


**Features**

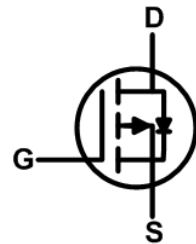
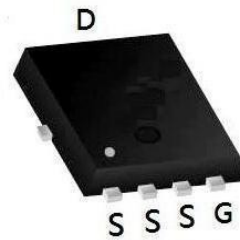
- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$

**Product Summary**

BVDSS	RDSON	ID
-60V	19mΩ	-40A

**Applications**

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

**PDFN5060-8L Pin Configuration**

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

Symbol	Parameter		Value	Units
$V_{DSS}$	Drain-to-Source Voltage		-60	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	-40	A
	Continuous Drain Current	$T_C = 100^\circ\text{C}$	-25	A
$I_{DM}^{a1}$	Pulsed Drain Current		-150	A
$V_{GS}$	Gate-to-Source Voltage		$\pm 20$	V
$P_D$	Power Dissipation		95	W
$E_{AS}^{a2}$	Single pulse avalanche energy		200	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range		150, -55 to 150	$^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering		260	$^\circ\text{C}$

**Thermal Characteristics**

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.32	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	60	$^\circ\text{C}/\text{W}$

**P-Ch 60V Fast Switching MOSFETs**
**Electrical Characteristics** ( $T_J = 25^\circ\text{C}$  unless otherwise specified):

<b>Static Characteristics</b>						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$V_{DSS}$	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-60	--	--	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS} = -60V, V_{GS}= 0V$	--	--	1	$\mu A$
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS} = -20V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS} = +20V$	--	--	-100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.3	-1.8	-2.3	V
$R_{DS(ON)1}$	Drain-to-Source Resistance	On- $V_{GS}=-10V, I_D=-10A$	--	19.0	24.0	$m\Omega$
$R_{DS(ON)2}$	Drain-to-Source Resistance	On- $V_{GS}=-4.5V, I_D=-8A$	--	24.5	31	$m\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=-5V, I_D=-5A$	--	20	--	S

<b>Dynamic Characteristics</b>						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{GS}=0V$ $V_{DS}=-30V$ $f=1.0MHz$	--	1500	--	pF
$C_{oss}$	Output Capacitance		--	248	--	
$C_{rss}$	Reverse Transfer Capacitance		--	12	--	
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}$ Open	--	8.0	--	$\Omega$

<b>Resistive Switching Characteristics</b>						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=-10A, R_L=3.0\Omega$ $V_{DS}= -30V$ $V_{GS}= -10V$ $R_G= 3\Omega$	--	15	--	ns
$t_r$	Rise Time		--	17	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	40	--	
$t_f$	Fall Time		--	45	--	
$Q_g$	Total Gate Charge	$V_{GS}=-10V$ $V_{DS}=-30V$ $I_D=-10A$	--	22	--	nC
$Q_{gs}$	Gate Source Charge		--	3.7	--	
$Q_{gd}$	Gate Drain Charge		--	3	--	

<b>Source-Drain Diode Characteristics</b>						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$I_S$	Diode Forward Current	$T_C=25^\circ C$	--	--	-40	A
$I_{SM}$	Diode Pulse Current		--	--	-150	A
$V_{SD}$	Diode Forward Voltage	$I_S=-5.0A, V_{GS}=0V$	--	--	-1.2	V

**P-Ch 60V Fast Switching MOSFETs**

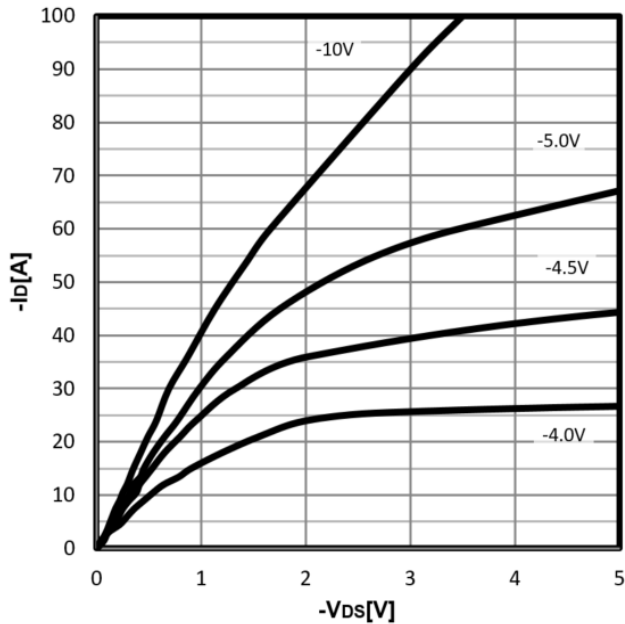
$t_{rr}$	Reverse Recovery time	$I_S=-10A, V_{DD}=-30V$ $dI/dt=100A/\mu s$	--	60	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	105	--	nC

<sup>a1</sup>: Repetitive rating; pulse width limited by maximum junction temperature

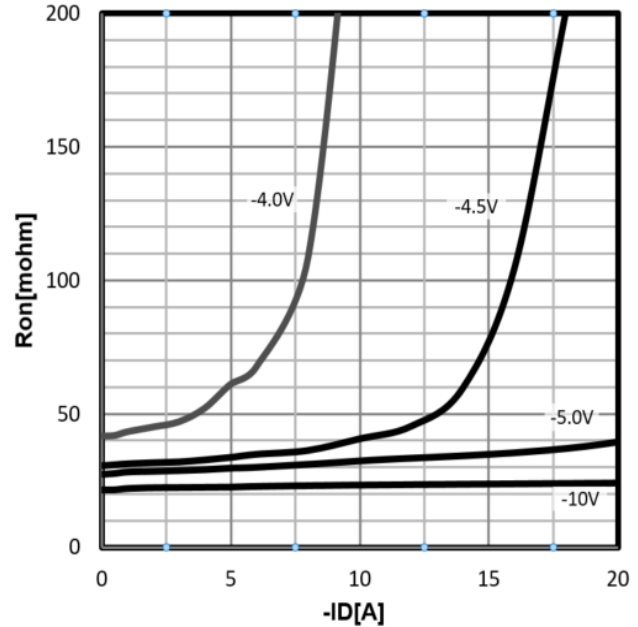
<sup>a2</sup>:  $V_{DD} = -30V$ ,  $L=1.0mH$ ,  $R_G = 25\Omega$ , Starting  $T_j=25^\circ C$

**Characteristics Curve:**

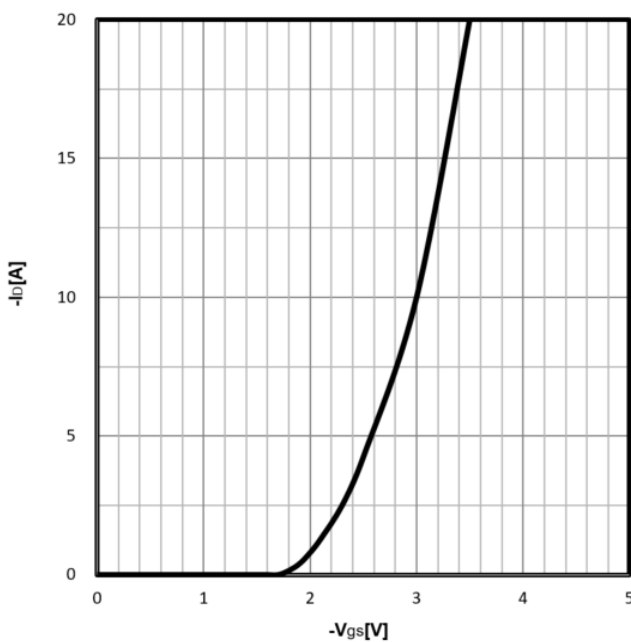
**Typ. output characteristics**  
 $-I_D = f(-V_{DS})$



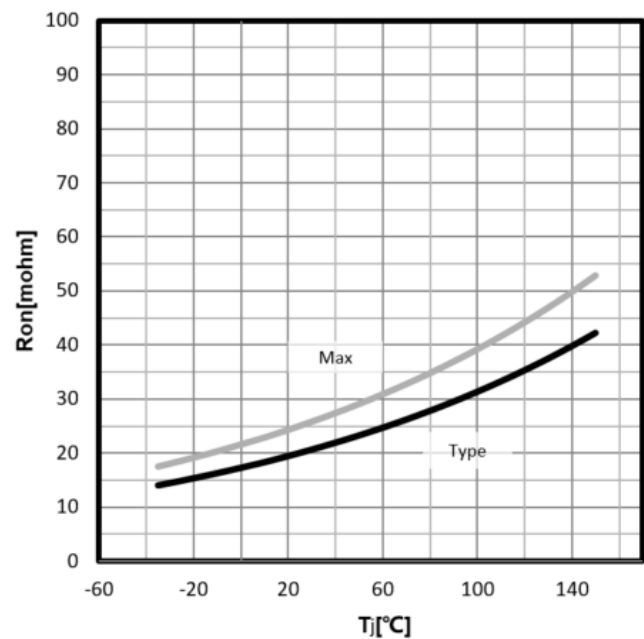
**Typ. drain-source on resistance**  
 $R_{DS(on)} = f(-I_D)$



**Typ. transfer characteristics**  
 $-I_D = f(-V_{GS})$

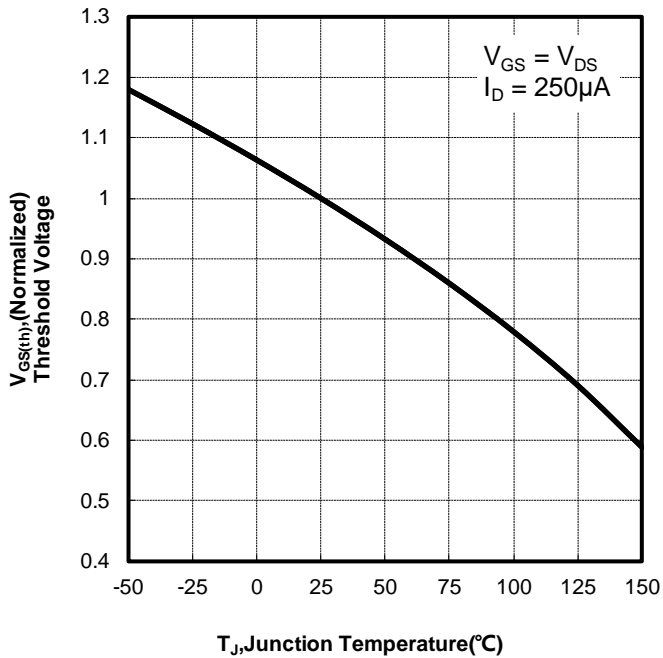


**Drain-source on-state resistance**  
 $R_{DS(on)} = f(T_j); I_D = -10A; V_{GS} = -10V$



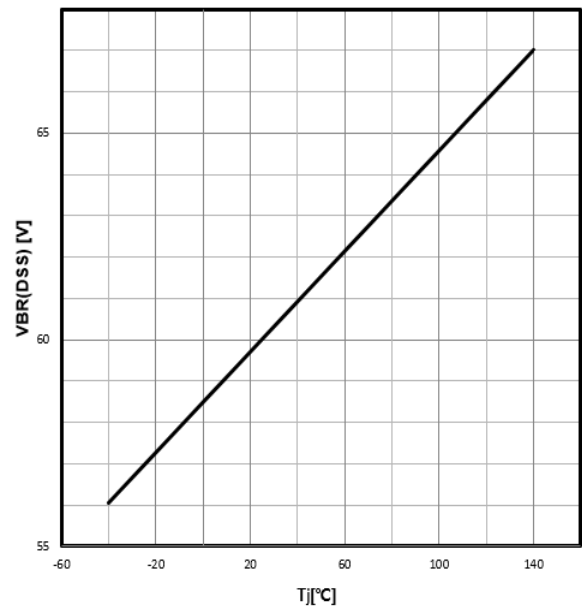
**Gate Threshold Voltage**

$-V_{TH}=f(T_j); I_D=-250\mu A$

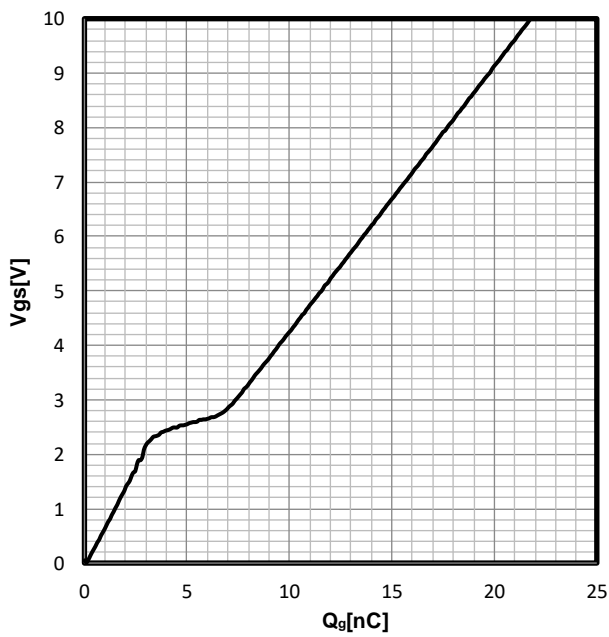


**Drain-source breakdown voltage**

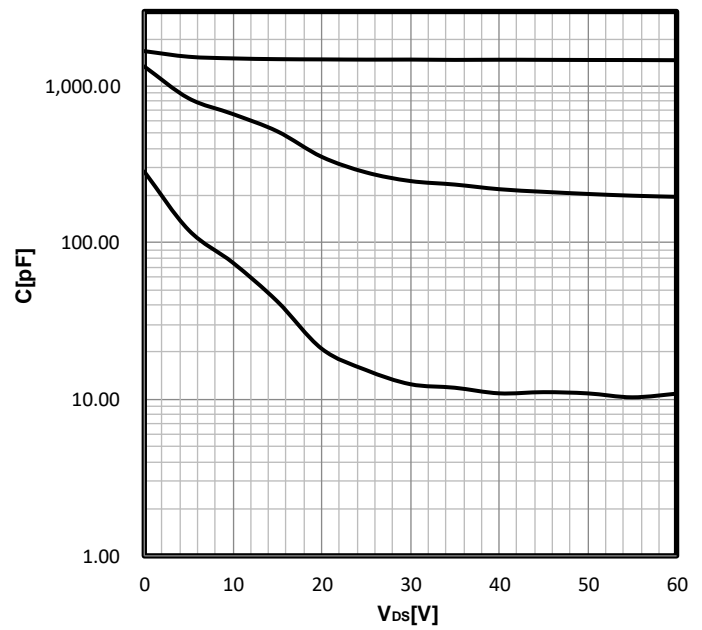
$-V_{BR(DSS)}=f(T_j); I_D=-250\mu A$



**Typ. gate charge**  
 $V_{GS}=f(Q_{gate}); I_D=-5A$

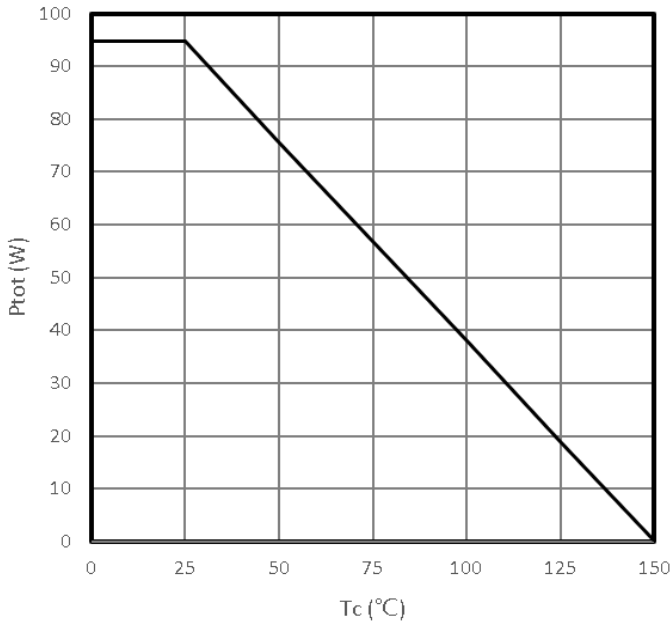


**Typ. Capacitances**  
 $C=f(-V_{DS}); V_{GS}=0V; f=1MHz$



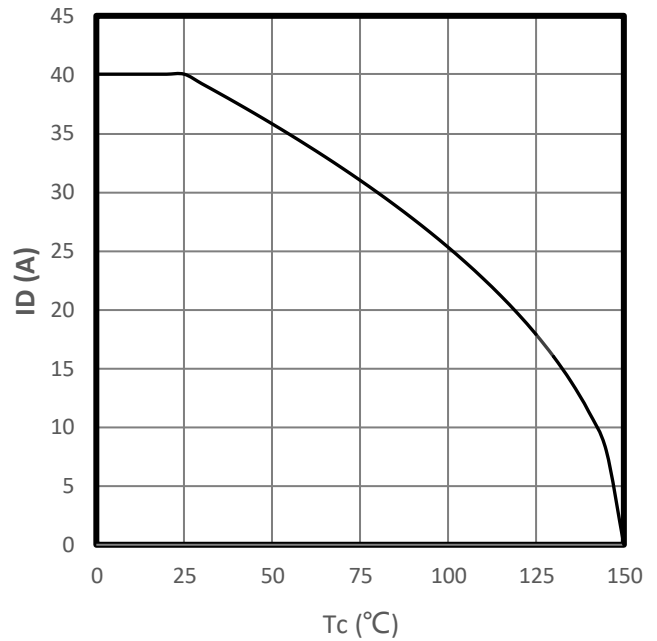
**Power Dissipation**

$P_{tot}=f(T_c)$



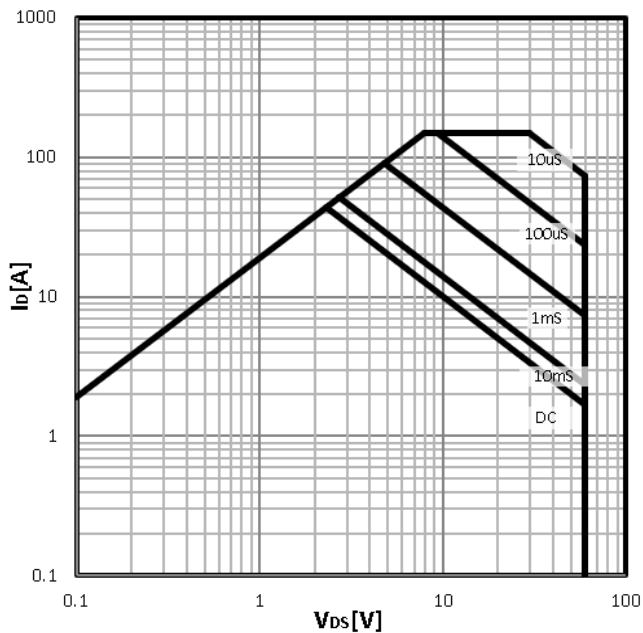
**Maximum Drain Current**

$-I_D=f(T_c)$



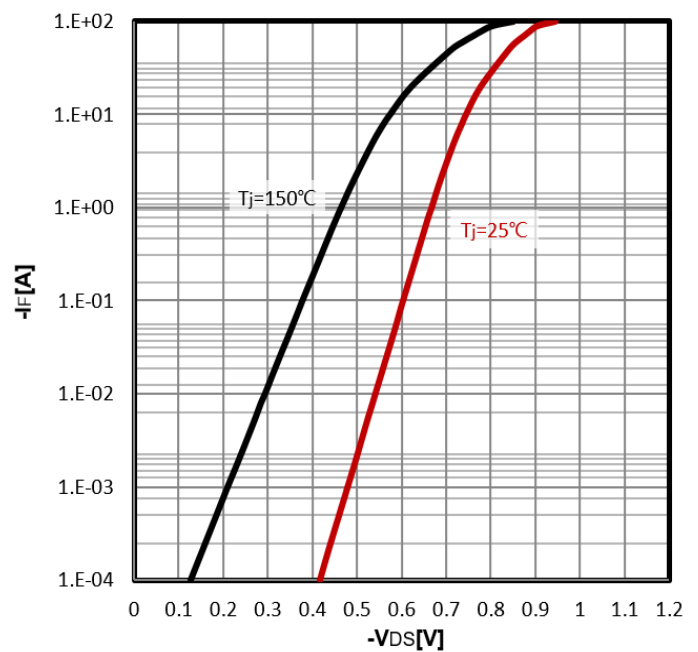
**Safe operating area**

$-I_D=f(-V_{DS})$



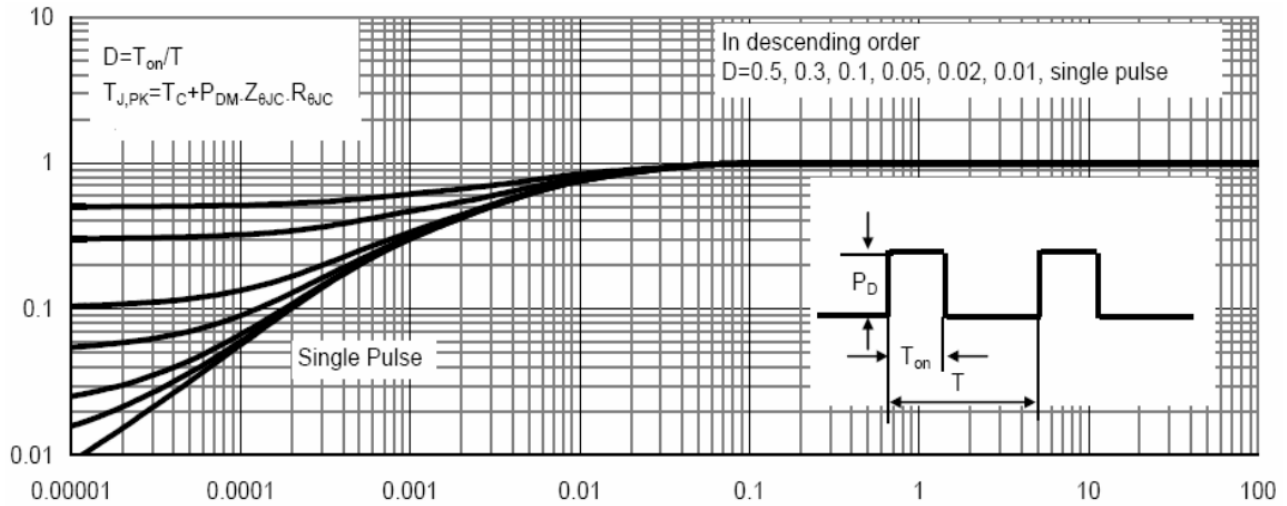
**Body Diode Forward Voltage Variation**

$-I_F=f(-V_{DS})$

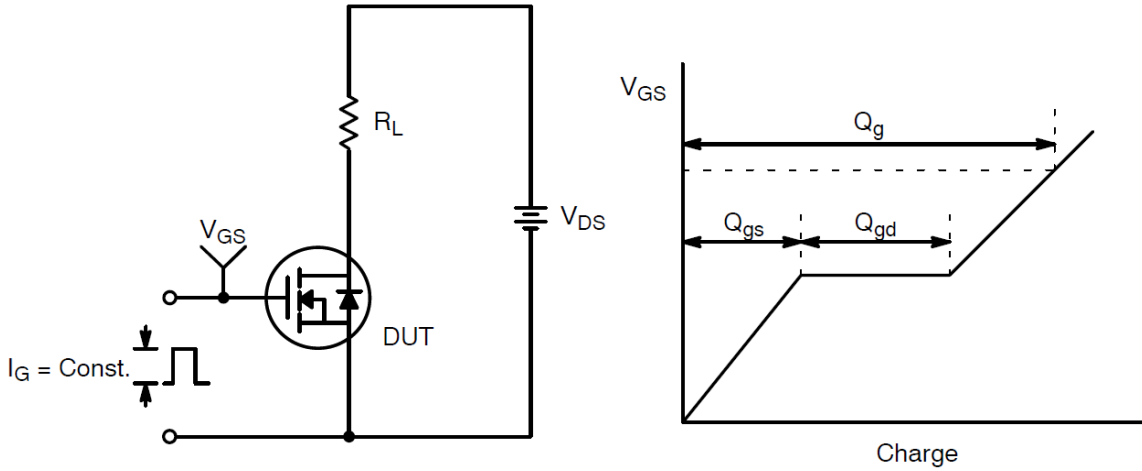


**Max. transient thermal impedance**

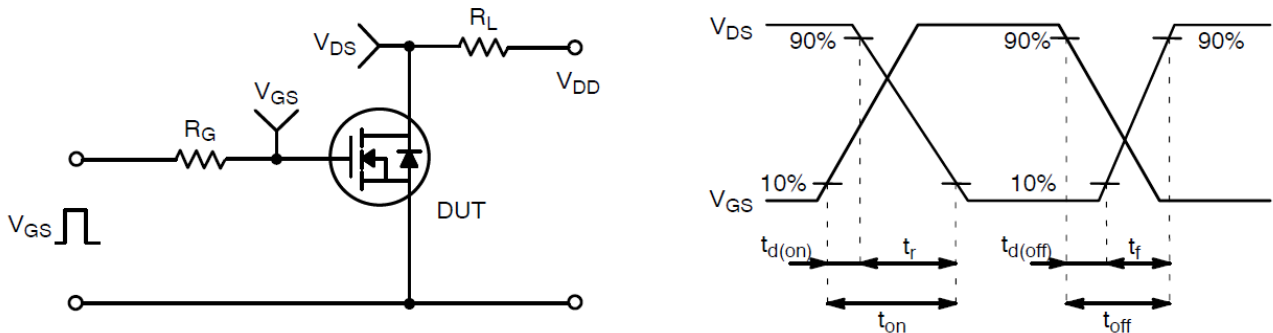
$$Z_{thJC} = f(t_p)$$



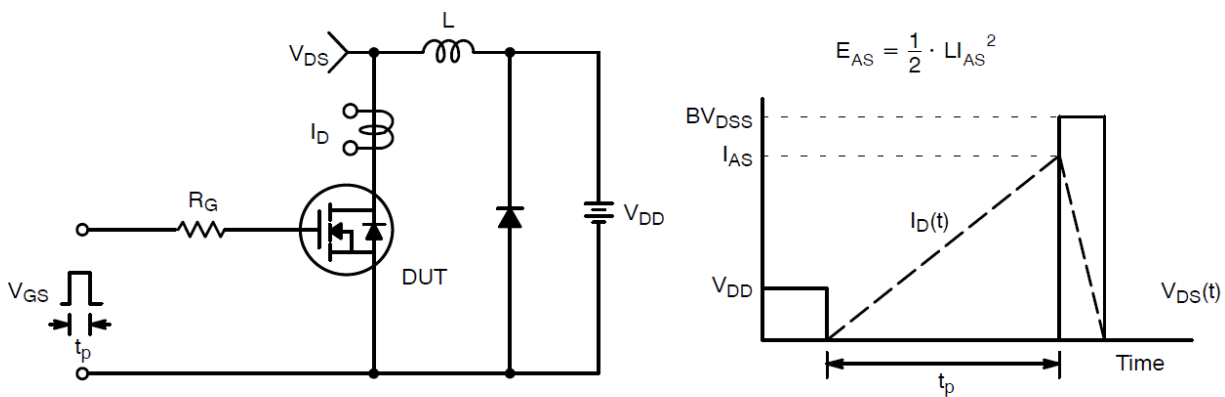
**Test Circuit and Waveform:**



**Gate Charge Test Circuit & Waveform**

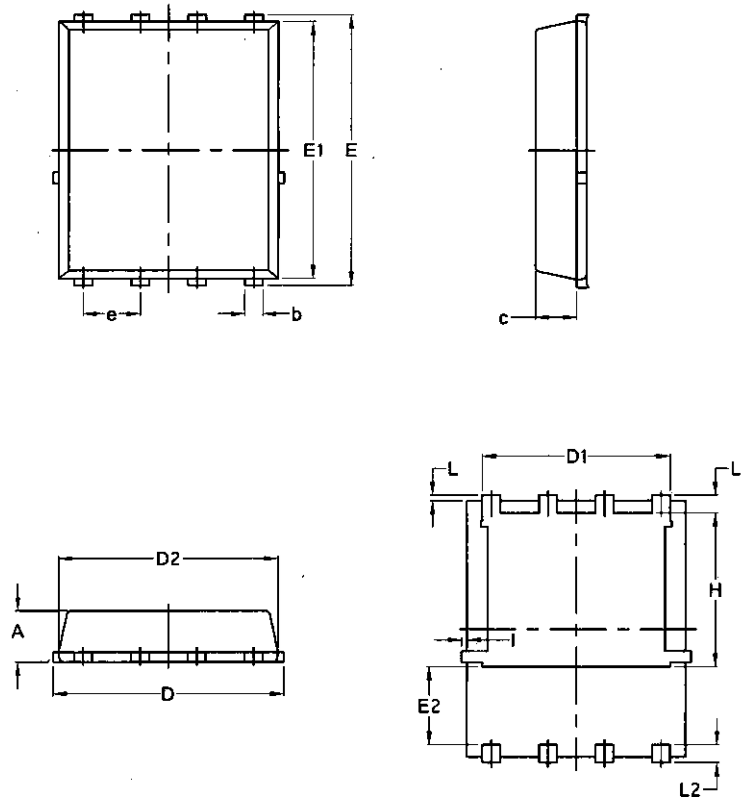


**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**



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


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