



40A,60V N-CHANNEL POWER MOSFET

PDFN5060-8L(Prefix :L)

Description

This model is an n-channel enhanced MOS power field effect transistor manufactured by silicon epitaxial process.

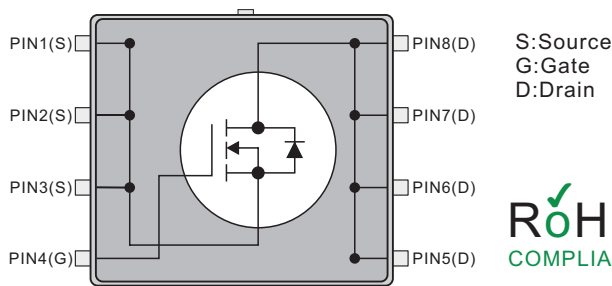
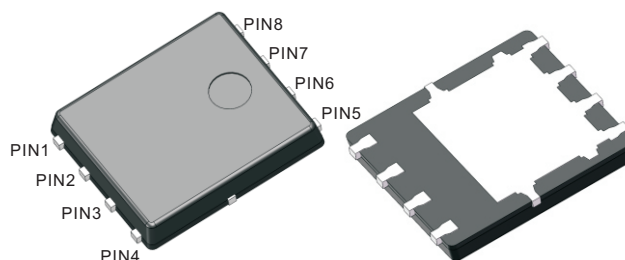
This model has excellent switching characteristics, extremely low on impedance, low gate charge and other characteristics.

Features

- $R_{DS(ON)} < 6.0 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=20\text{A}$
- Extremely low on impedance
- Low gate charge
- Superior switching characteristics

Mechanical data

- Case: PDFN5060-8L
- Approx. Weight:0.093g (0.0032oz)
- Lead free finish, RoHS compliant
- Case Material: "Green" molding compound, UL flammability classification 94V-0, "Halogen-free".



Packing Marking And Ordering Information

| Device Package | Device | Marking | Packing Type | QTY Per Reel | Inner box | Per Carton |
|----------------|-----------|-----------|--------------|--------------|------------|------------|
| PDFN5060-8L | L4R5NS60S | L4R5NS60S | Reel | 5,000 Pcs | 10,000 Pcs | 50,000 Pcs |

Absolute Maximum Ratings (Ta=25°C, Unless Otherwise Specified)

| Parameter | Symbols | Ratings | Units |
|--|----------------|------------|------------------|
| Drain-Source Voltage | V_{DSS} | 60 | V |
| Gate-Source Voltage | V_{GSS} | ± 20 | V |
| Continuous Drain Current | I_D | 40 | A |
| Pulsed Drain Current (Note 2) | I_{DM} | 145 | A |
| Avalanche Energy Single Pulsed (Note 3) | E_{AS} | 306 | mJ |
| Power Dissipation ($T_c = 25^\circ\text{C}$) | P_D | 25 | W |
| Operating junction and storage temperature | T_J, T_{STG} | -55 ~ +150 | $^\circ\text{C}$ |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. L = 0.5mH, IAS = 35A, VDD = 90V, RG = 25 Ω , Starting $T_J = 25^\circ\text{C}$

Thermal Resistance

| Parameter | Symbols | Ratings | Units |
|--|------------|---------|---------------------------|
| Thermal resistance, junction – case. | R_{thJC} | 5 | $^\circ\text{C}/\text{W}$ |
| Thermal resistance, junction – ambient(min. footprint) | R_{thJA} | 50 | $^\circ\text{C}/\text{W}$ |



Electrical Characteristics (Ta=25°C, Unless Otherwise Specified)

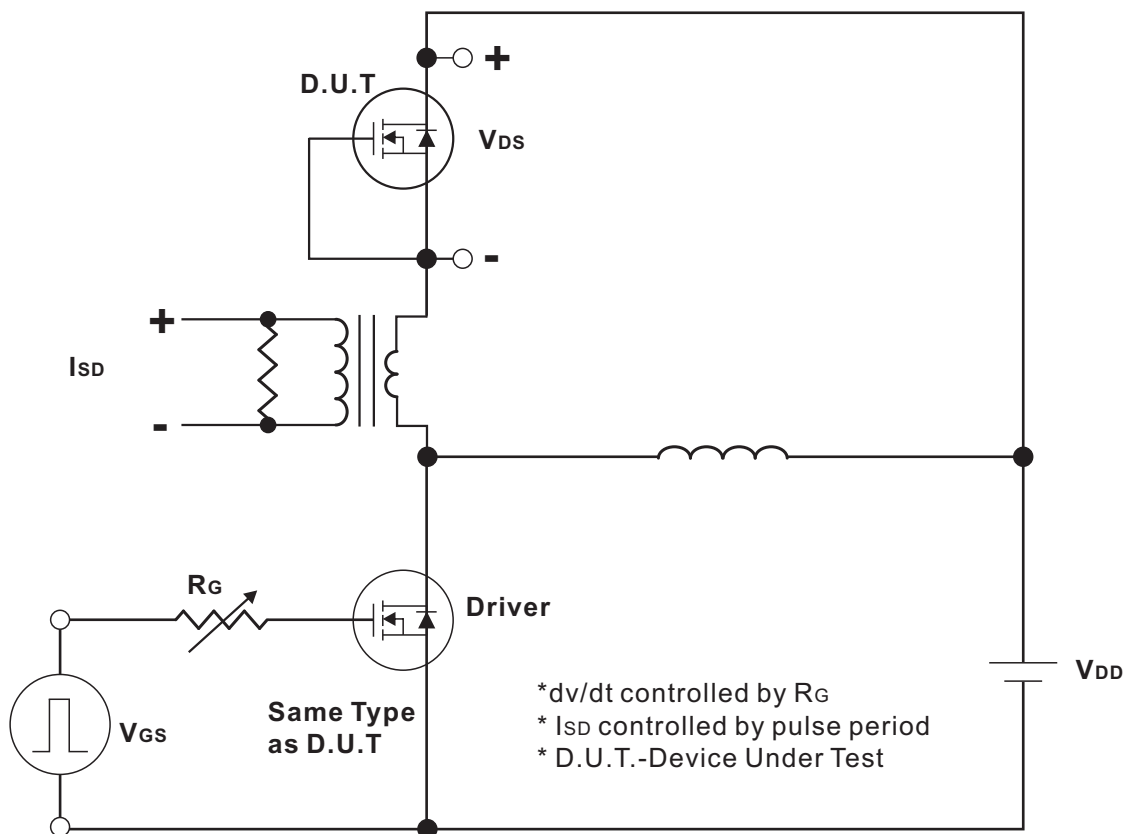
| Parameter | Symbols | Test Conditions | Min | Typ | Max | Units |
|---|--------------|-------------------------------|-----|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 60 | | | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=60V, V_{GS}=0V$ | | | 1.0 | μA |
| Gate- Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 100 | nA |
| On Characteristics | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.2 | | 2.2 | V |
| Static Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=20A$ | | 4.5 | 6.0 | m Ω |
| Transconductance | g_{fs} | $V_{DS}=10V, I_D=2A$ | | 10 | | S |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C_{ISS} | $V_{DS}=30V,$ | | 1759 | | pF |
| Output Capacitance | C_{OSS} | $V_{GS}=0V,$ | | 802 | | pF |
| Reverse Transfer Capacitance | C_{RSS} | $f=1.0MHz$ | | 15.4 | | pF |
| Gate resistance | R_G | | | 1.6 | | Ω |
| Switching Characteristics | | | | | | |
| Total Gate Charge (Note 1) | Q_G | $V_{DS}=30V, V_{GS}=10V,$ | | 31 | | nC |
| Gate-Source Charge | Q_{GS} | $I_D=16.5A(NOTE1,2)$ | | 7.2 | | nC |
| Gate-Drain Charge | Q_{GD} | | | 7 | | nC |
| Turn-On Delay Time (Note 1) | $t_{D(ON)}$ | $V_{DS}=30V, V_{GS}=10V,$ | | 10 | | ns |
| Turn-On Rise Time | t_R | $R_G=3\Omega, I_D=16.5A$ | | 64 | | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | (NOTE1,2) | | 36 | | ns |
| Turn-Off Fall Time | t_F | | | 12 | | ns |
| Drain-source Diode Characteristics And Maximum Ratings | | | | | | |
| Drain-Source Diode Forward Voltage (Note 1) | V_{SD} | $I_{SD}=16.5A, V_{GS}=0V$ | | | 1.4 | V |
| Diode continuous forward current | I_S | | | | 16.5 | A |
| Reverse Recovery time | t_{rr} | $I_{SD}=16.5A$ | | 35 | | nS |
| Reverse Recovery Charge | Q_{rr} | $di/dt=100A/us$ | | 30 | | nC |

Notes:

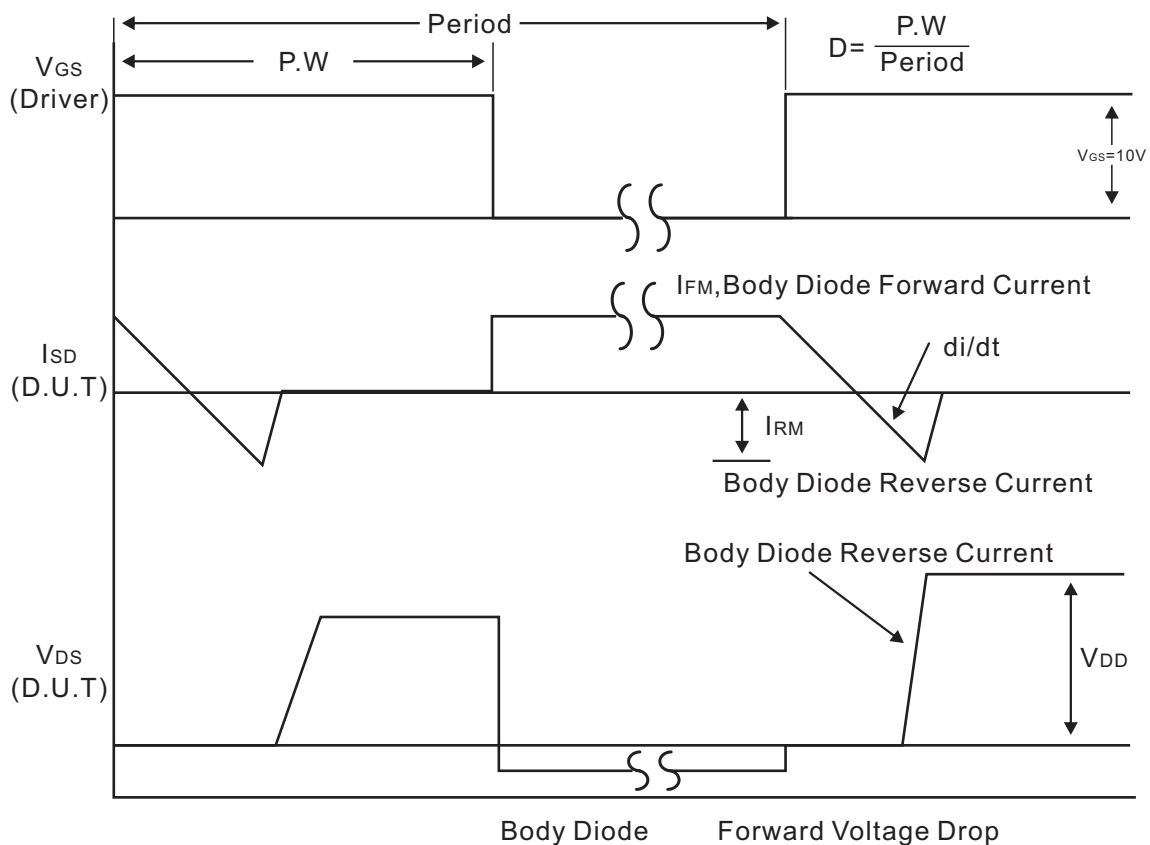
1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.



Test Circuits and waveforms



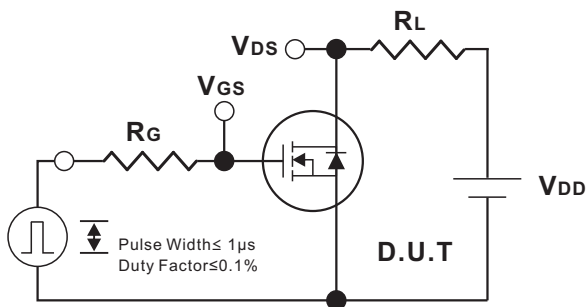
Peak Diode Recovery dv/dt Test Circuit



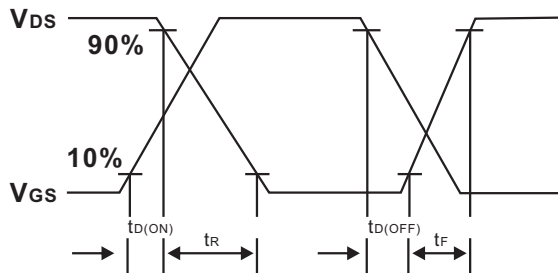
Peak Diode Recovery dv/dt Waveforms



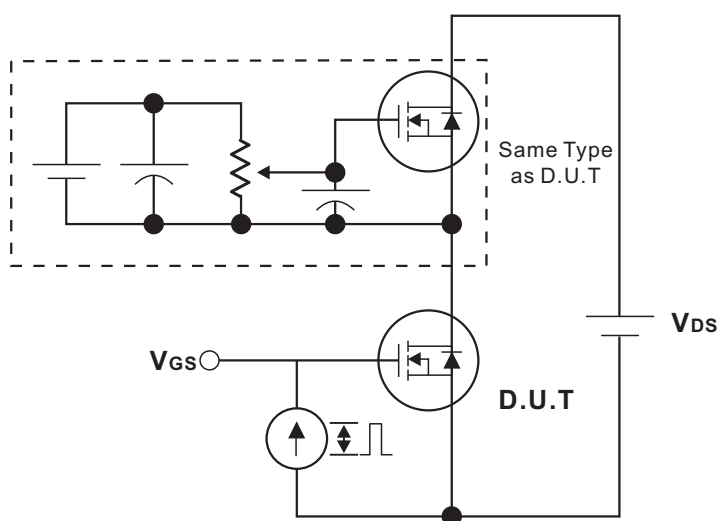
Test Circuits and waveforms



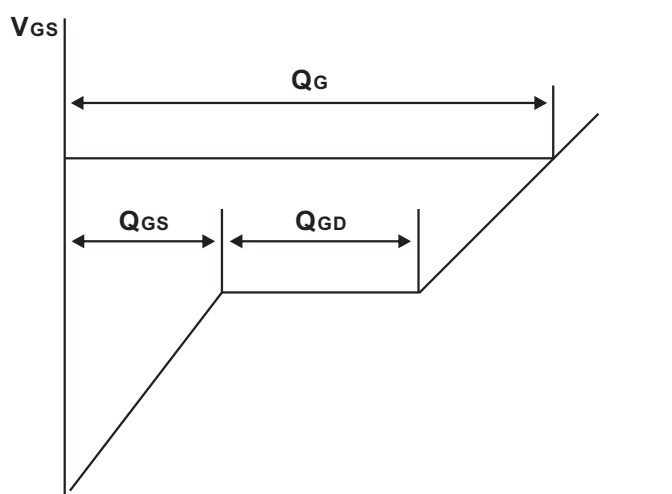
Switching Test Circuit



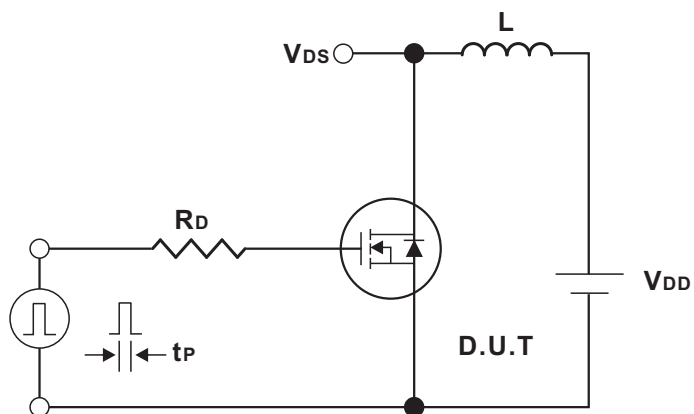
Switching Waveforms



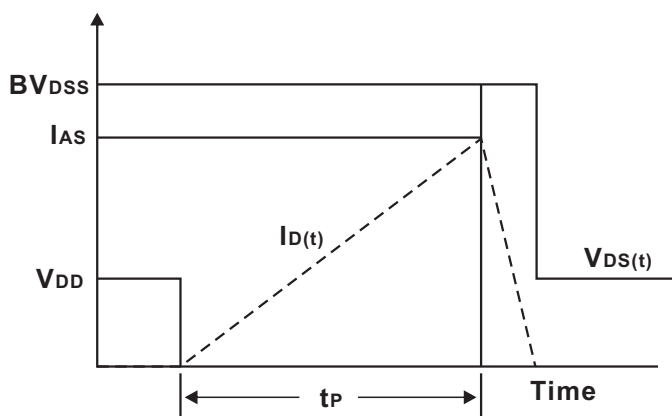
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



Typical Characteristics

Fig.1 Output characteristics

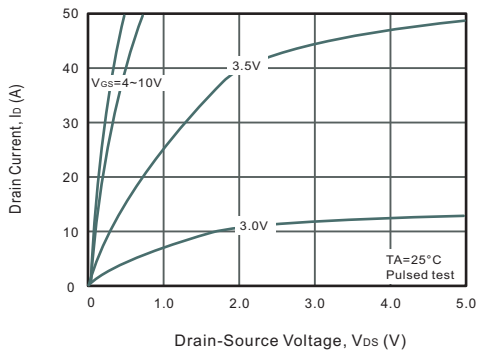


Fig.2 Power Dissipation

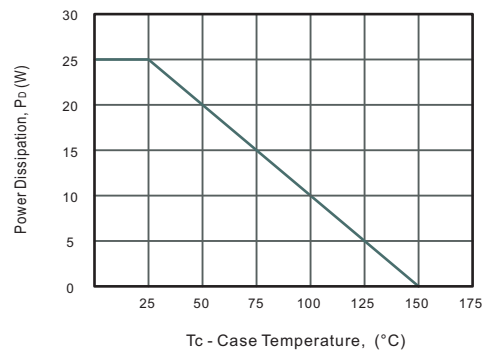


Fig.3 Drain Current Derating

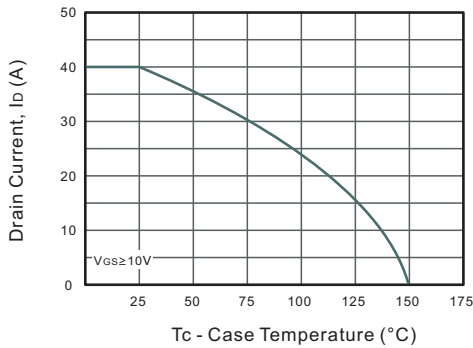


Fig.4 Drain-Source On-Resistance vs. Drain Current

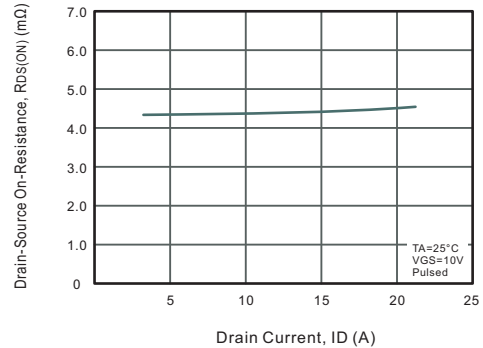


Fig.5 Gate Threshold Voltage vs. Junction Temperature

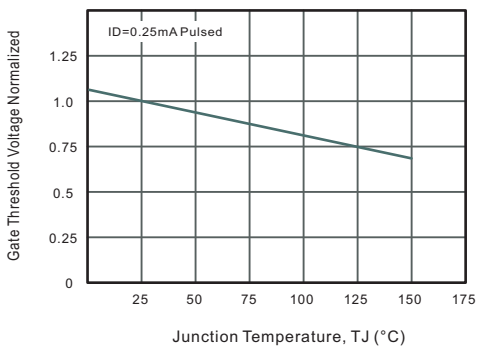


Fig.6 Body-diode Forward Characteristics

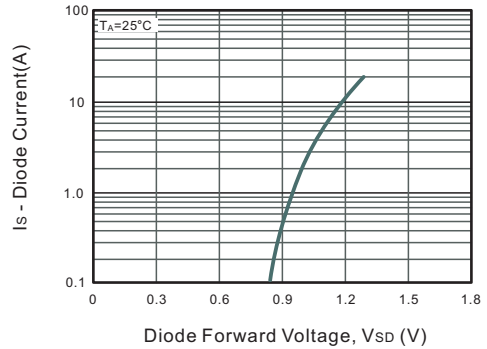


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

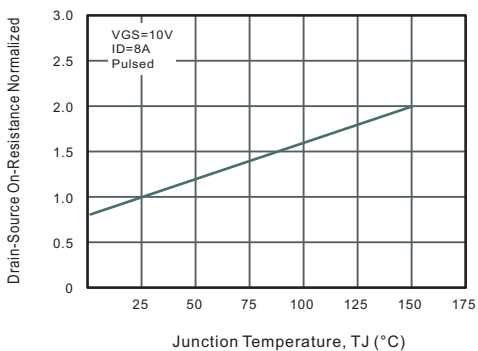
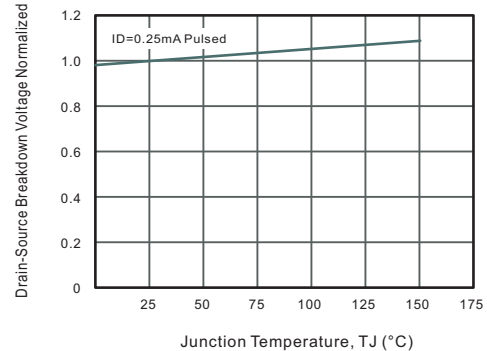


Fig.8 Breakdown Voltage vs. Junction Temperature





Typical Characteristics

Fig.9 Safe Operating Area

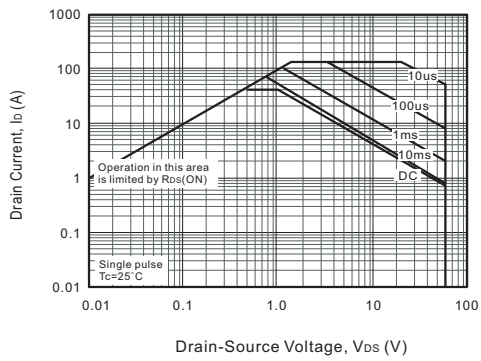


Fig.10 Gate Charge Characteristics

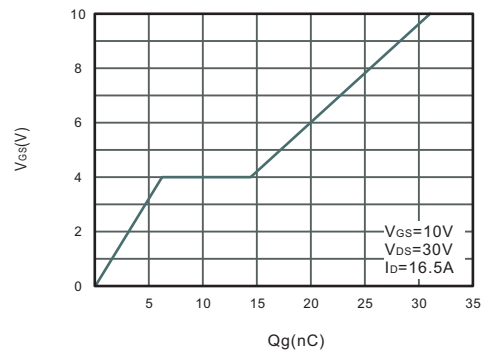


Fig.11 Capacitance Characteristics

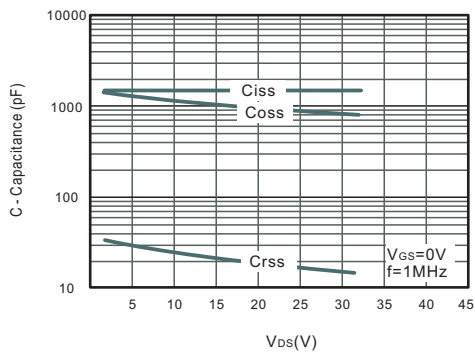
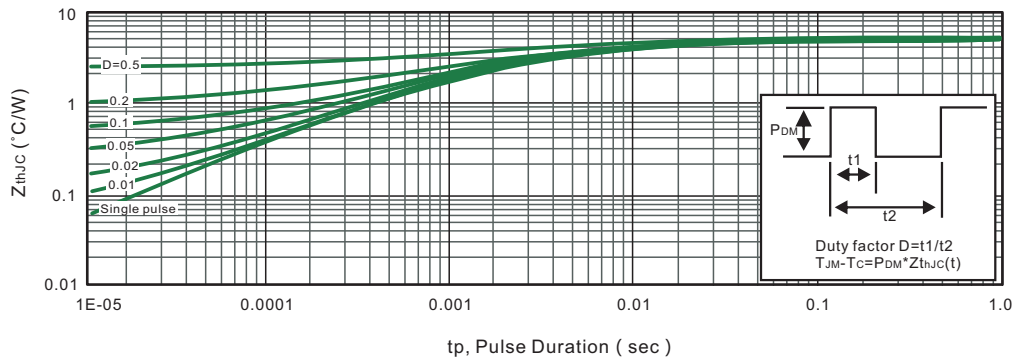


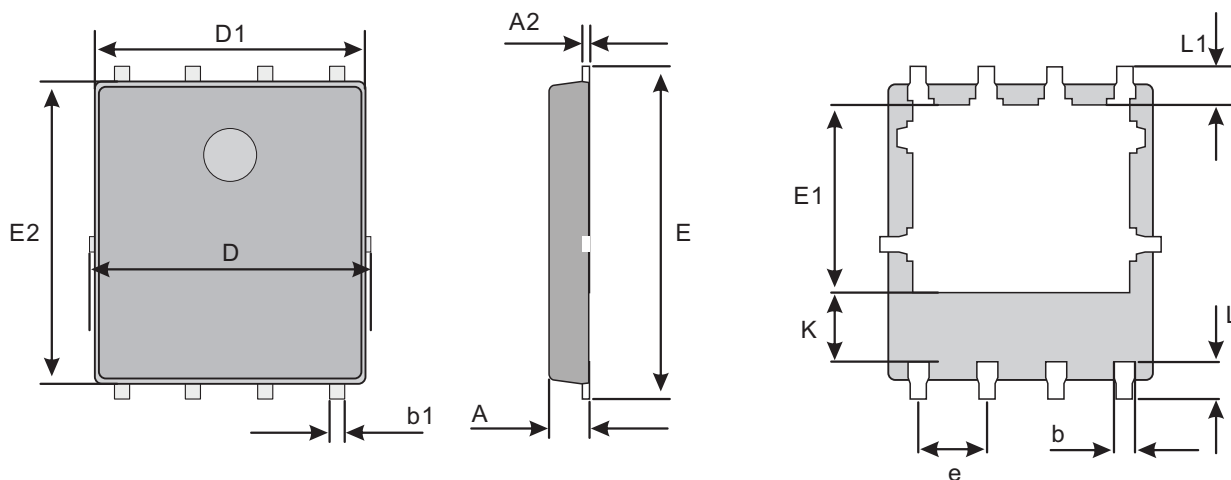
Fig.12 Max. Transient Thermal Impedance





Package Outline
Plastic surface mounted package;8 leads

PDFN5060-8L



Mechanical data

| UNIT | | A | A2 | b | b1 | D | D1 | E | E1 | E2 | e | K | L | L1 |
|------|-----|-----|-------|-------------|-----|------|------|------|-------|------|--------------|--------------|-------|-------------|
| mm | max | 1.1 | 0.304 | 0.4 ref. | 0.4 | 5.3 | 5.24 | 6.35 | 3.675 | 6.09 | 1.27 typ. | 1.29 typ. | 0.785 | 0.7 typ. |
| | typ | 1.0 | 0.254 | | 0.3 | 5.15 | 5.04 | 6.15 | 3.475 | 5.89 | | | 0.685 | |
| | min | 0.9 | 0.204 | | 0.2 | 5.0 | 4.84 | 5.95 | 3.275 | 5.69 | | | 0.585 | |
| mil | max | 43 | 12 | 16 ref. | 16 | 209 | 206 | 250 | 145 | 240 | 50 typ. | 51 typ. | 31 | 28 typ. |
| | typ | 39 | 10 | | 12 | 203 | 198 | 242 | 137 | 232 | | | 27 | |
| | min | 35 | 8 | | 8 | 197 | 191 | 234 | 129 | 224 | | | 23 | |

Marking Diagram



- Jingdao Logo
- Unmarkable Surfacea
- Pin1 Mark
- LXXXX XXXXXXXX: Marking code
- 0A0: Traceability code
- YWW: Y: Years(0~9)
- WW: Week



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