

N-Ch 120V Fast Switching MOSFETs

Features

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

Applications

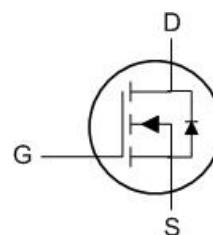
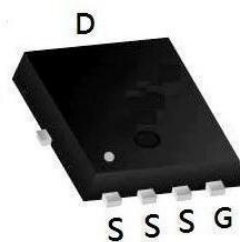
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary



BVDSS	RDSON	ID
120V	6.0mΩ	100A

PDFN5060-8L Pin Configuration



Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		120	V
I_D	Continuous Drain Current	$T_C = 25\text{ }^{\circ}\text{C}$	100	A
	Continuous Drain Current	$T_C = 100\text{ }^{\circ}\text{C}$	69	A
I_{DM}^{a1}	Pulsed Drain Current		500	A
E_{AS}^{a2}	Single pulse avalanche energy		326	mJ
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		227	W
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	0.55	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	60	$^{\circ}\text{C/W}$

Electrical Characteristics (T_c= 25°C unless otherwise specified) :

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V _{DSS}	Drain to Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	120	--	--	V
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 120V, V _{GS} = 0V	--	--	1	μA
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 = 250μA	2.5	3	3.5	V
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =20A	--	6	7.5	mΩ

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 60V f = 1.0MHz	--	3614	--	pF
C _{oss}	Output Capacitance		--	423	--	
C _{rss}	Reverse Transfer Capacitance		--	12	--	
R _g	Gate resistance		--	0.84	--	Ω

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =20A V _{DS} = 60V V _{GS} = 10V R _G = 5Ω	--	20	--	ns
t _r	Rise Time		--	65	--	
t _{d(OFF)}	Turn-Off Delay Time		--	32	--	
t _f	Fall Time		--	49	--	
Q _g	Total Gate Charge	V _{GS} =0~10V V _{DS} = 90V I _D =20A	--	60.8	--	nC
Q _{gs}	Gate Source Charge		--	18.8	--	
Q _{gd}	Gate Drain Charge		--	14.7	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I _S	Diode Forward Current	T _C =25 °C	--	--	100	A
V _{SD}	Diode Forward Voltage	I _S =20A, V _{GS} =0V	--	0.83	1.2	V
t _{rr}	Reverse Recovery time	I _S =40A, dI/dt=100A/μs	--	70	--	ns
Q _{rr}	Reverse Recovery Charge		--	129	--	nC

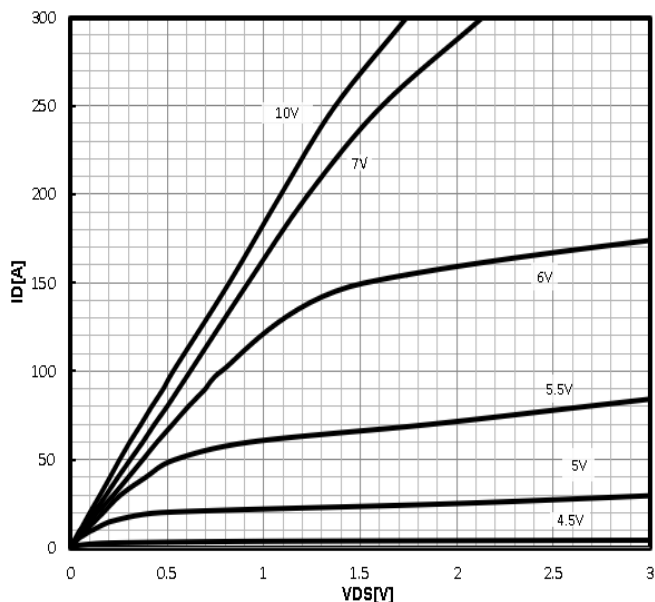
a1 : Repetitive rating; pulse width limited by maximum junction temperature

a2 : VDD=60V, L=0.5mH, R_g=25Ω, Starting T_J=25 °C

Characteristics Curve:

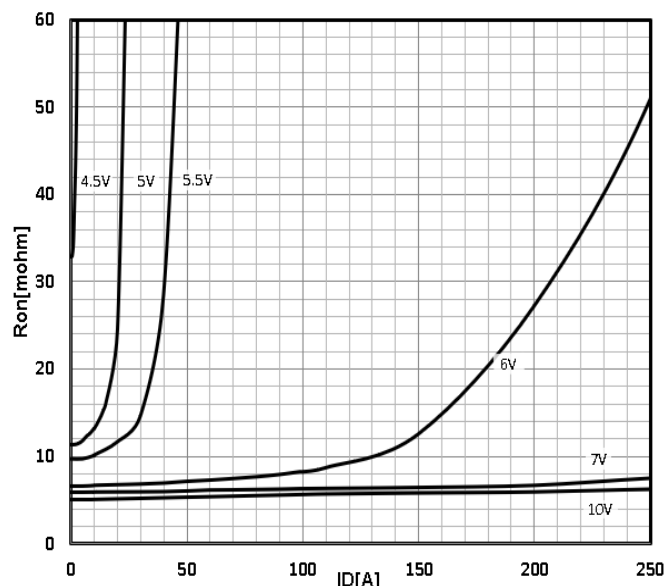
Typ. output characteristics

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



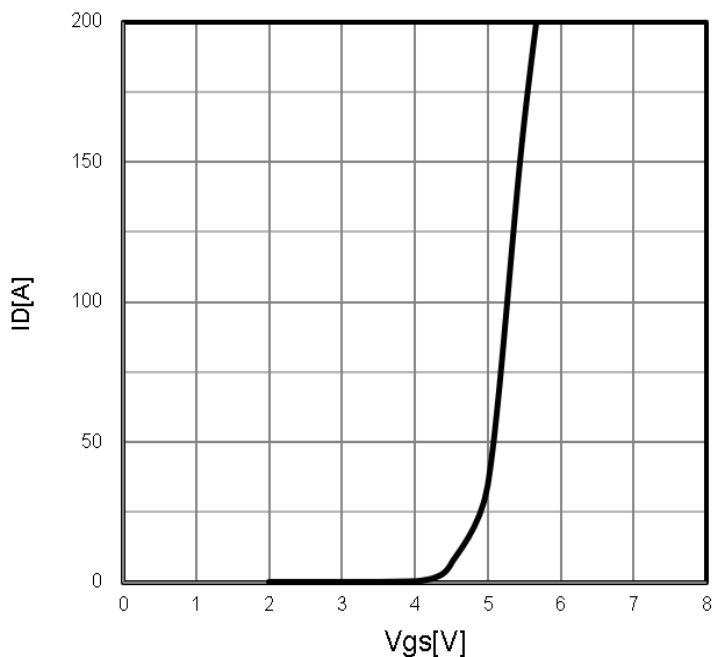
Typ. drain-source on resistance

$$R_{DS(on)} = f(I_D)$$



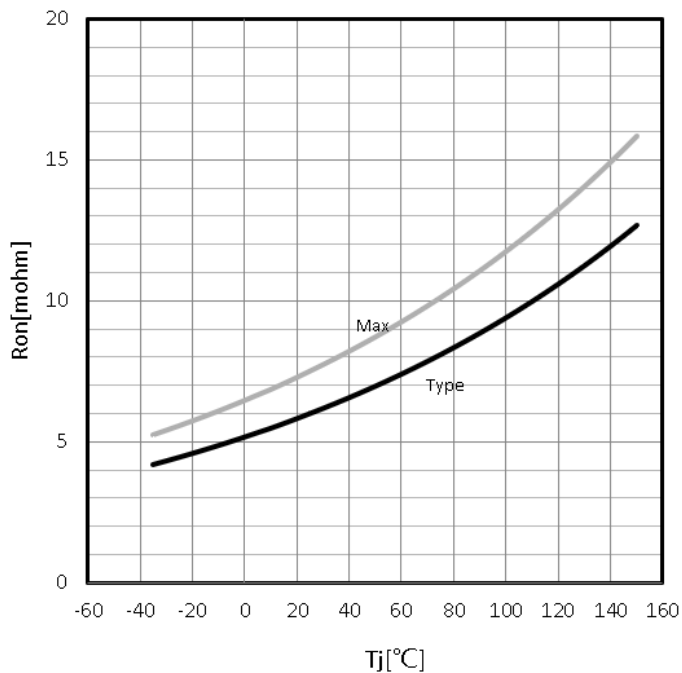
Typ. transfer characteristics

$$I_D = f(V_{GS})$$



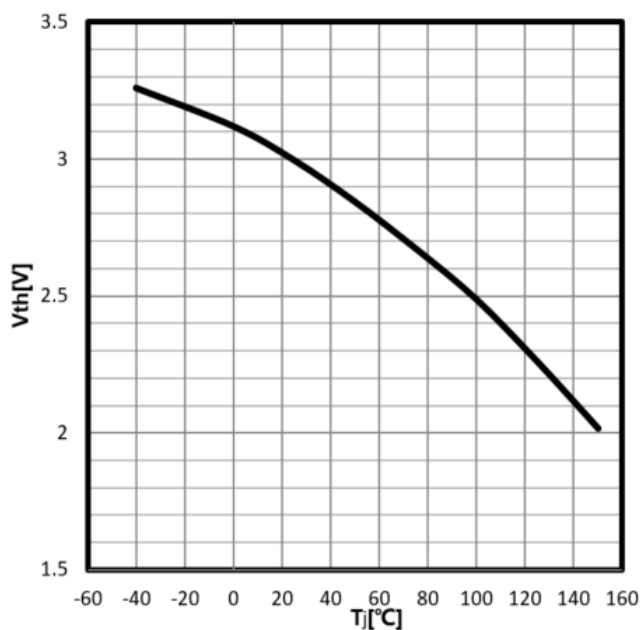
Drain-source on-state resistance

$$R_{DS(on)} = f(T_J); I_D = 20A; V_{GS} = 10V$$



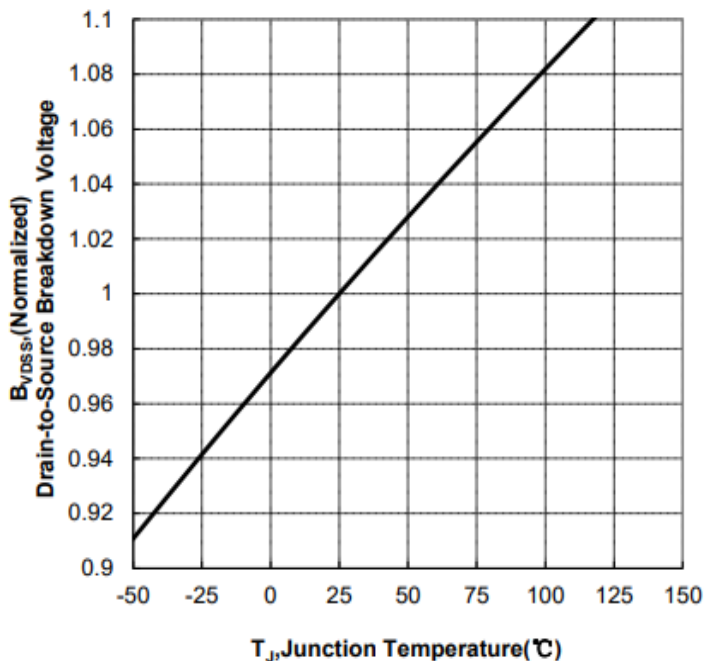
Gate Threshold Voltage

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



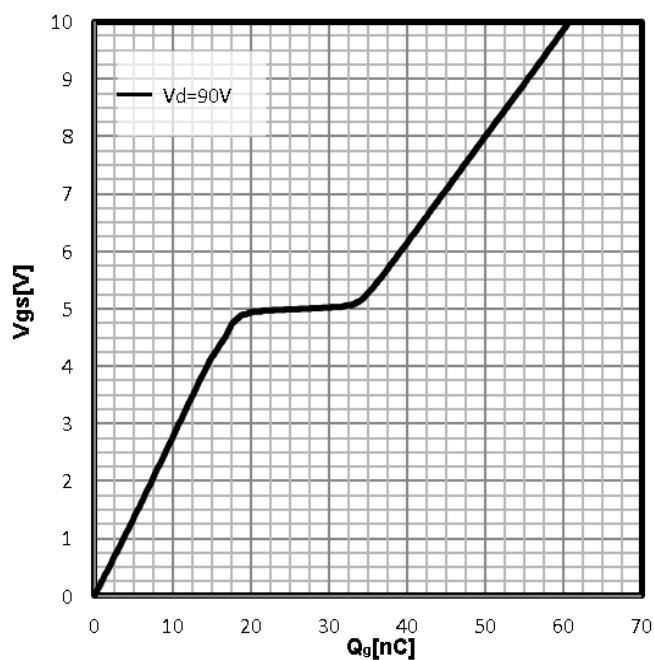
Drain-source breakdown voltage

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



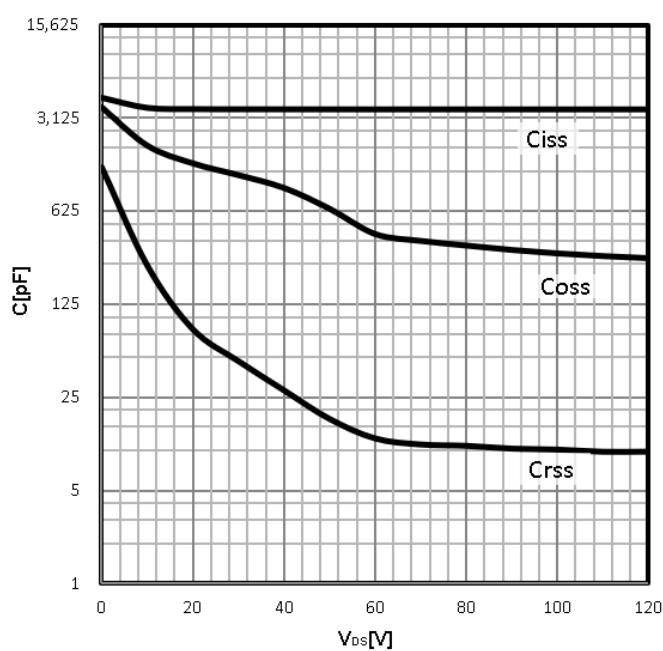
Typ. gate charge

$$V_{GS}=f(Q_{gate})$$



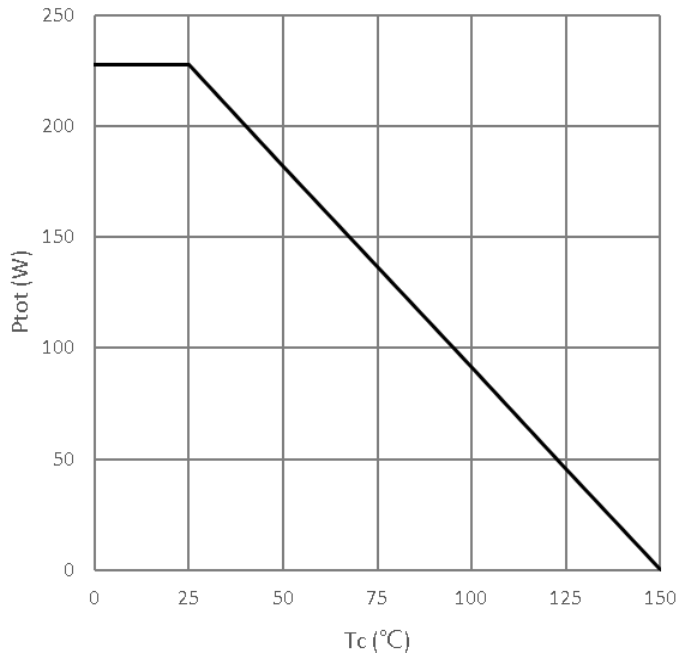
Typ. capacitances

$$C=f(V_{DS}); V_{GS}=0V; f=1MHz$$

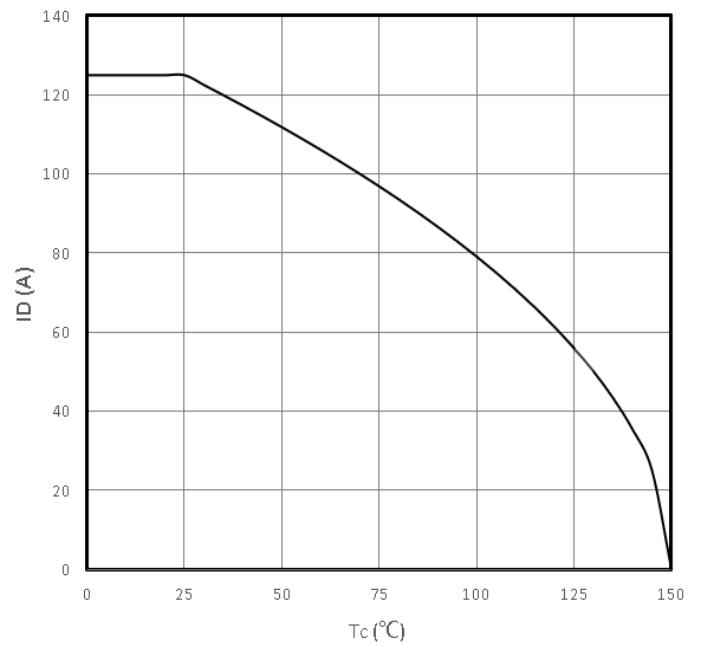


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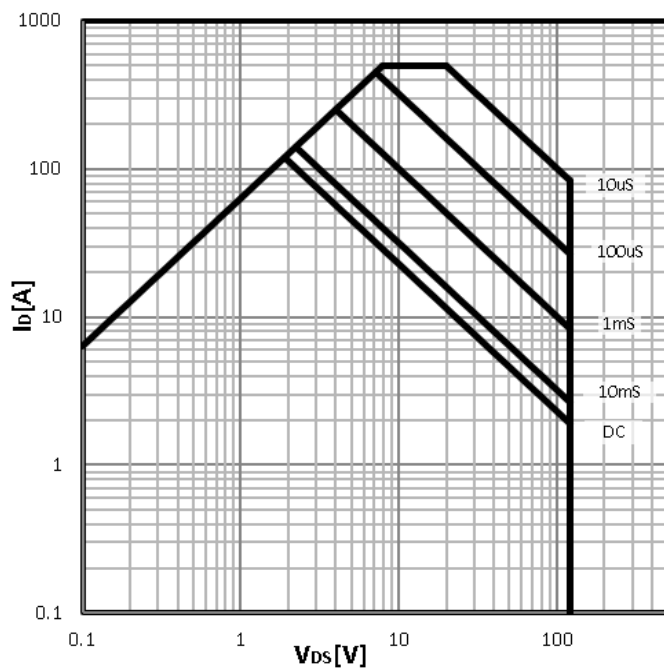
Power Dissipation
 $P_{tot}=f(T_j)$



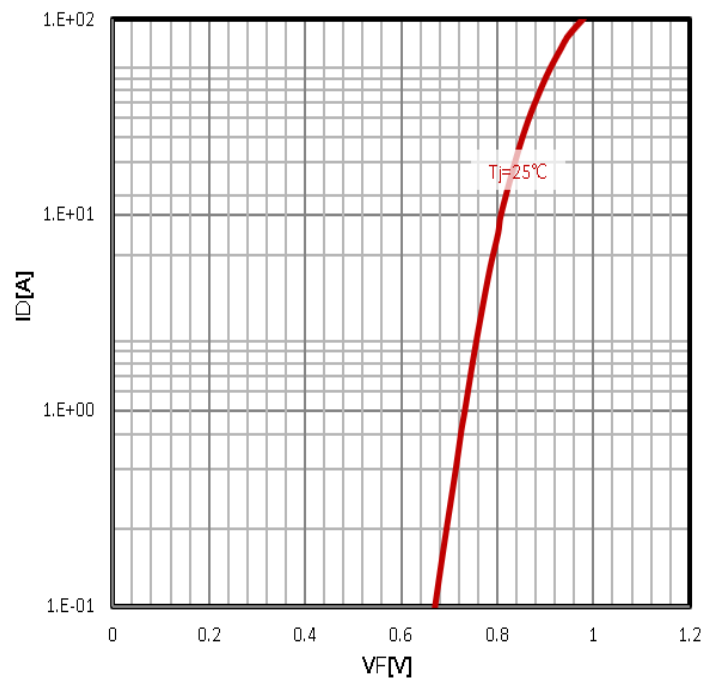
Maximum Drain Current
 $I_D=f(T_c)$



Safe operating area
 $I_D=f(V_{DS})$



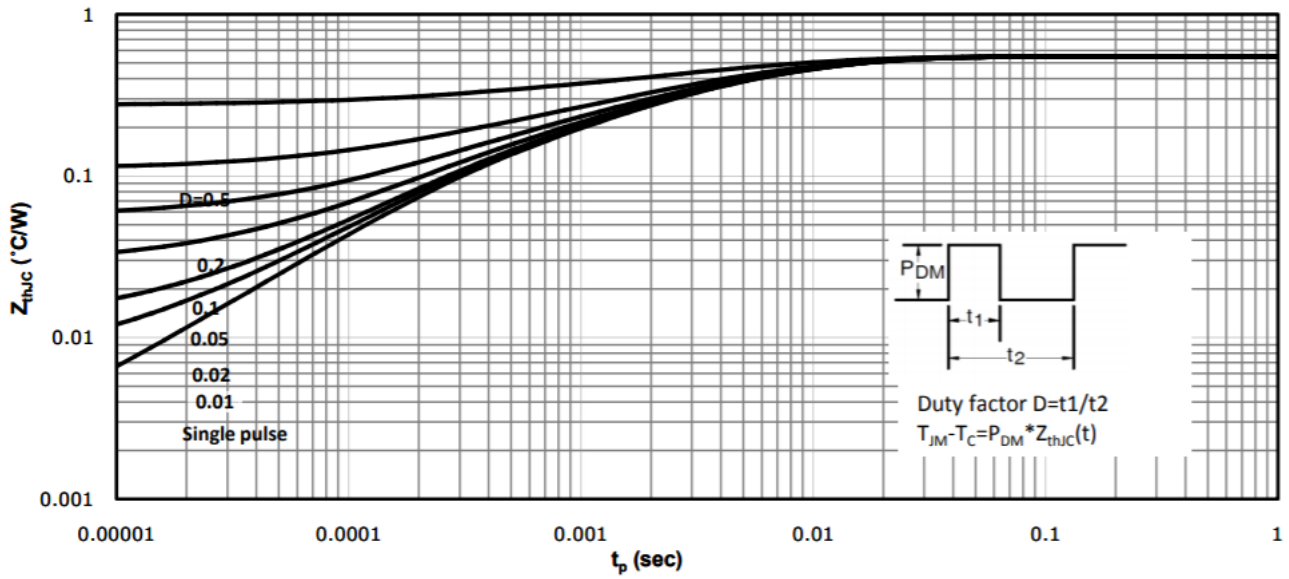
Body Diode Forward Voltage Variation
 $I_F=f(V_{GS})$



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Max. transient thermal impedance

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



Test Circuit

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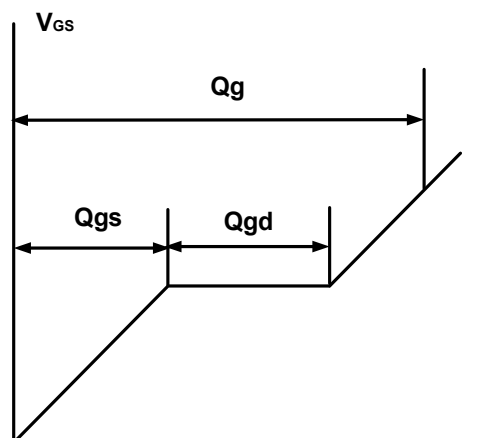
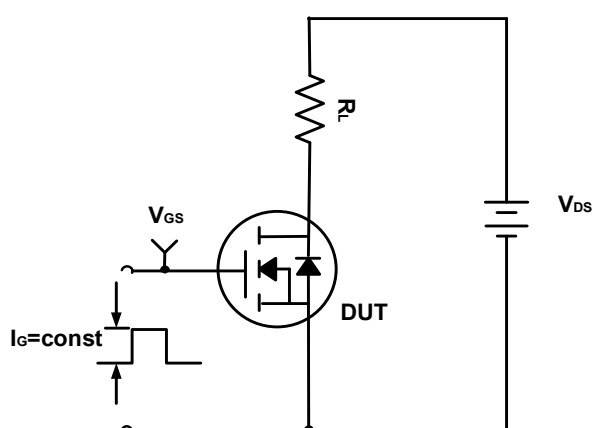


Figure A. Gate Charge Test Circuit & Waveforms

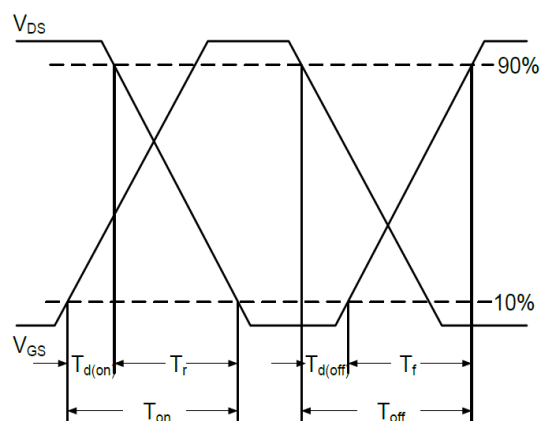
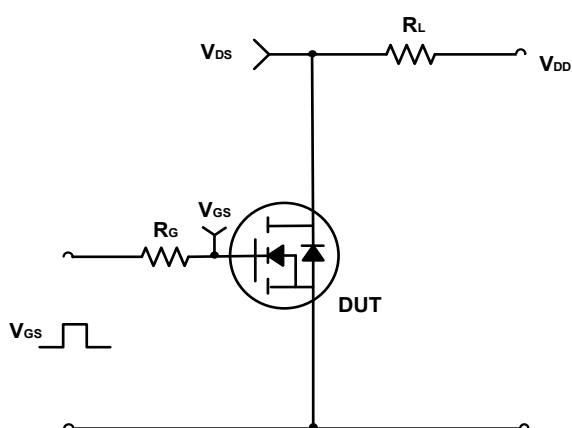


Figure B. Switching Test Circuit & Waveforms

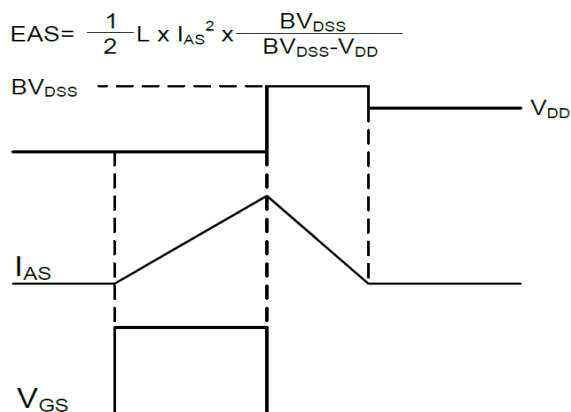
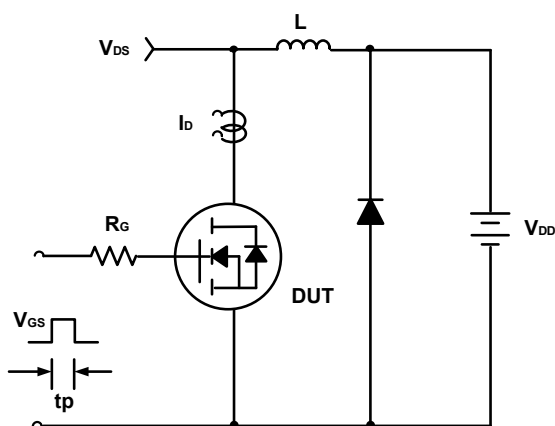
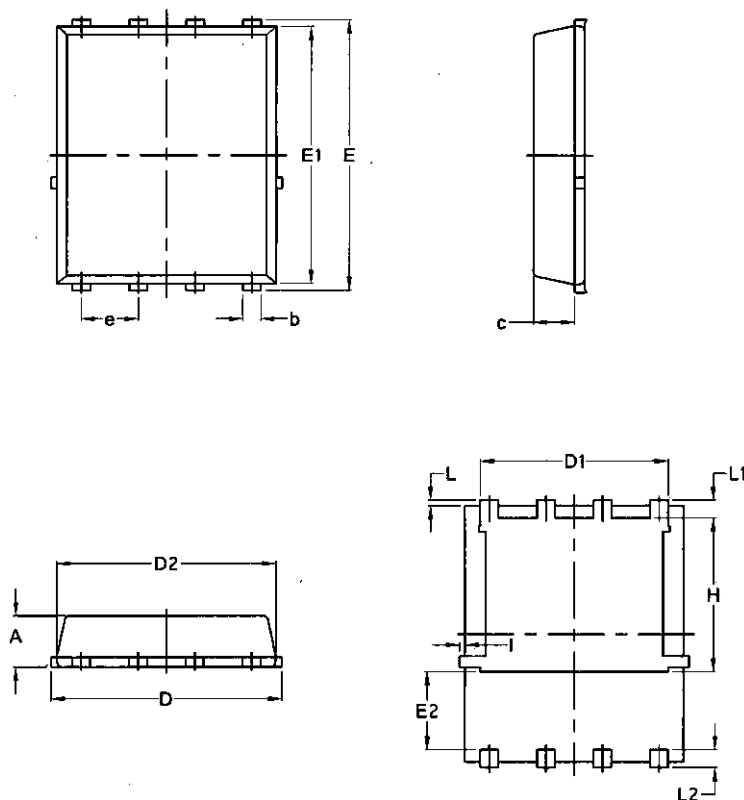


Figure C. Unclamped Inductive Switching Circuit & Waveforms

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