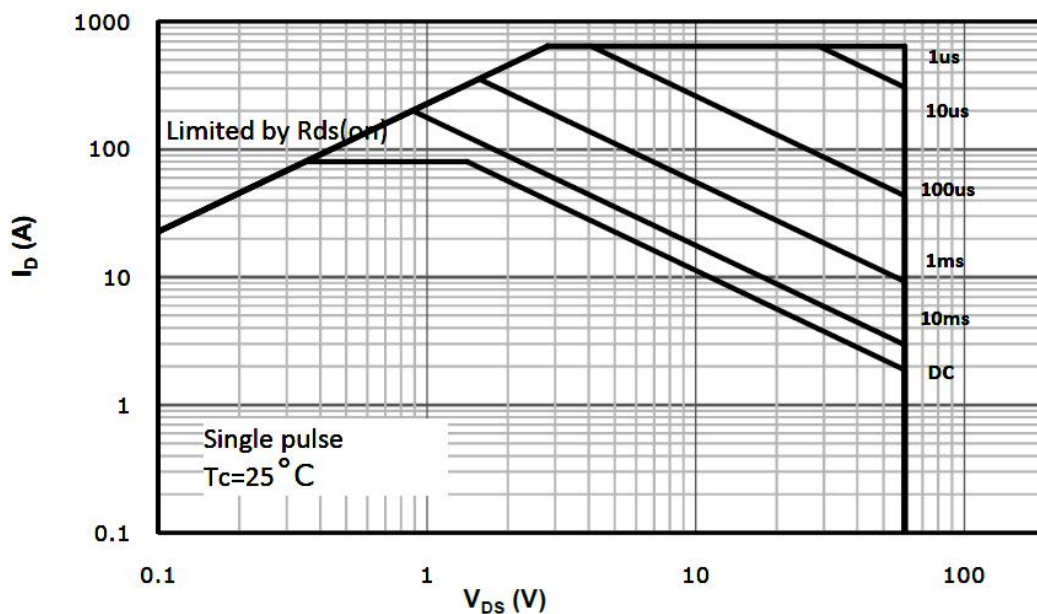
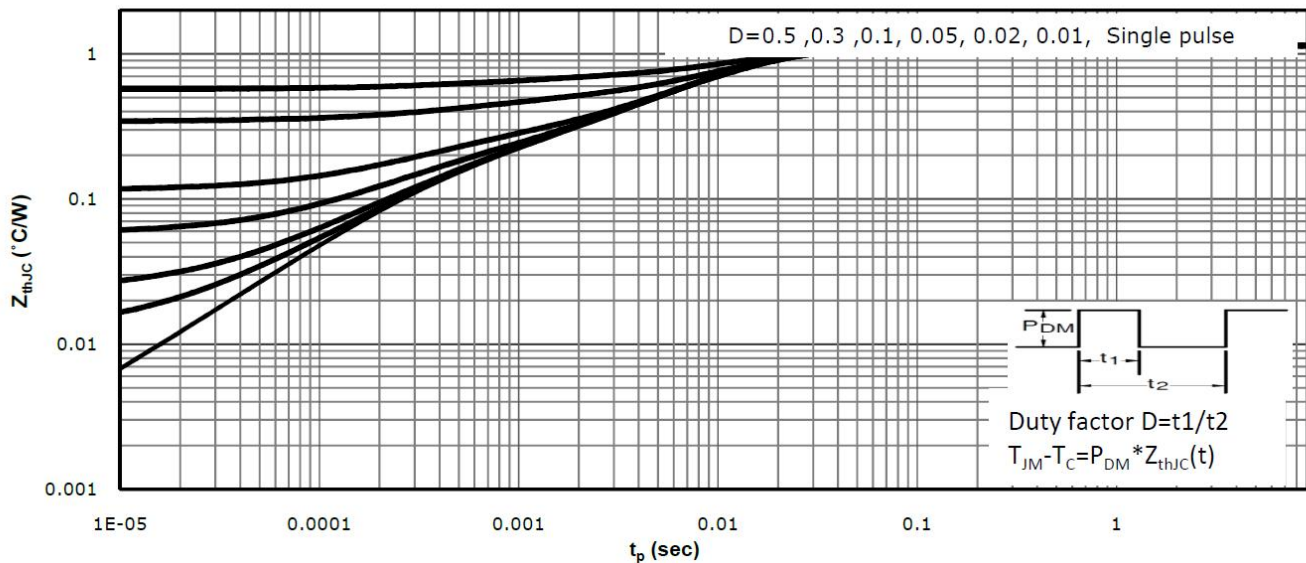
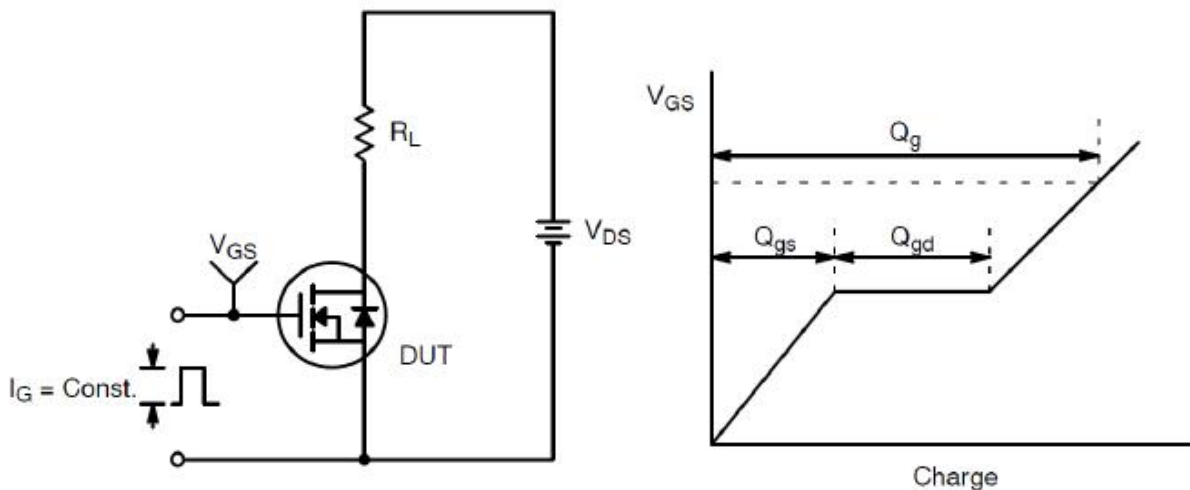


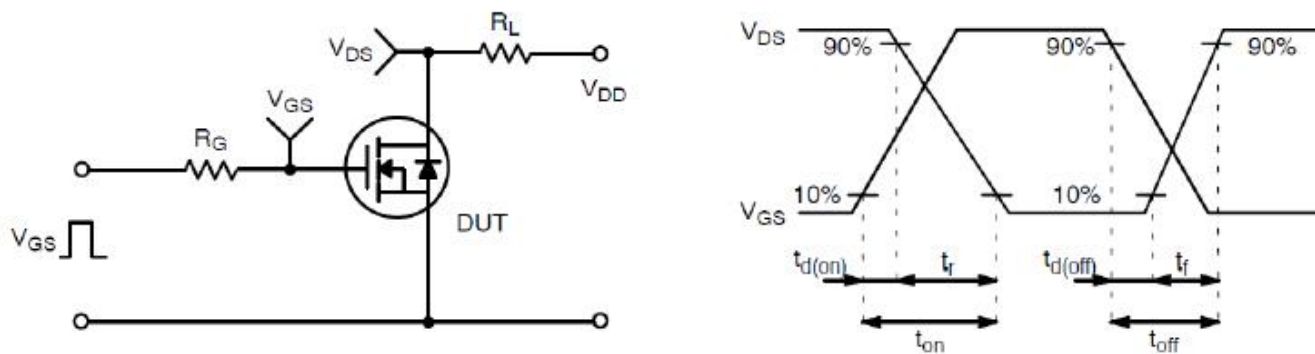
Fig 12: Max. Transient Thermal Impedance



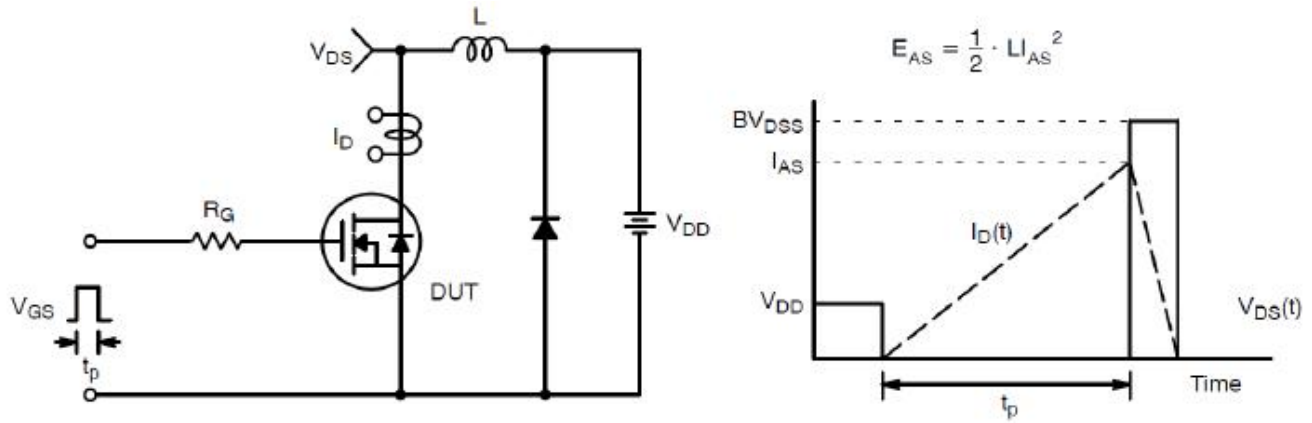
Test Circuit and Waveform



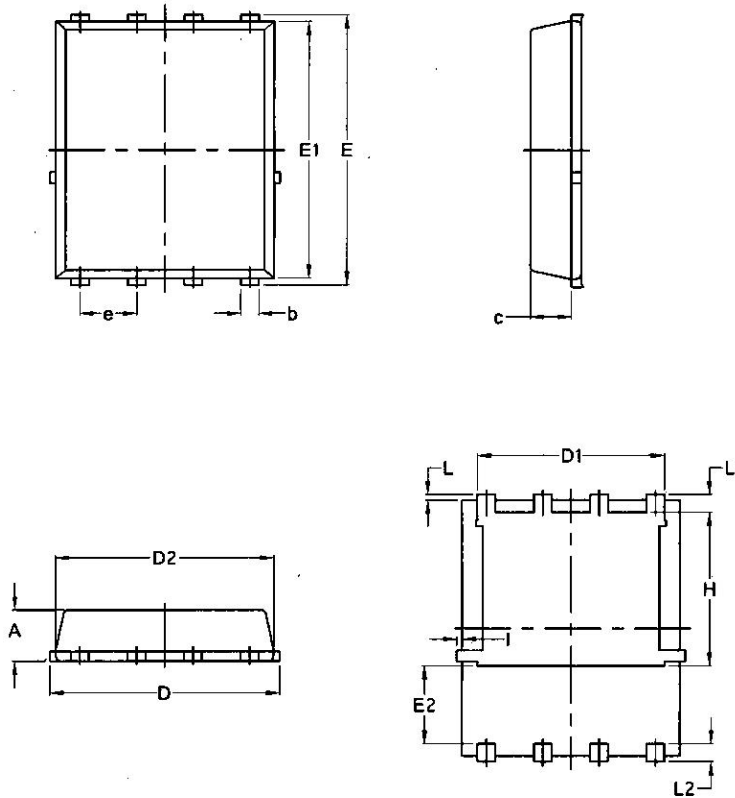
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

Package Dimensions PDFN5x6-8L


Symbol	Common			
	mm		Inch	
	Min	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070



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