

**Features**

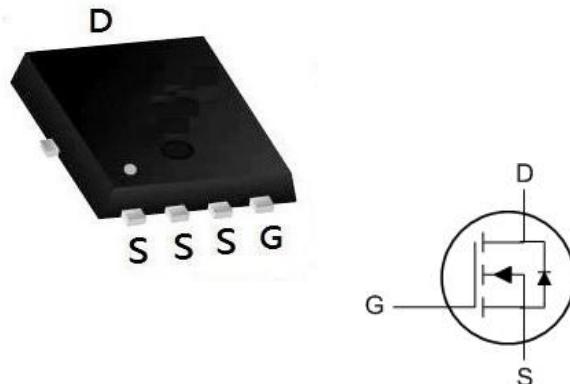
- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$

**Product Summary**

BVDSS	RDS(on)	ID
30V	0.5mΩ	280A

**Applications**

- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

**PDFN5060-8L Pin Configuration****Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1.6}$	280	A
$I_D @ T_c = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1.6}$	177	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	1120	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	1332	mJ
$I_{AS}$	Avalanche Current	---	A
$P_D @ T_c = 25^\circ C$	Total Power Dissipation <sup>4</sup>	166.6	W
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	50	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	0.78	°C/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	$V_{\text{GS}}=0\text{V}$ , $I_D=250\mu\text{A}$	30	---	---	V
$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	$\text{BV}_{\text{DSS}}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	---	---	$\text{V}^\circ\text{C}$
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{\text{GS}}=10\text{V}$ , $I_D=15\text{A}$	---	0.5	0.7	$\text{m}\Omega$
		$V_{\text{GS}}=4.5\text{V}$ , $I_D=5\text{A}$	---	0.7	1	
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{\text{GS}}=V_{\text{DS}}$ , $I_D=-250\mu\text{A}$	1.2	1.6	2.2	V
$\Delta V_{\text{GS(th)}}$	$V_{\text{GS(th)}}$ Temperature Coefficient		---	---	---	$\text{mV}^\circ\text{C}$
$I_{\text{DSS}}$	Drain-Source Leakage Current	$V_{\text{DS}}=30\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $T_J=25^\circ\text{C}$	---	---	1	$\text{uA}$
		$V_{\text{DS}}=30\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $T_J=100^\circ\text{C}$	---	---	100	
$I_{\text{GSS}}$	Gate-Source Leakage Current	$V_{\text{GS}}=\pm 20\text{V}$ , $V_{\text{DS}}=0\text{V}$	---	---	$\pm 100$	nA
$g_{\text{fs}}$	Forward Transconductance	$V_{\text{DS}}=10\text{V}$ , $I_D=15\text{A}$	---	130	---	S
$R_g$	Gate Resistance	$V_{\text{DS}}=0\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $f=1\text{MHz}$	---	1.35	---	$\Omega$
$Q_g$	Total Gate Charge	$V_{\text{DS}}=15\text{V}$ , $V_{\text{GS}}=10\text{V}$ , $I_D=15\text{A}$	---	147.4	---	$\text{nC}$
$Q_{\text{gs}}$	Gate-Source Charge		---	25.2	---	
$Q_{\text{gd}}$	Gate-Drain Charge		---	18	---	
$T_{\text{d(on)}}$	Turn-On Delay Time	$V_{\text{GS}}=10\text{V}$ , $V_{\text{DD}}=15\text{V}$ , $R_G=3\Omega$ , $I_D=15\text{A}$	---	12	---	$\text{ns}$
$T_r$	Rise Time		---	12.5	---	
$T_{\text{d(off)}}$	Turn-Off Delay Time		---	85	---	
$T_f$	Fall Time		---	39	---	
$C_{\text{iss}}$	Input Capacitance	$V_{\text{DS}}=15\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $f=1\text{MHz}$	---	7304	---	$\text{pF}$
$C_{\text{oss}}$	Output Capacitance		---	2688	---	
$C_{\text{rss}}$	Reverse Transfer Capacitance		---	240	---	

## Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_s$	Continuous Source Current <sup>1,4</sup>	$V_G=V_D=0\text{V}$ , Force Current	---	---	280	A
$V_{\text{SD}}$	Diode Forward Voltage <sup>2</sup>	$V_{\text{GS}}=0\text{V}$ , $I_s=15\text{A}$ , $T_J=25^\circ\text{C}$	---	---	1.2	V
$t_{\text{rr}}$	Reverse Recovery Time	$IF=15\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$ , $T_J=25^\circ\text{C}$	---	120	---	nS
			---	60	---	nC

Notes:

- Repetitive rating, pulse width limited by junction temperature  $T_{J(\text{MAX})}=150^\circ\text{C}$ .
- The test condition is  $V_{\text{DD}}=40\text{V}$ ,  $V_{\text{GS}}=10\text{V}$ ,  $L=0.5\text{mH}$ ,  $I_{\text{AS}}=73\text{A}$ .
- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
- The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- This value is guaranteed by design hence it is not included in the production test..

## Typical Characteristics

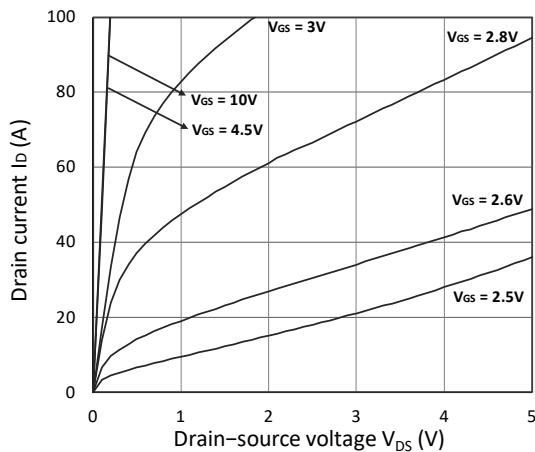


Figure 1. Output Characteristics

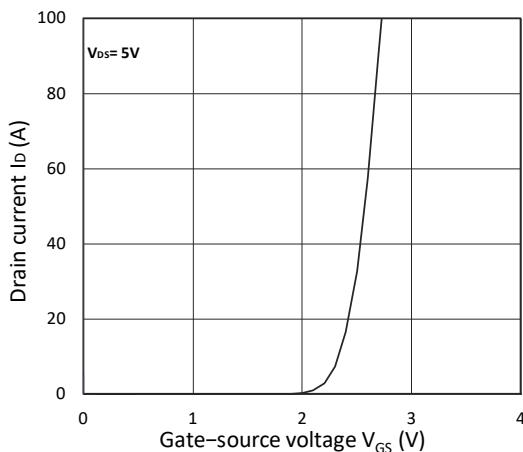


Figure 2. Transfer Characteristics

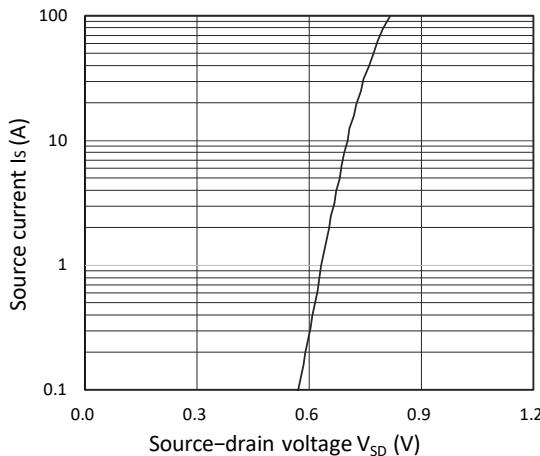


Figure 3. Forward Characteristics of Reverse

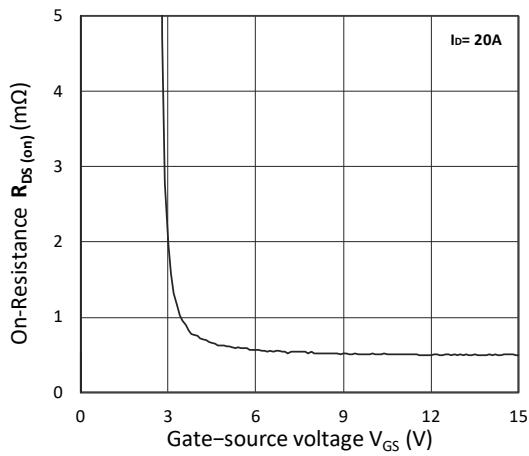


Figure 4.  $R_{DS(on)}$  vs.  $V_{GS}$

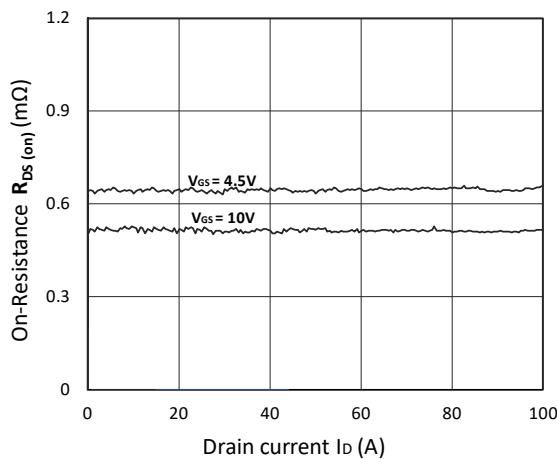


Figure 5.  $R_{DS(on)}$  vs.  $I_D$

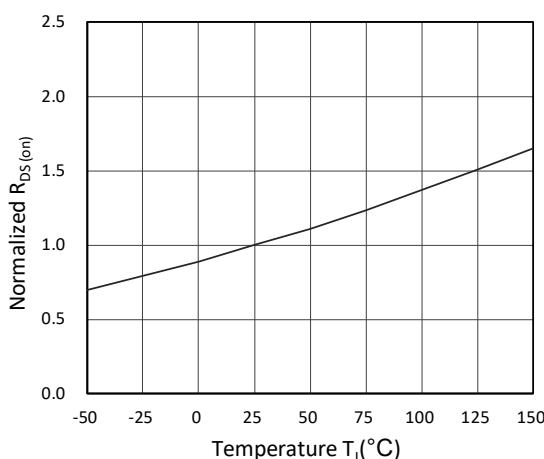


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

## N-Ch 30V Fast Switching MOSFETs

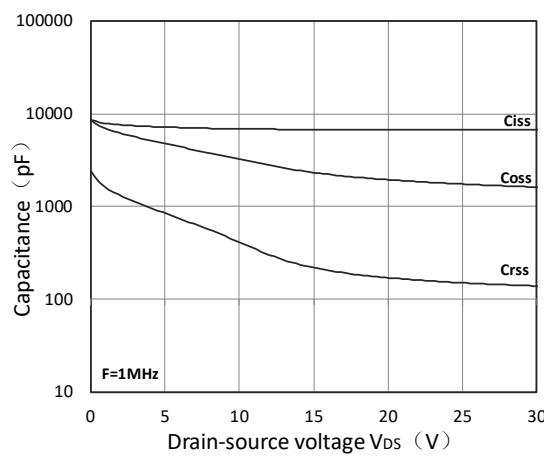


Figure 7. Capacitance Characteristics

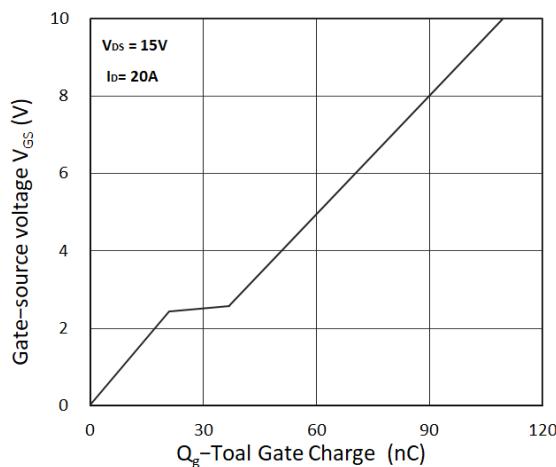


Figure 8. Gate Charge Characteristics

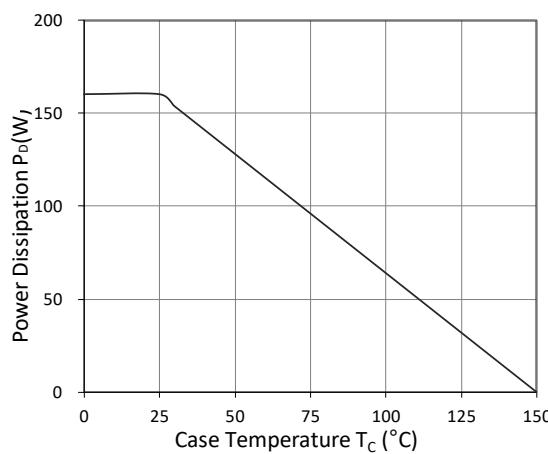


Figure 9. Power Dissipation

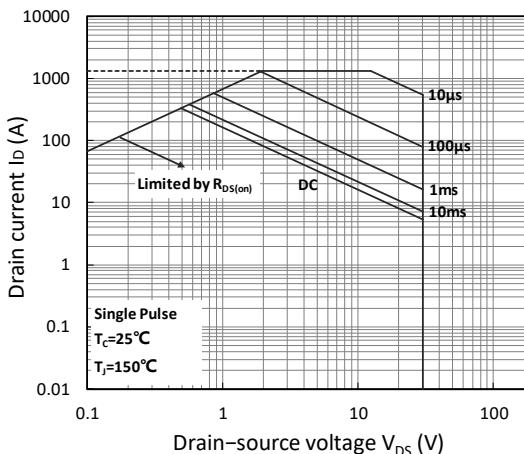


Figure 10. Safe Operating Area

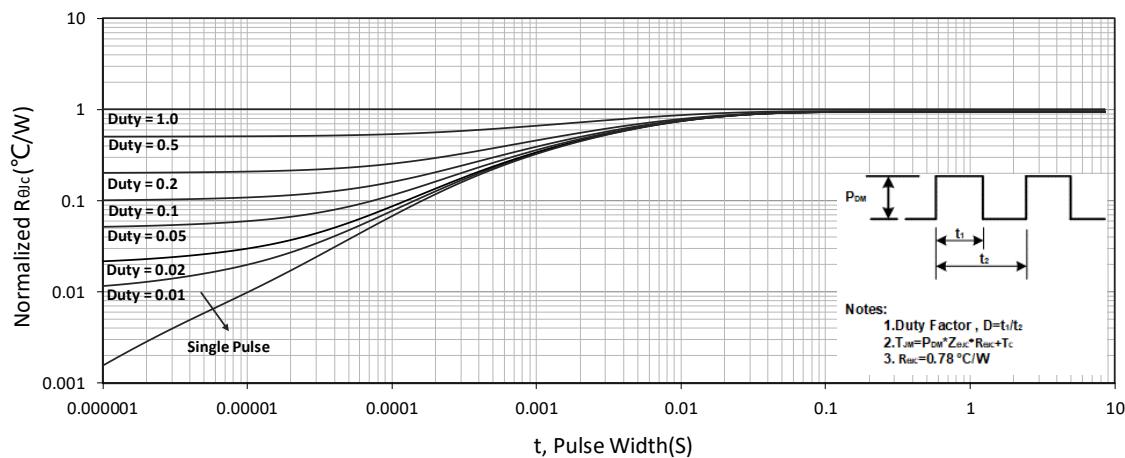
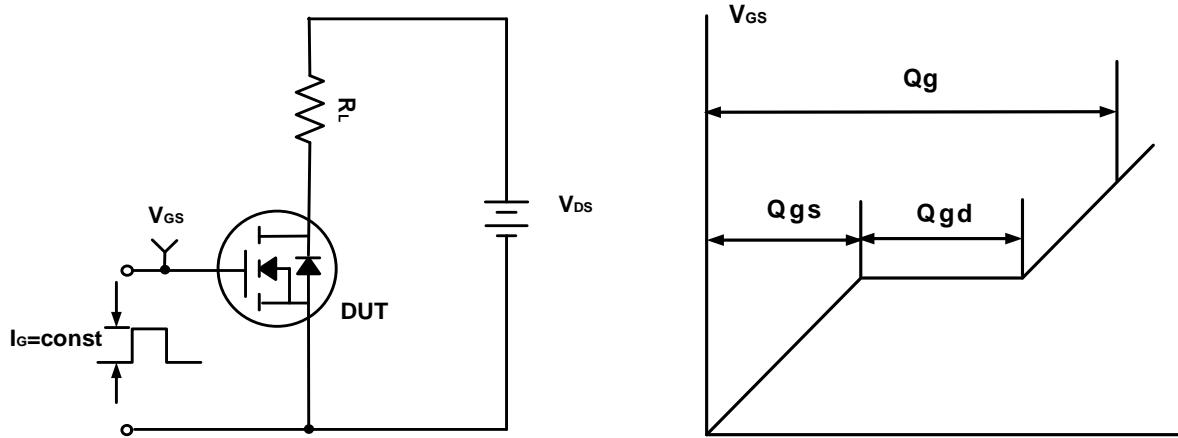
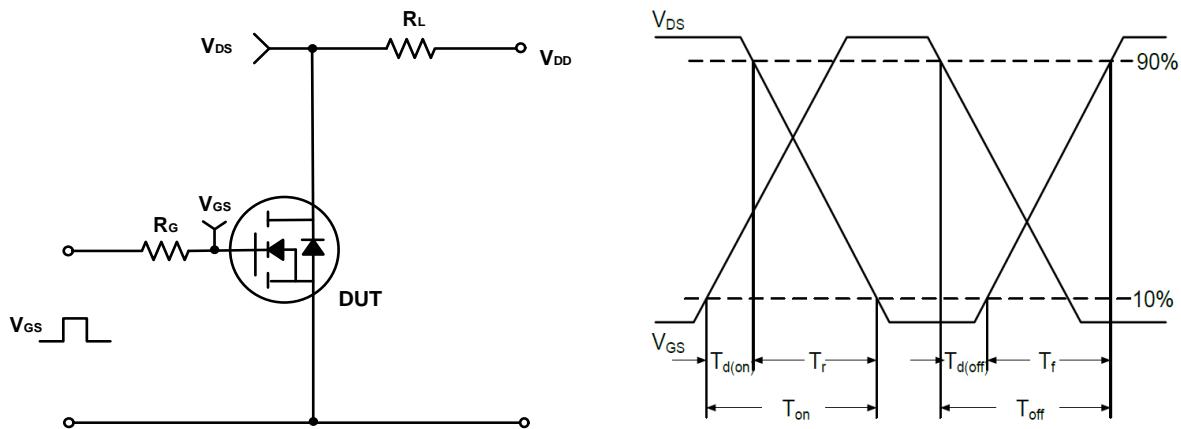
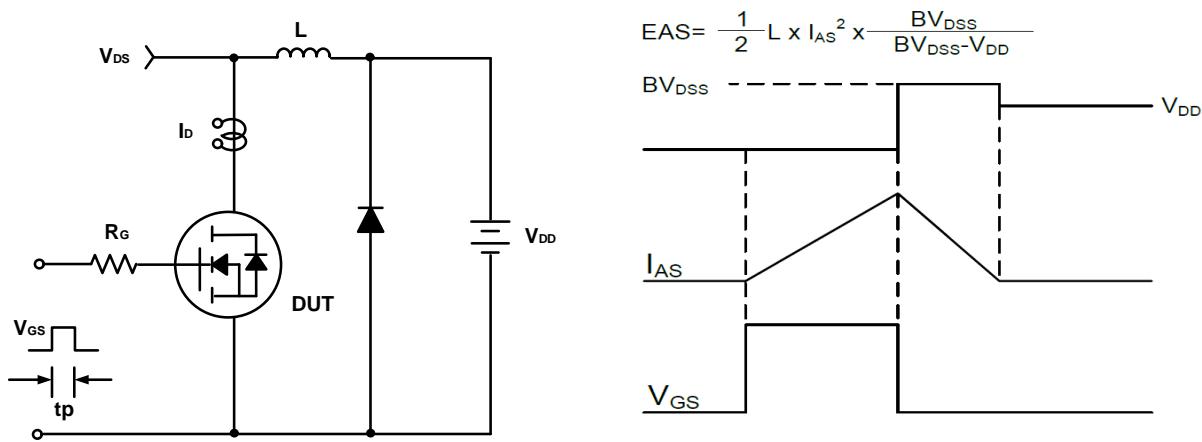
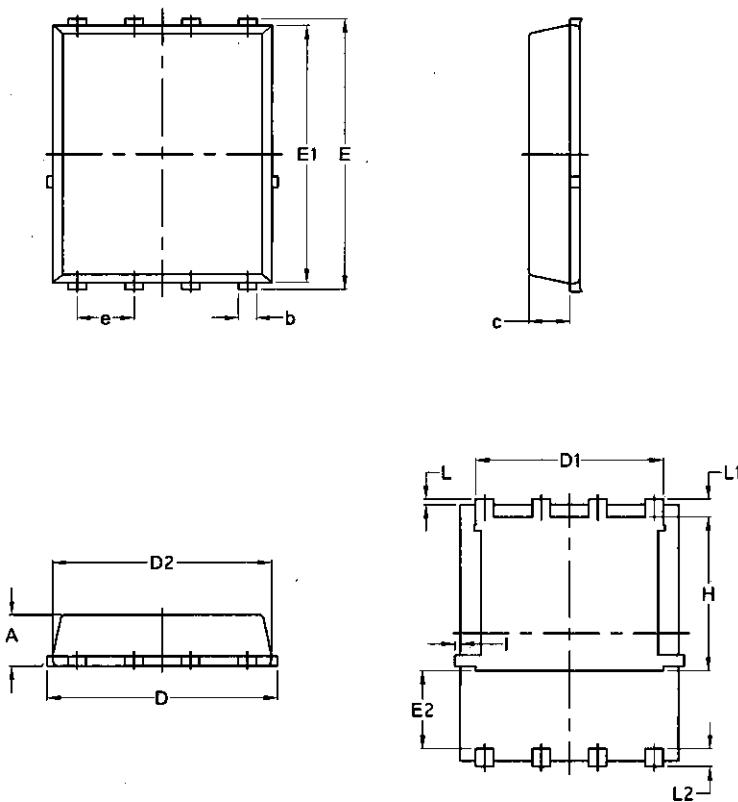


Figure 11. Normalized Maximum Transient Thermal Impedance

**Test Circuit****Figure A. Gate Charge Test Circuit & Waveforms****Figure B. Switching Test Circuit & Waveforms****Figure C. Unclamped Inductive Switching Circuit & Waveforms**

## Package Mechanical Data-PDFN5060-8L-Single



Symbol	Common			
	mm		Inch	
	Mim	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