

**Features**

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

**Applications**

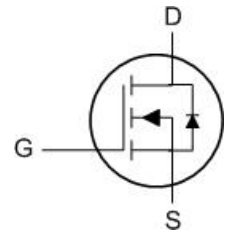
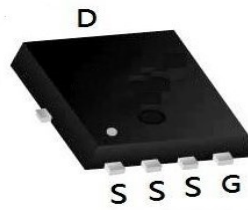
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

**Product Summary**



BVDSS	RDSON	ID
40V	1.3mΩ	200A

**PDFN5060-8L Pin Configuration**



**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	200	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	120	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	690	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	500	mJ
$I_{AS}$	Avalanche Current	---	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	220	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	35	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	1	$^\circ C/W$

**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	40	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	---	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =1A	---	1.3	1.65	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =1A	---	1.8	2.2	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	1.55	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	---	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	---	100	---	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =20V, I <sub>D</sub> =35A	---	205	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	3.1	---	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =32V, V <sub>GS</sub> =10V, I <sub>D</sub> =40A	---	85	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	20.2	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	13	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, R <sub>G</sub> =2Ω, I <sub>D</sub> =40A	---	12.6	---	ns
T <sub>r</sub>	Rise Time		---	46.5	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	86.7	---	
T <sub>f</sub>	Fall Time		---	103	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	---	5631	---	pF
C <sub>oss</sub>	Output Capacitance		---	2525	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	39.6	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	200	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =25A, T <sub>J</sub> =25°C	0.7	0.9	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =40A, di/dt=100A/μs,	---	75.9	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25°C	---	86.9	---	nC

Note :

1 The data is tested by surface mounted on a 4 inch<sup>2</sup> FR-4 board with 2oz copper.

2 The data is tested by pulsed pulse width < 300us duty cycle < 2%

3 The EAS data shows Max. rating. The test condition is V<sub>RM</sub>>0, V<sub>DD</sub>=32V, V<sub>GS</sub>=10V, L=0.5mH

4 The power dissipation is limited by 150 °C junction temperature

5 The data is theoretically the same as I<sub>DM</sub> and I<sub>DMA</sub> in real applications. It should be limited by total power dissipation.

Typical Performance Characteristics

Fig 1: Output Characteristics

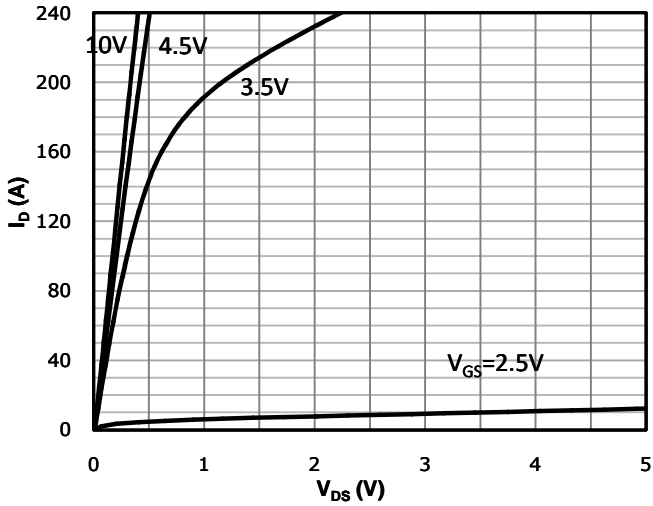


Fig 2: Transfer Characteristics

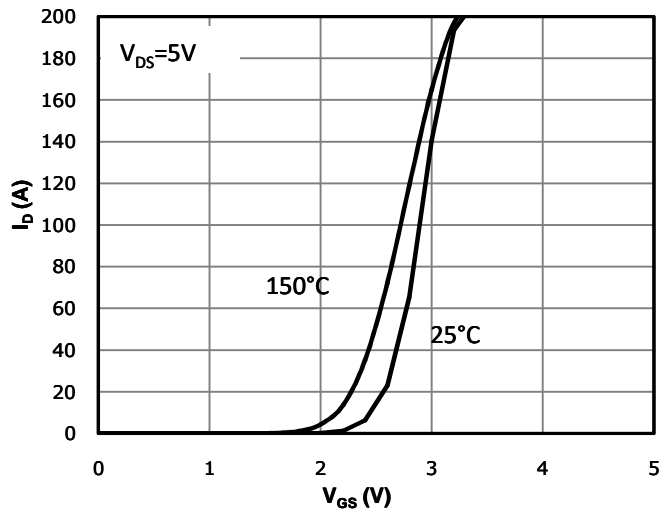


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

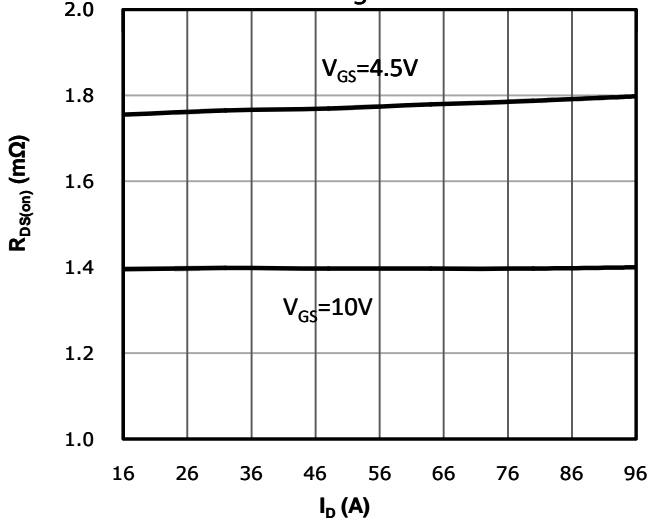


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

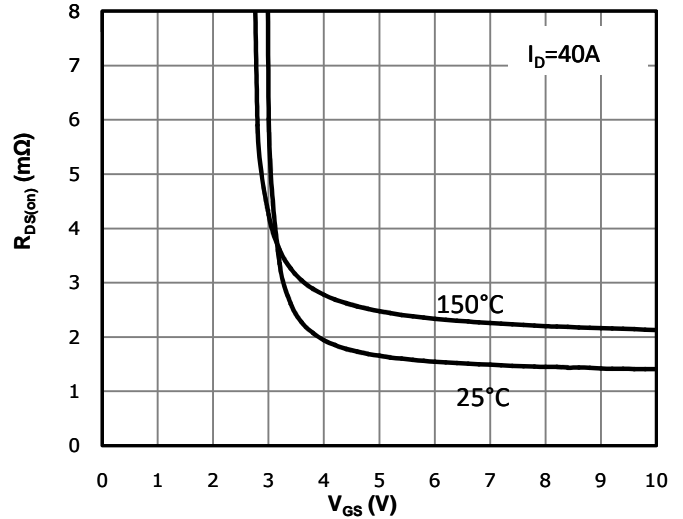


Fig 5:  $R_{DS(on)}$  vs. Temperature

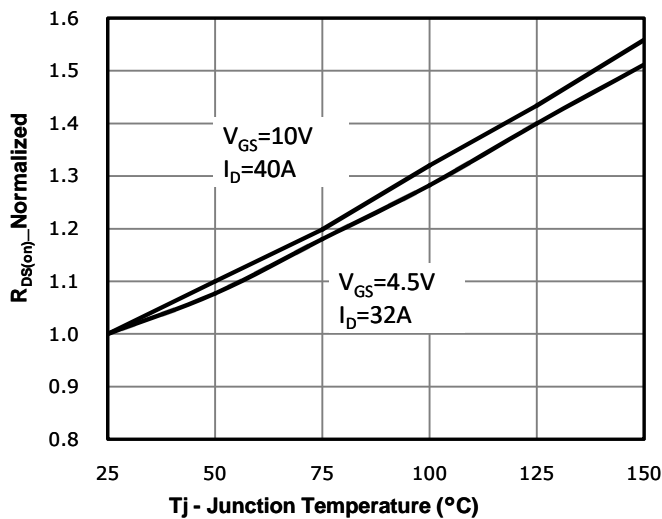


Fig 6: Capacitance Characteristics

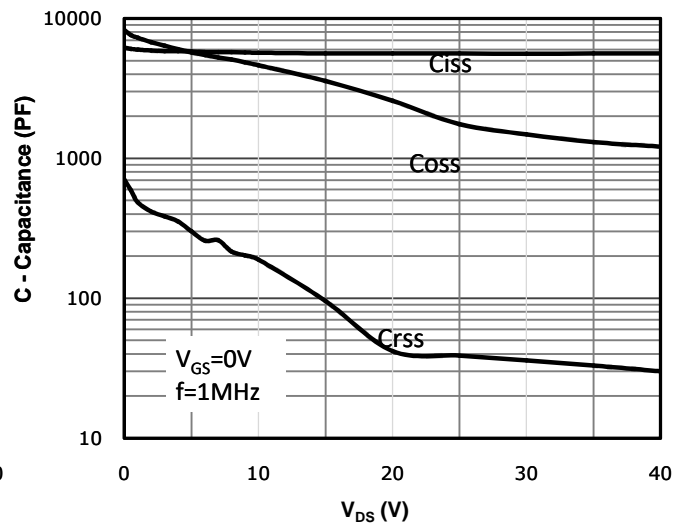


Fig 7: Gate Charge Characteristics

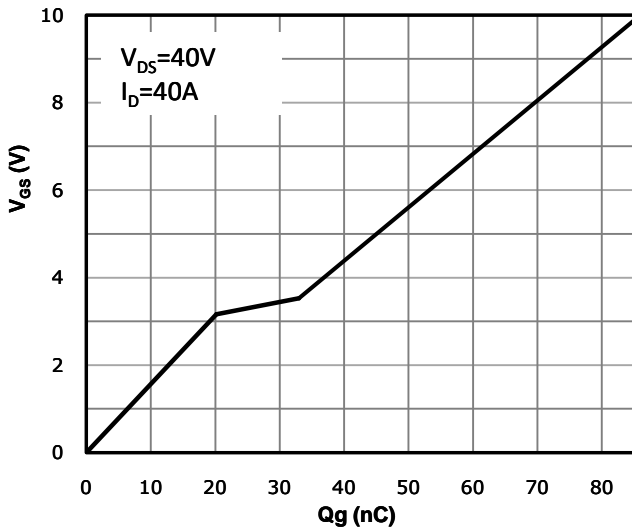


Fig 8: Body-diode Forward Characteristics

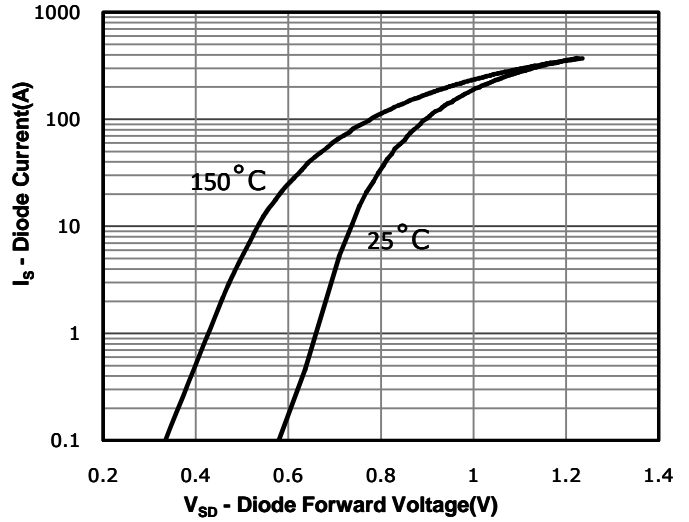


Fig 9: Power Dissipation

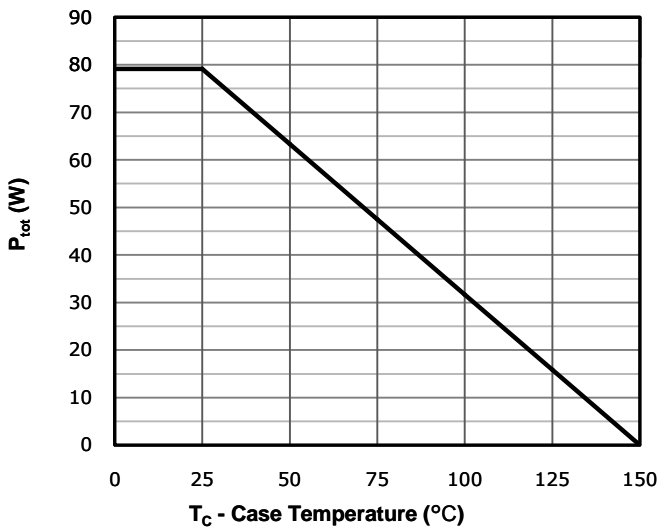


Fig 10: Drain Current Derating

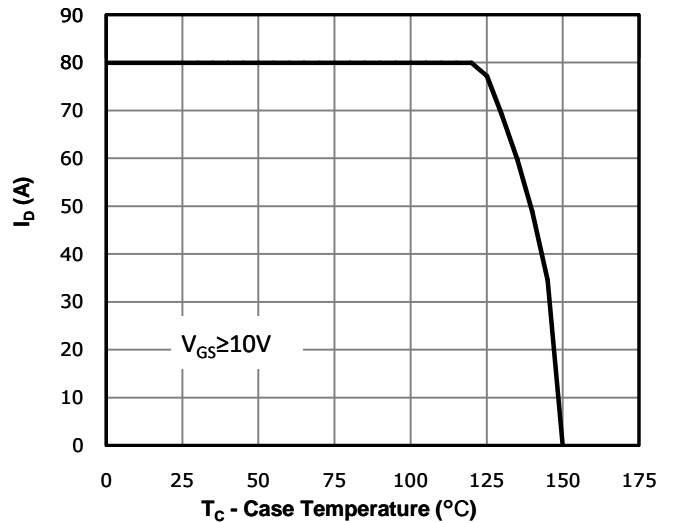


Fig 11: Safe Operating Area

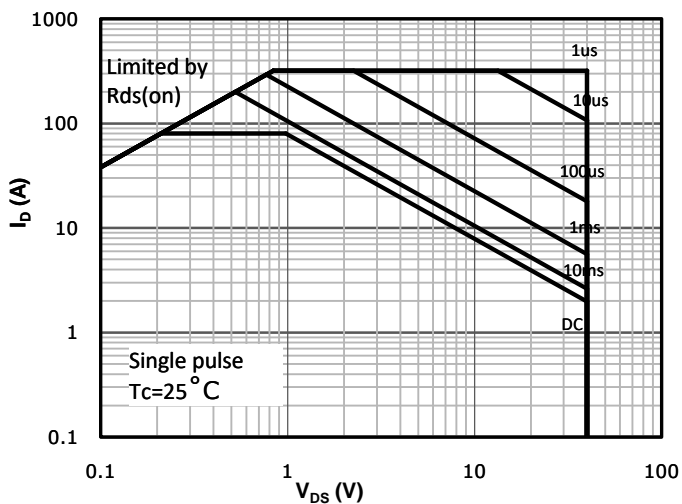
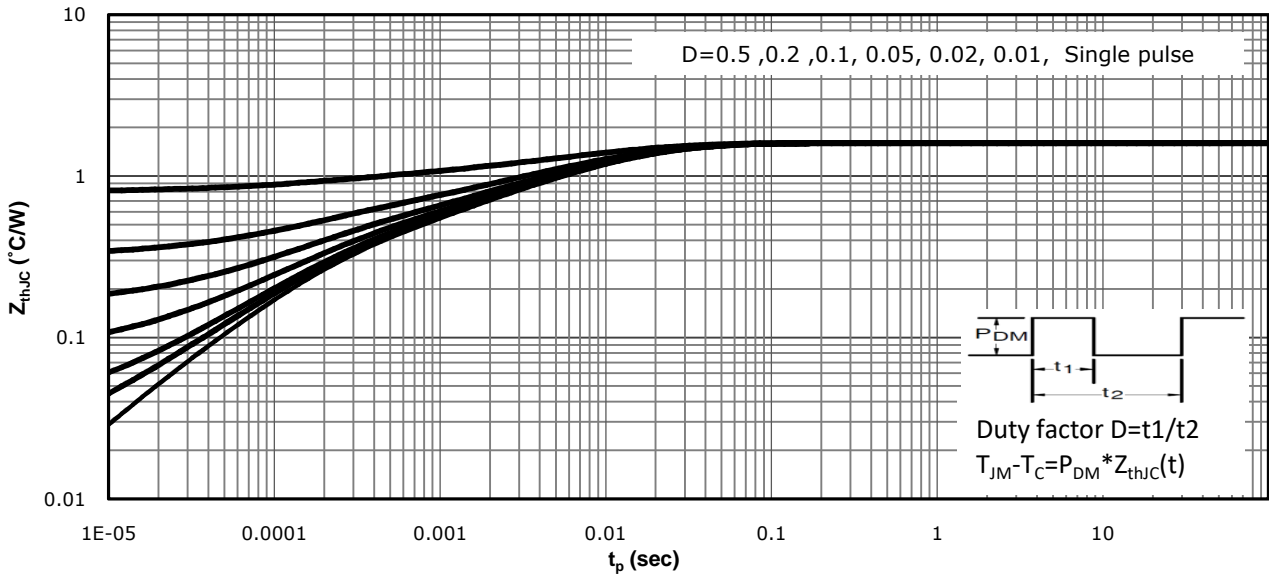


Fig 12: Max. Transient Thermal Impedance



■ Test circuits and waveforms

Figure A: Gate Charge Test Circuit & Waveforms

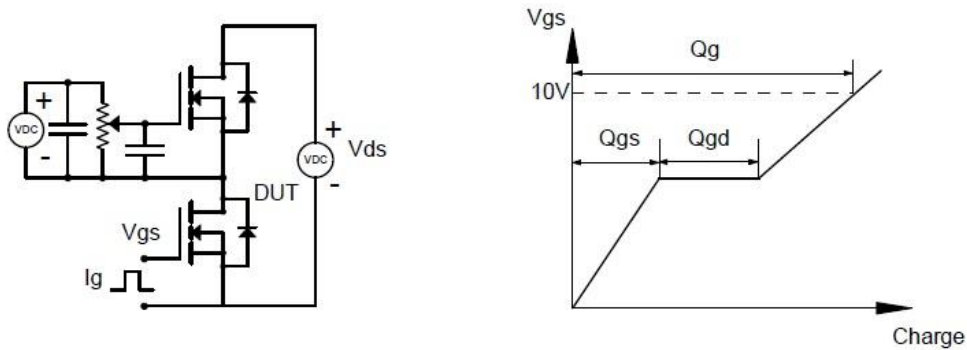


Figure B: Resistive Switching Test Circuit & Waveforms

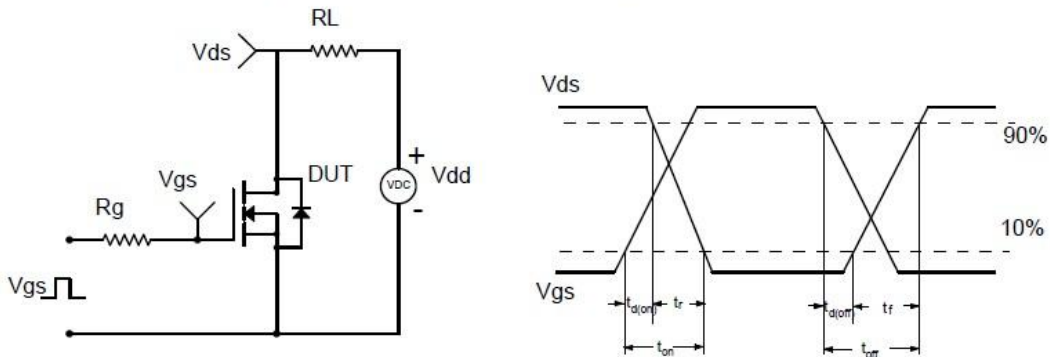


Figure C: Unclamped Inductive Switching (UIS) Test

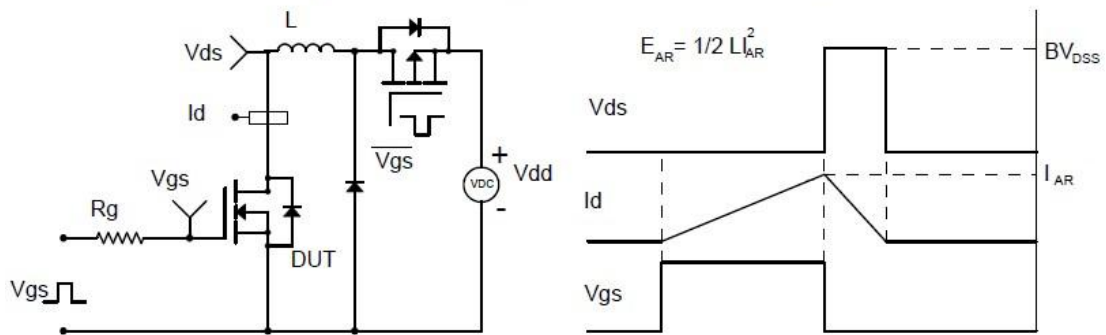
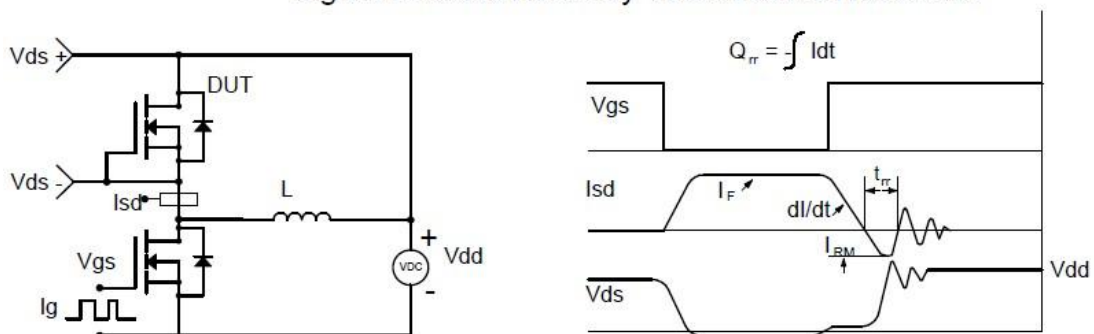
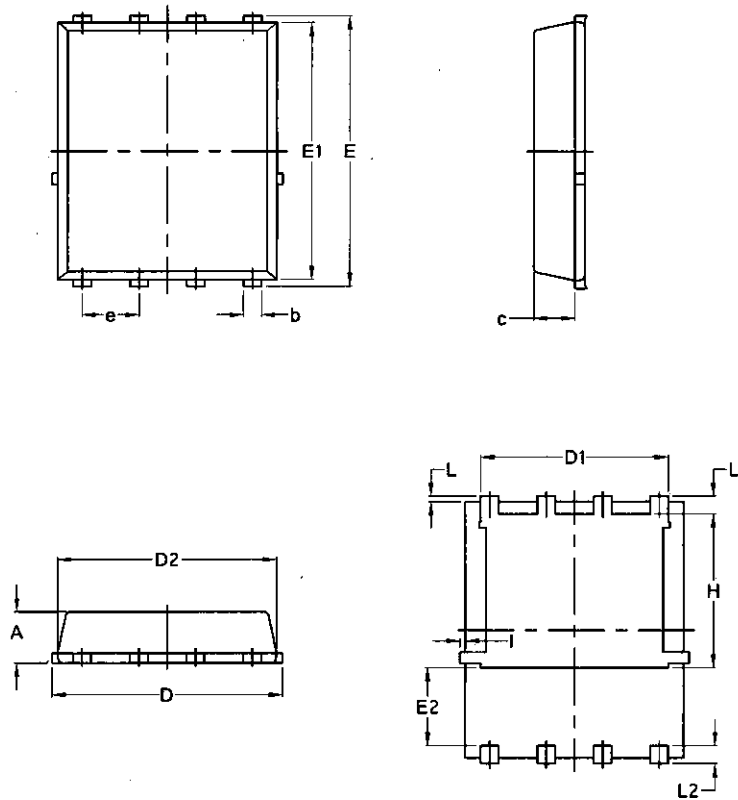


Figure D: Diode Recovery Test Circuit & Waveforms



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