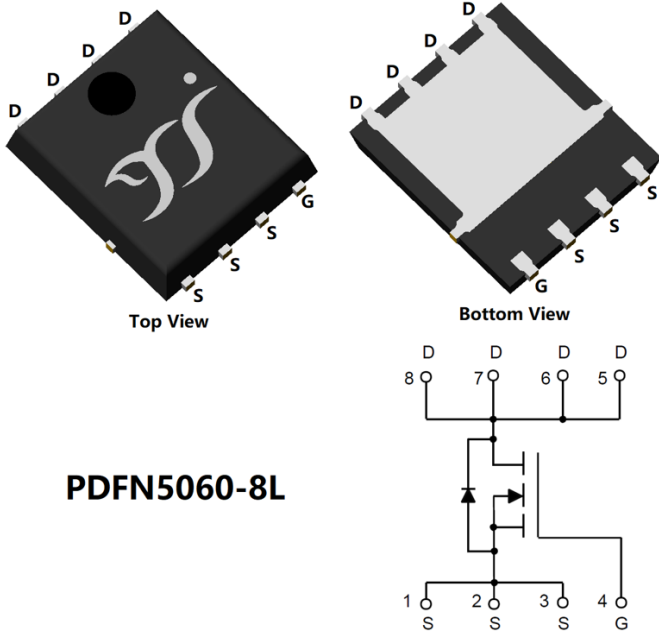


## N-Channel Enhancement Mode Field Effect Transistor



PDFN5060-8L

### Product Summary

- $V_{DS}$  40V
- $I_D$  130A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ )  $< 1.75m\Omega$
- $R_{DS(ON)}$  (at  $V_{GS}=4.5V$ )  $< 2.5m\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Split gate trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

### Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor

### ■ Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	40	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_A=25^\circ C$	$I_D$	20	A
	$T_A=100^\circ C$		12	
	$T_C=25^\circ C$		130	
	$T_C=100^\circ C$		82	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	450	A
Avalanche energy <sup>B</sup>		EAS	661	mJ
Total Power Dissipation <sup>C</sup>	$T_A=25^\circ C$	$P_D$	2.5	W
	$T_A=100^\circ C$		1	
	$T_C=25^\circ C$		125	
	$T_C=100^\circ C$		50	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+150	$^\circ C$

### ■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient <sup>D</sup>	Steady-State	$R_{\theta JA}$	40	50	$^\circ C/W$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	0.8	1	

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJG130G04C	F1	YJG130G04C	5000	10000	100000	13" reel



# YJG130G04C

## ■ Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	40	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C	-	-	100	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.8	2.5	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =65A	-	1.45	1.75	mΩ
		V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	1.45	1.75	
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	2.0	2.5	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V	-	0.8	1.2	V
Gate resistance	R <sub>G</sub>	f=1MHz	-	1.5	-	Ω
Maximum Body-Diode Continuous Current	I <sub>S</sub>		-	-	130	A
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	7400	-	pF
Output Capacitance	C <sub>oss</sub>		-	1340	-	
Reverse Transfer Capacitance	C <sub>riss</sub>		-	70	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, I <sub>D</sub> =20A	-	129	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	18	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	32	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =20A, di/dt=100A/us	-	120	-	nC
Reverse Recovery Time	t <sub>rr</sub>		-	73	-	ns
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =20V, I <sub>D</sub> =20A R <sub>GEN</sub> =2.2Ω	-	28	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	113	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	56	-	
Turn-off fall Time	t <sub>f</sub>		-	21	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B. T<sub>J</sub>=25°C, V<sub>DD</sub>=30V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=3mH, I<sub>AS</sub>=21A.

C. P<sub>g</sub> is based on max. junction temperature, using junction-case thermal resistance.

D. The value of R<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in the still air environment with T<sub>A</sub> =25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.



# YJG130G04C

## Typical Electrical and Thermal Characteristics Diagrams

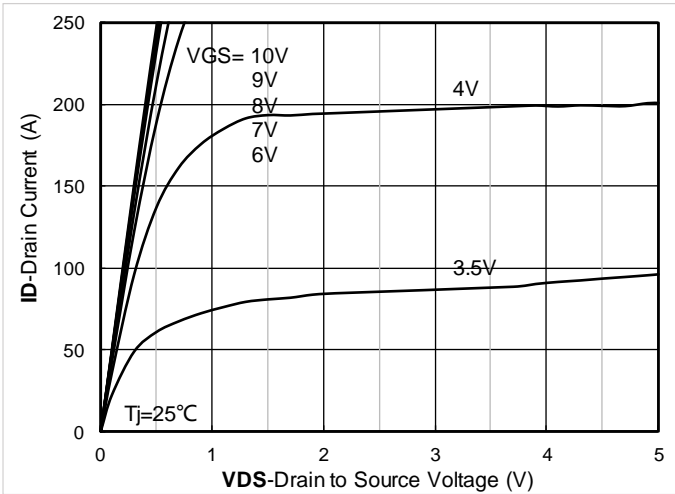


Figure 1. Output Characteristics

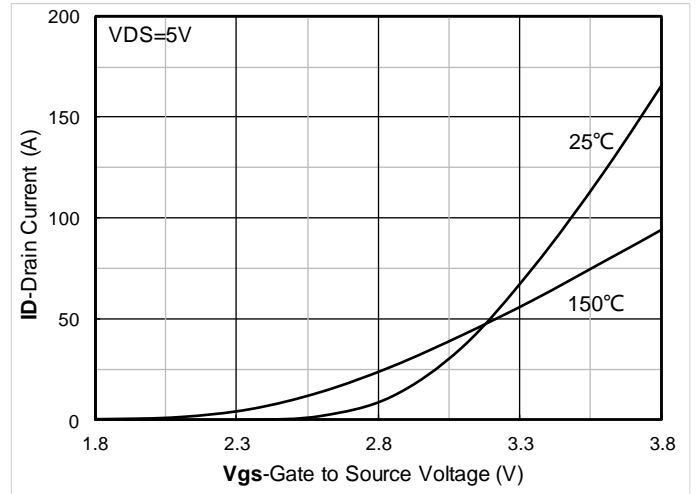


Figure 2. Transfer Characteristics

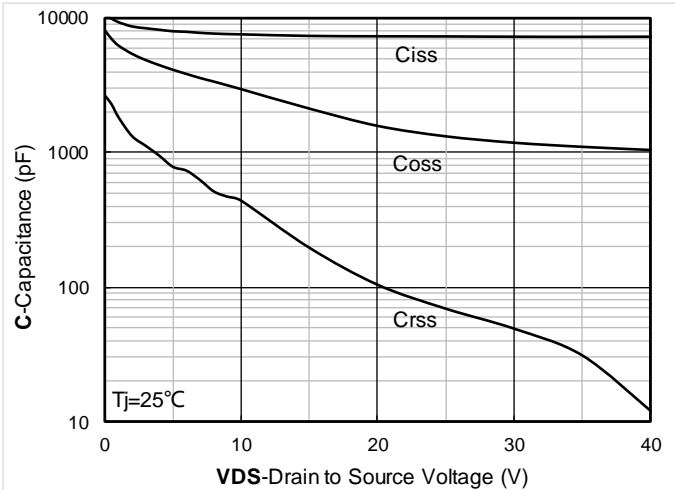


Figure 3. Capacitance Characteristics

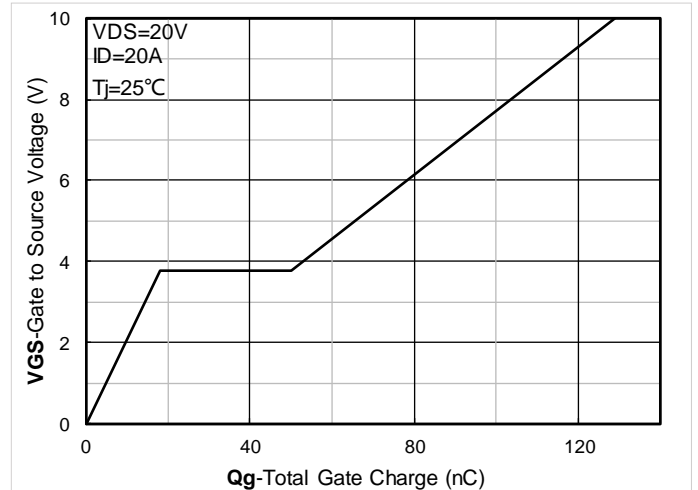


Figure 4. Gate Charge

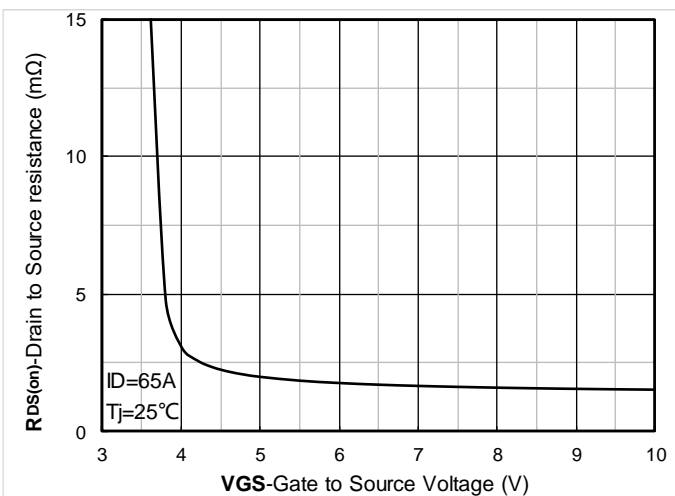


Figure 5. On-Resistance vs Gate to Source Voltage

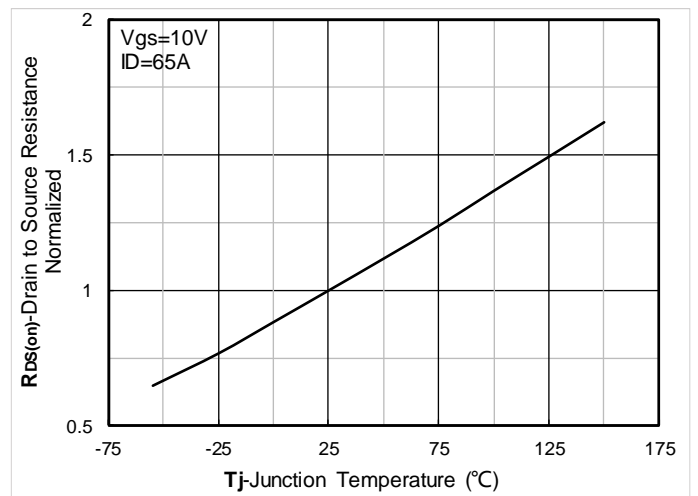


Figure 6. Normalized On-Resistance



# YJG130G04C

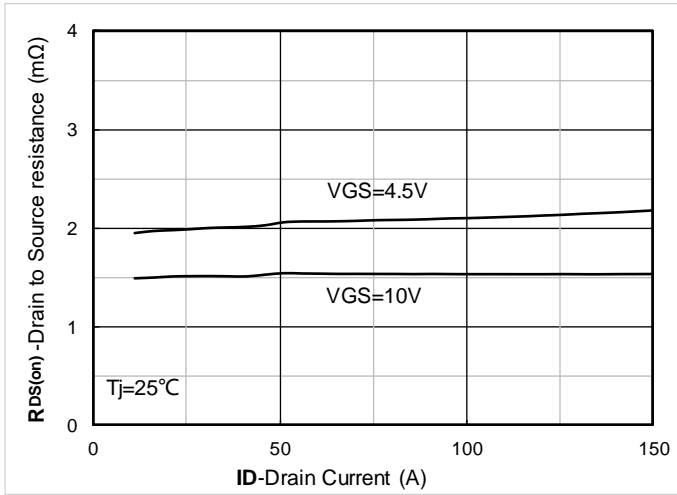


Figure 7.  $R_{DS(on)}$  VS Drain Current

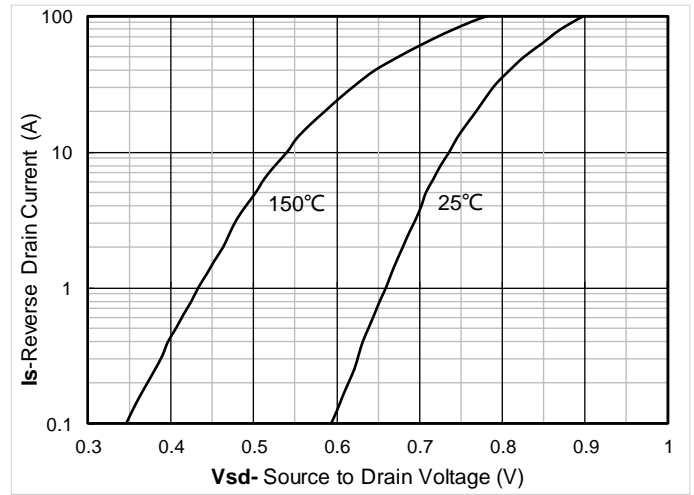


Figure 8. Forward characteristics of reverse diode

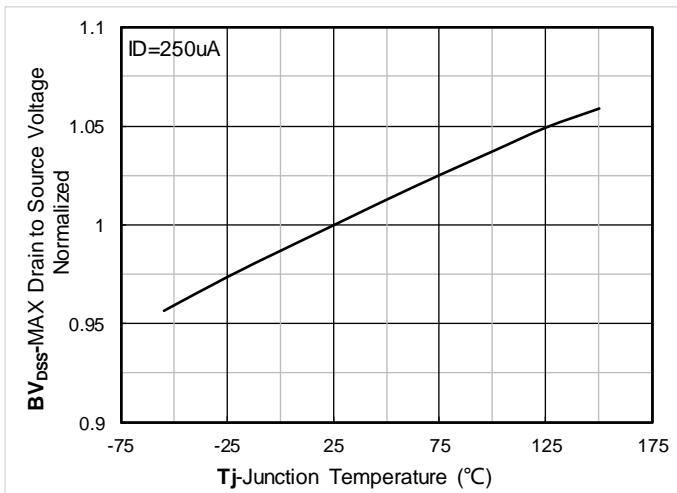


Figure 9. Normalized breakdown voltage

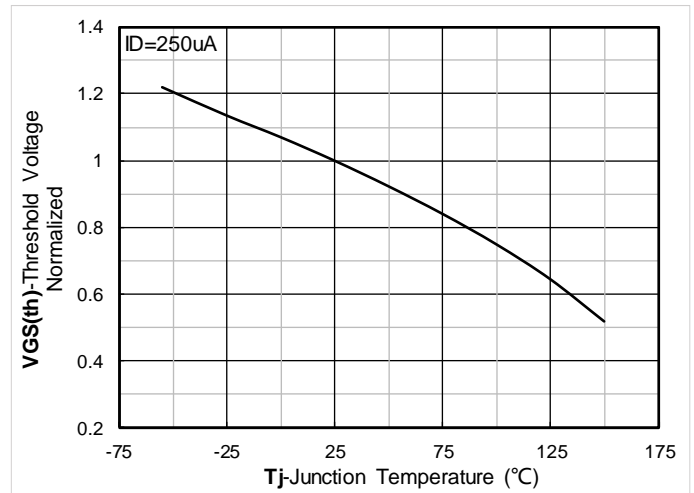


Figure 10. Normalized Threshold voltage

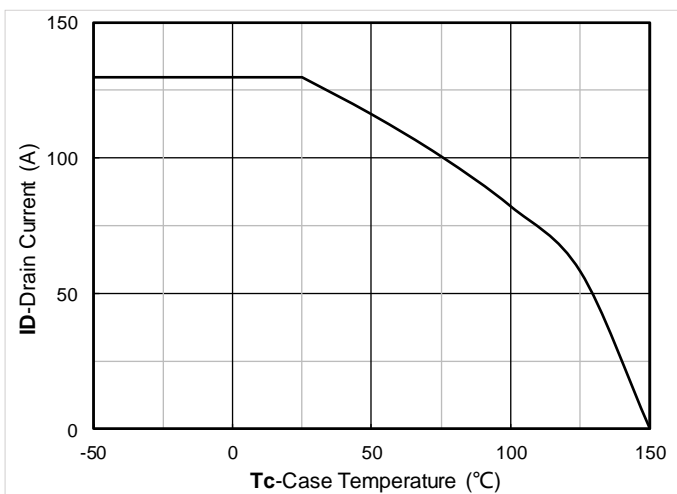


Figure 11. Current dissipation

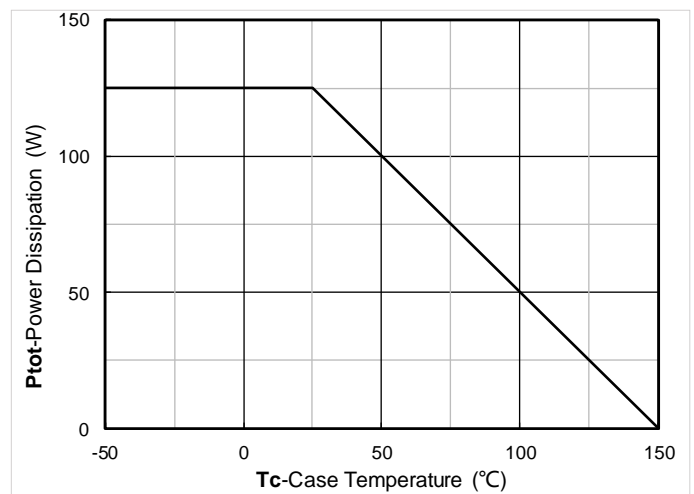


Figure 12. Power dissipation

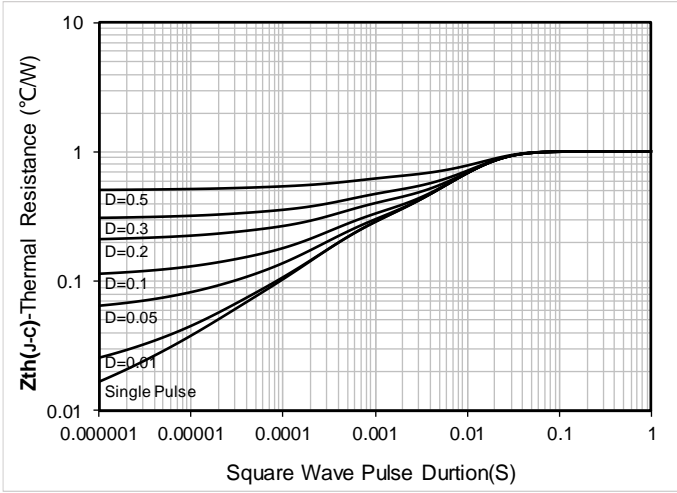


Figure 13. Maximum Transient Thermal Impedance

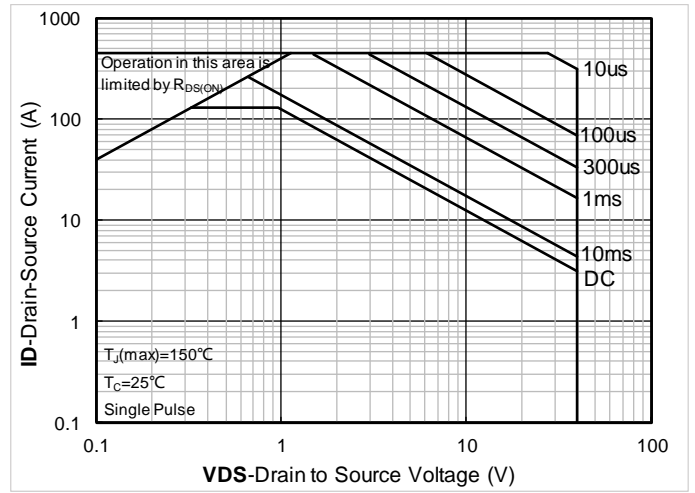


Figure 14. Safe Operation Area

## ■ Test Circuits & Waveforms

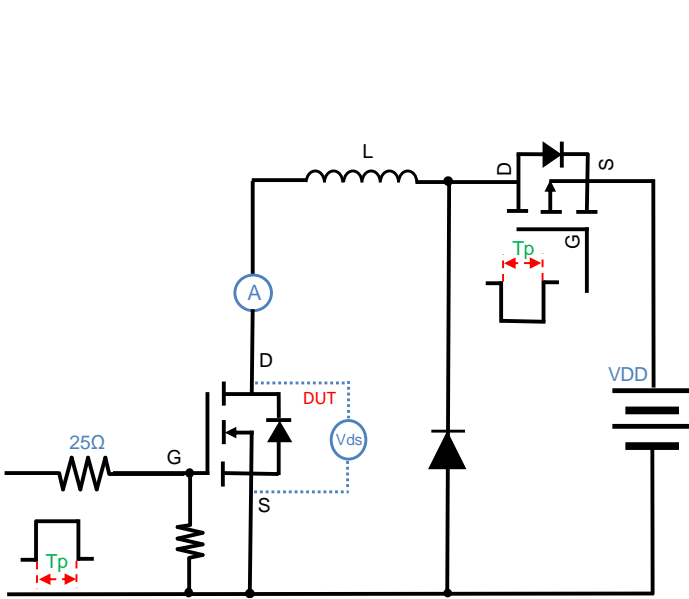
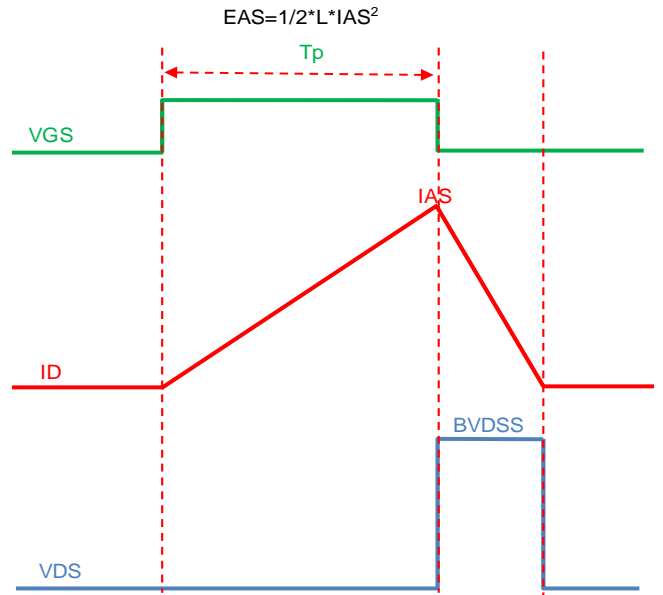


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform



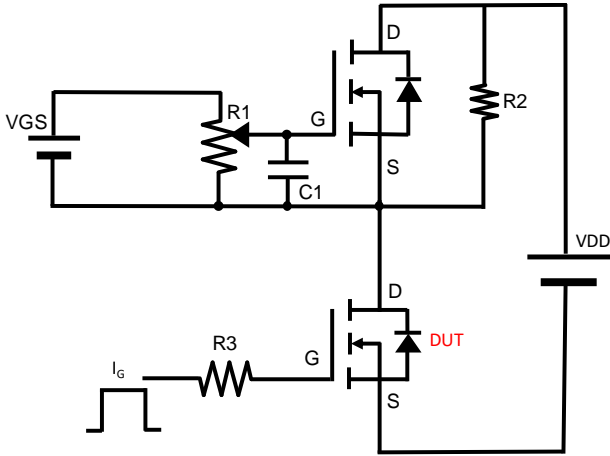


Figure B. Gate Charge Test Circuit & Waveform

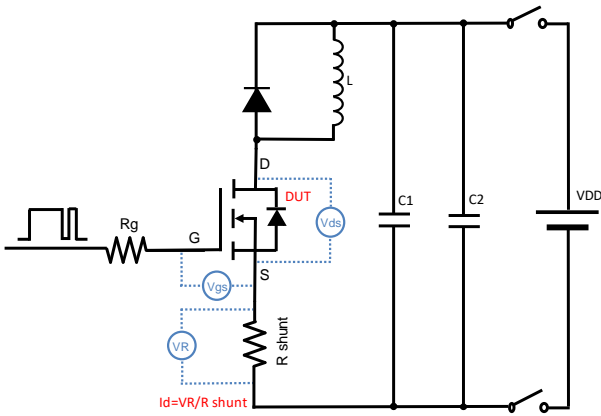


Figure C. Resistive Switching Test Circuit & Waveform



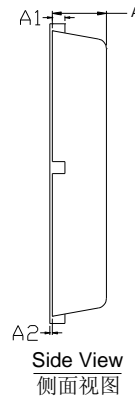
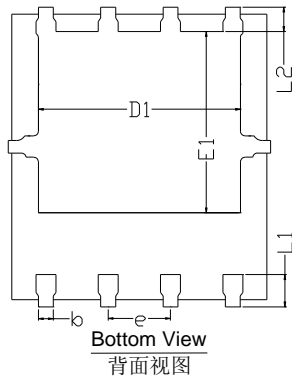
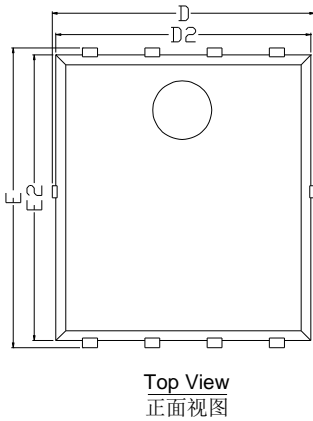
Figure D. Diode Recovery Test Circuit & Waveform



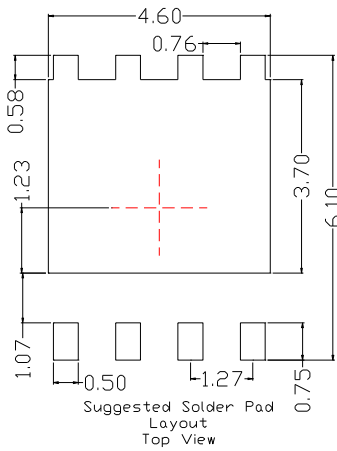
# YJG130G04C

## ■ PDFN5060-8L-E-1.0MM Package information

Type E:

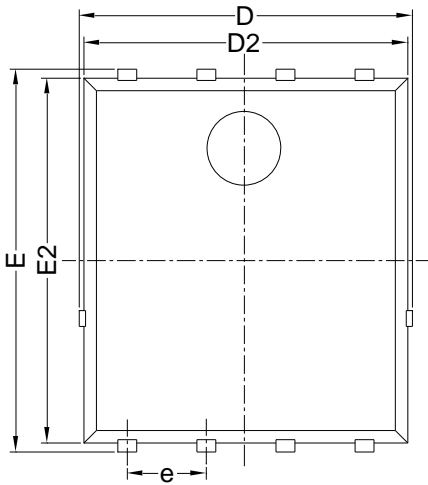


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
D	4.85	5.05	5.25
E	5.80	6.00	6.20
A	0.90	1.00	1.10
A1	0.254 BSC		
A2			0.10
D1	4.00	4.20	4.40
E1	3.35	3.55	3.75
D2	4.70	4.90	5.10
E2	5.55	5.75	5.95
L1	0.55	0.65	0.75
L2	0.575 BSC		
b	0.20	0.30	0.40
e	1.27 BSC		

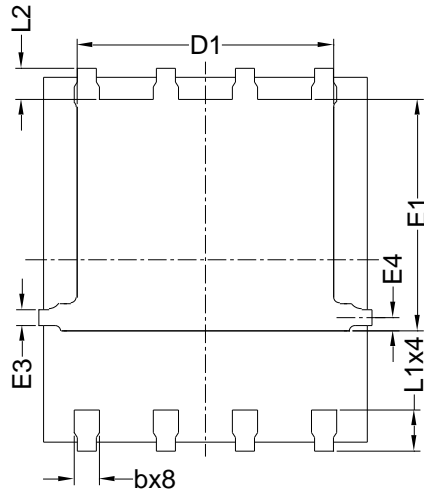


Note:  
 1. Controlling dimension in millimeters.  
 2. General tolerance:  $\pm 0.10$ mm.  
 3. The pad layout is for reference purposes only.

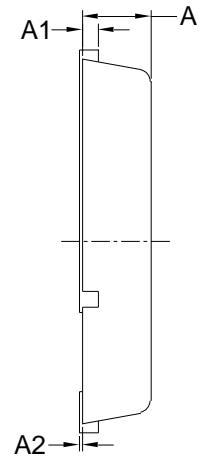
Type B:



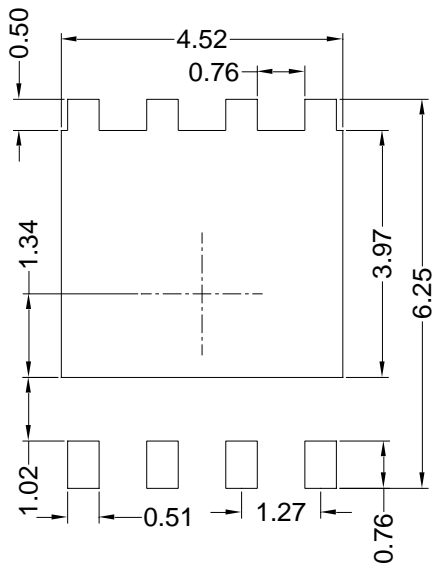
Top View  
正面视图



Bottom View  
背面视图



Side View  
侧面视图



Suggested Solder Pad Layout  
Top View

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
D	5.15	5.35	5.55
E	5.95	6.15	6.35
A	1.00	1.10	1.20
A1	0.254 BSC		
A2			0.10
D1	3.92	4.12	4.32
E1	3.52	3.72	3.92
D2	5.00	5.20	5.40
E2	5.66	5.86	6.06
E3	0.254 REF		
E4	0.21 REF		
L1	0.56	0.66	0.76
L2	0.50 BSC		
b	0.31	0.41	0.51
e	1.27 BSC		

Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.10$  mm.
3. The pad layout is for reference purposes only.





# YJG130G04C

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