



## Features

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

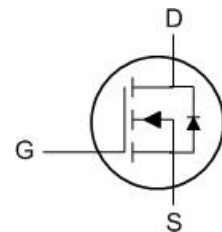
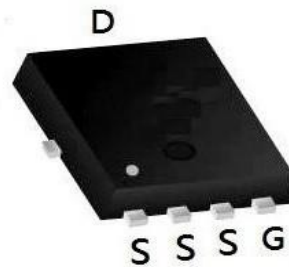
## Product Summary

| BVDSS | RDSON | ID   |
|-------|-------|------|
| 30V   | 2.0mΩ | 120A |

## Applications

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

## PDFN5060-8L(CLIP) Pin Configuration



## Absolute Maximum Ratings

| Parameter                                        |                           | Symbol         | Value      | Unit |
|--------------------------------------------------|---------------------------|----------------|------------|------|
| Drain-Source Voltage                             |                           | $V_{DS}$       | 30         | V    |
| Gate-Source Voltage                              |                           | $V_{GS}$       | ±20        | V    |
| Continuous Drain Current                         | $T_C=25^{\circ}\text{C}$  | $I_D$          | 120        | A    |
|                                                  | $T_C=100^{\circ}\text{C}$ |                | 75         |      |
| Pulsed Drain Current <sup>1</sup>                |                           | $I_{DM}$       | 380        | A    |
| Single Pulse Avalanche Energy <sup>2</sup>       |                           | $E_{AS}$       | 101        | mJ   |
| Total Power Dissipation                          | $T_C=25^{\circ}\text{C}$  | $P_D$          | 69         | W    |
| Operating Junction and Storage Temperature Range |                           | $T_J, T_{STG}$ | -55 to 150 | °C   |

## Thermal Characteristics

| Parameter                                                | Symbol          | Value | Unit |
|----------------------------------------------------------|-----------------|-------|------|
| Thermal Resistance from Junction-to-Ambient <sup>3</sup> | $R_{\theta JA}$ | 50    | °C/W |
| Thermal Resistance from Junction-to-Case                 | $R_{\theta JC}$ | 1.8   | °C/W |

Electrical Characteristics ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)

| Parameter                               |                       | Symbol               | Test Conditions                                                                        | Min. | Typ. | Max. | Unit |
|-----------------------------------------|-----------------------|----------------------|----------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                  |                       |                      |                                                                                        |      |      |      |      |
| Drain-Source Breakdown Voltage          |                       | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                           | 30   | -    | -    | V    |
| Gate-body Leakage Current               |                       | I <sub>GSS</sub>     | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V                                           | -    | -    | ±100 | nA   |
| Zero Gate Voltage Drain Current         | T <sub>J</sub> =25°C  | I <sub>DSS</sub>     | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V                                            | -    | -    | 1    | μA   |
|                                         | T <sub>J</sub> =125°C |                      |                                                                                        | -    | 2    | -    |      |
| Gate-Threshold Voltage                  |                       | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                             | 1.3  | -    | 2.3  | V    |
| Drain-Source On-Resistance <sup>4</sup> |                       | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 22.5A                                          | -    | 2.0  | 2.4  | mΩ   |
|                                         |                       |                      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> =22.5A                                          | -    | 3.0  | 3.8  |      |
| Forward Transconductance <sup>4</sup>   |                       | g <sub>fs</sub>      | V <sub>DS</sub> = 10V, I <sub>D</sub> = 20A                                            | -    | 130  | -    | S    |
| Dynamic Characteristics <sup>5</sup>    |                       |                      |                                                                                        |      |      |      |      |
| Input Capacitance                       |                       | C <sub>iss</sub>     | V <sub>DS</sub> = 15V, V <sub>GS</sub> =0V, f =1MHz                                    | -    | 2566 | -    | pF   |
| Output Capacitance                      |                       | C <sub>oss</sub>     |                                                                                        | -    | 1419 | -    |      |
| Reverse Transfer Capacitance            |                       | C <sub>rss</sub>     |                                                                                        | -    | 111  | -    |      |
| Gate Resistance                         |                       | R <sub>g</sub>       | f = 1MHz                                                                               | -    | 2.5  | -    | Ω    |
| Switching Characteristics <sup>5</sup>  |                       |                      |                                                                                        |      |      |      |      |
| Total Gate Charge                       |                       | Q <sub>g</sub>       | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A                     | -    | 39   | -    | nC   |
| Gate-Source Charge                      |                       | Q <sub>gs</sub>      |                                                                                        | -    | 11   | -    |      |
| Gate-Drain Charge                       |                       | Q <sub>gd</sub>      |                                                                                        | -    | 4.5  | -    |      |
| Turn-On Delay Time                      |                       | t <sub>d(on)</sub>   | V <sub>GS</sub> =10V, V <sub>DD</sub> = 20V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = 20A | -    | 10   | -    | ns   |
| Rise Time                               |                       | t <sub>r</sub>       |                                                                                        | -    | 37   | -    |      |
| Turn-Off Delay Time                     |                       | t <sub>d(off)</sub>  |                                                                                        | -    | 45   | -    |      |
| Fall Time                               |                       | t <sub>f</sub>       |                                                                                        | -    | 16   | -    |      |
| Body Diode Reverse Recovery Time        |                       | t <sub>rr</sub>      | I <sub>F</sub> =20A, dI/dt=100A/μs                                                     | -    | 49   | -    | ns   |
| Body Diode Reverse Recovery Charge      |                       | Q <sub>rr</sub>      |                                                                                        | -    | 35   | -    | nC   |
| Drain-Source Body Diode Characteristics |                       |                      |                                                                                        |      |      |      |      |
| Diode Forward Voltage <sup>4</sup>      |                       | V <sub>SD</sub>      | I <sub>S</sub> = 45, V <sub>GS</sub> = 0V                                              | -    | -    | 1.4  | V    |
| Continuous Source Current               | T <sub>C</sub> =25°C  | I <sub>S</sub>       | -                                                                                      | -    | -    | 120  | A    |

## Notes:

1. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ\text{C}$ .
2. The EAS data shows Max. rating. The test condition is  $V_{DD} = 24V, V_{GS} = 10V, L = 0.1\text{mH}, R_g = 25\Omega$
3. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
5. This value is guaranteed by design hence it is not included in the production test.

### Typical Characteristics

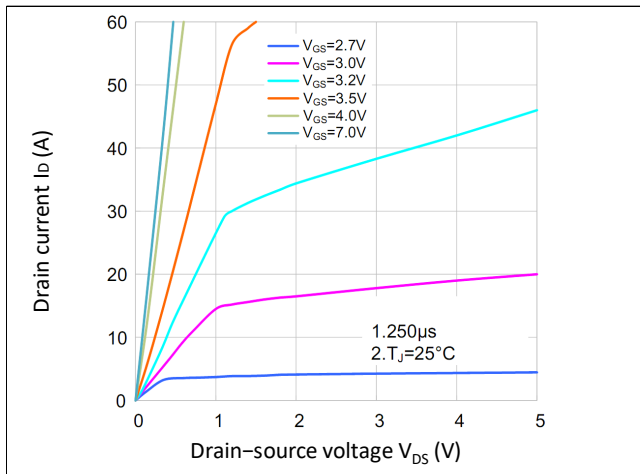


Figure 1. Output Characteristics

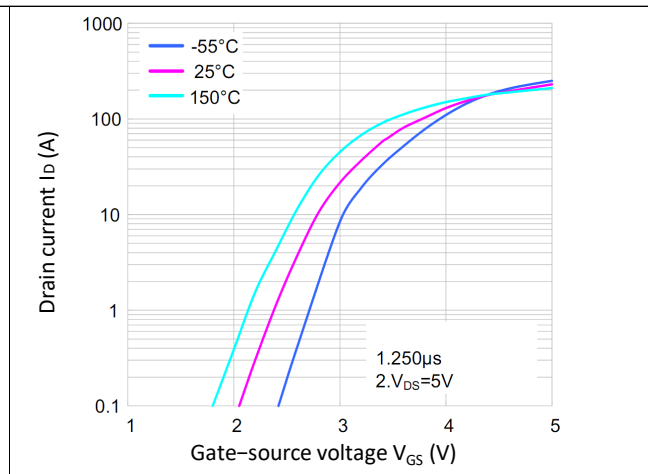


Figure 2. Transfer Characteristics

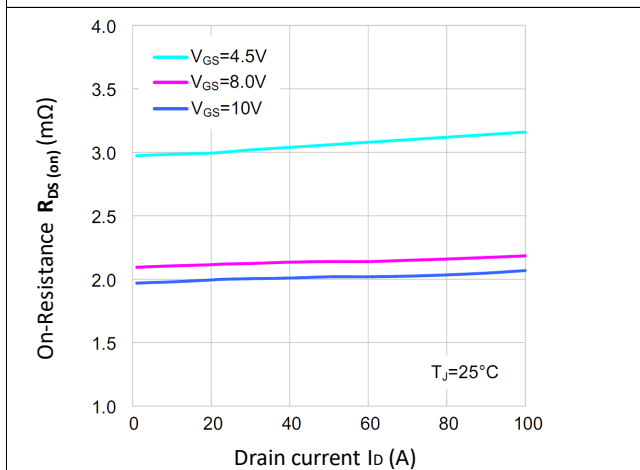


Figure 3.  $R_{DS(ON)}$  vs.  $I_D$

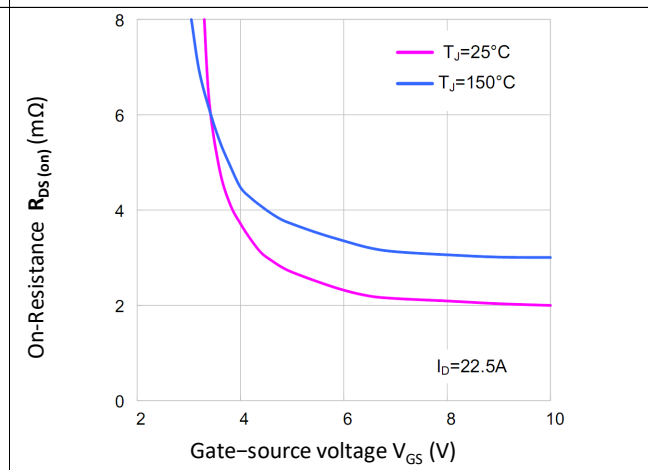


Figure 4.  $R_{DS(ON)}$  vs.  $V_{GS}$

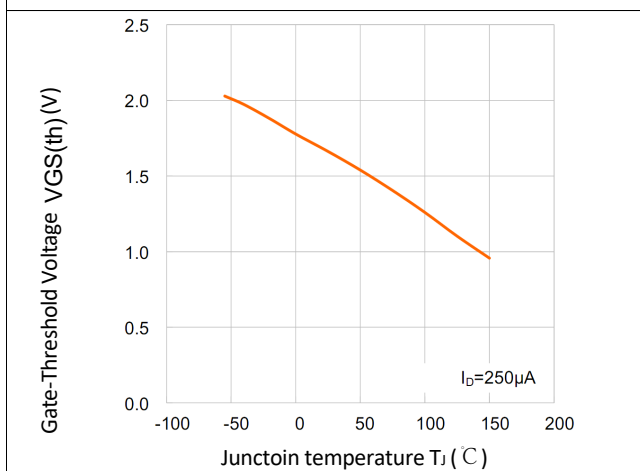


Figure 5.  $V_{GS(th)}$  vs.  $T_J$

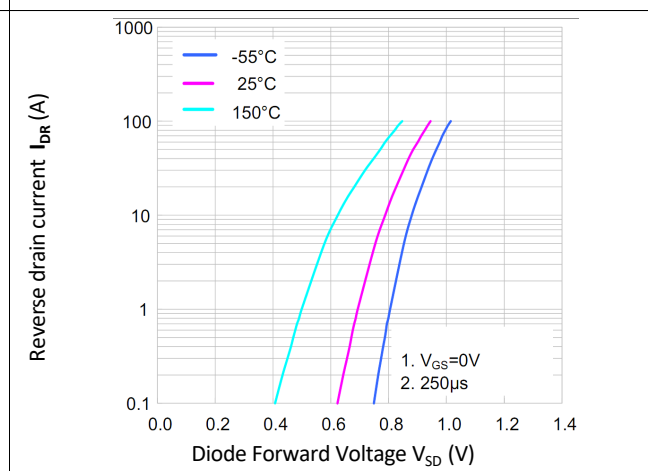


Figure 6.  $I_{DR}$  vs.  $V_{SD}$

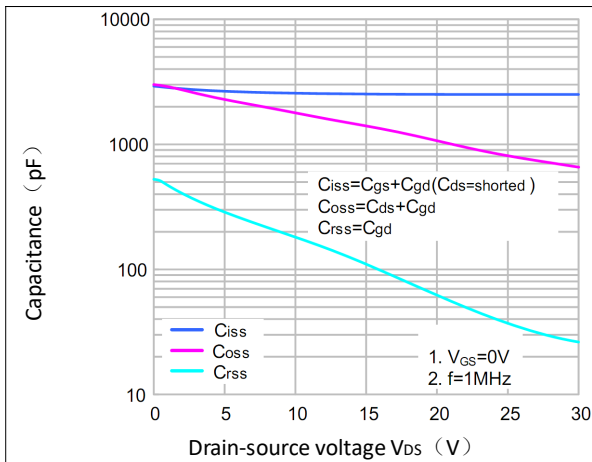


Figure 7. Capacitance Characteristics

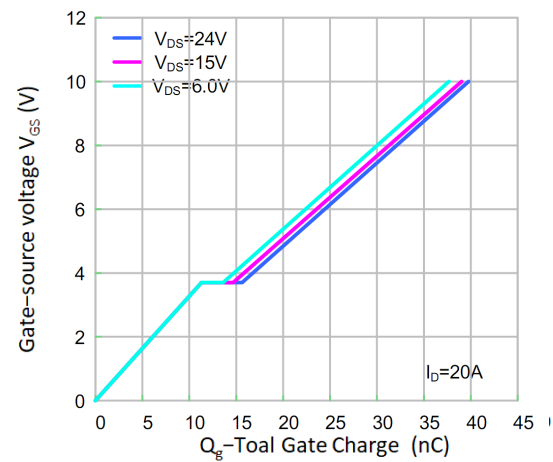


Figure 8 Gate Charge Characteristics

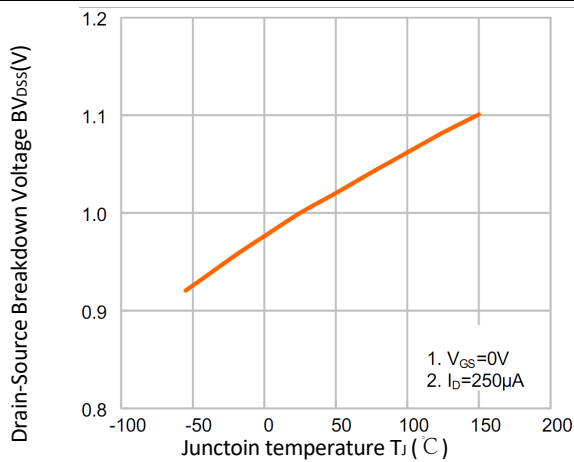


Figure 9.  $BV_{DSS}$  VS  $T_J$

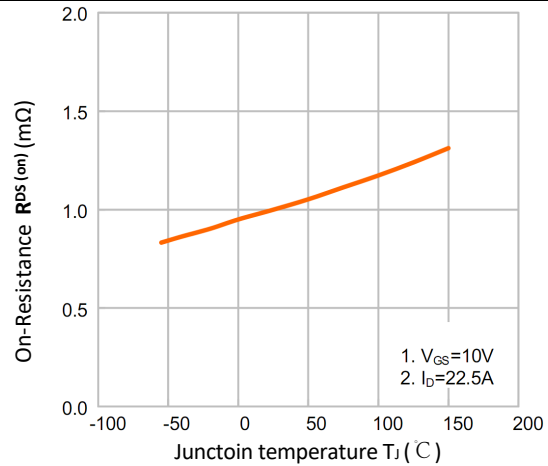


Figure 10.  $R_{DS(ON)}$  VS  $T_J$

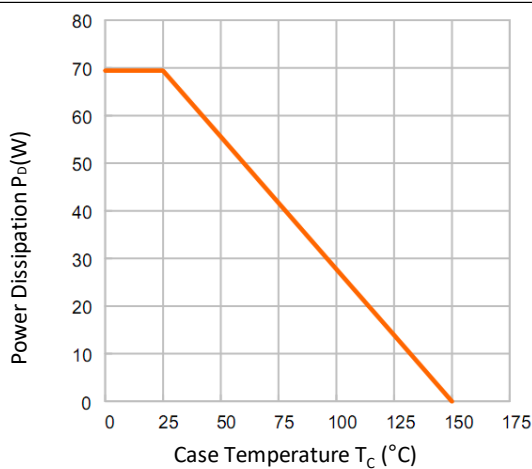


Figure 11. Power Dissipation

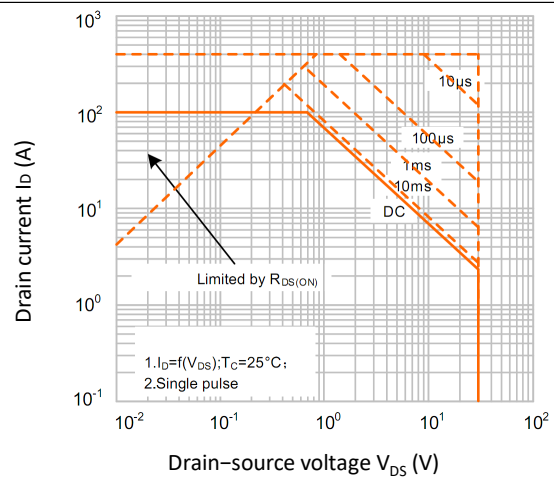


Figure 12. Safe Operating Area

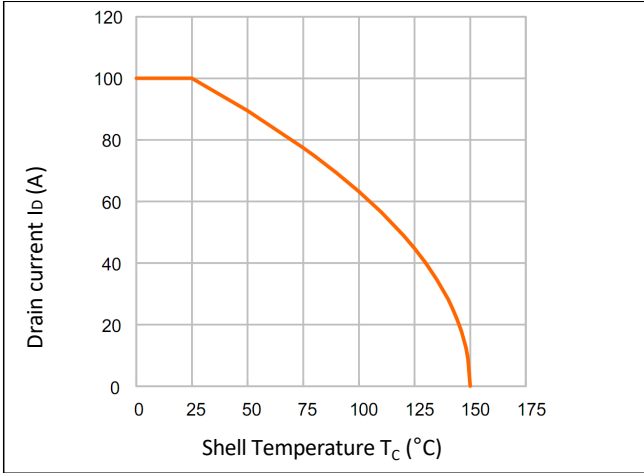


Figure 13.Drain current VS Shell Temperature

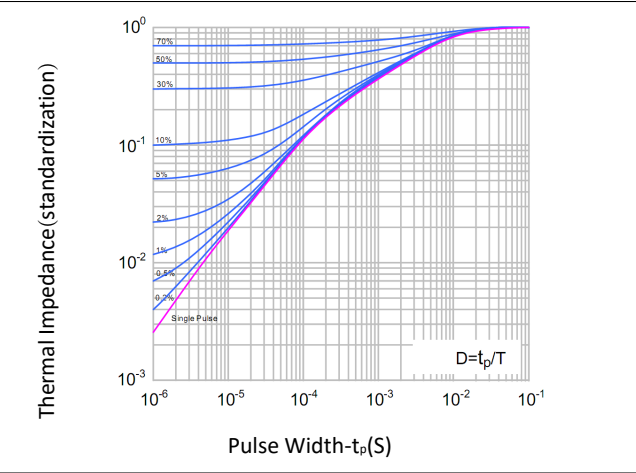


Figure 14 Transient thermal impedance VS Pulse Width

### Test Circuit

PDFN5060-8L Package Information

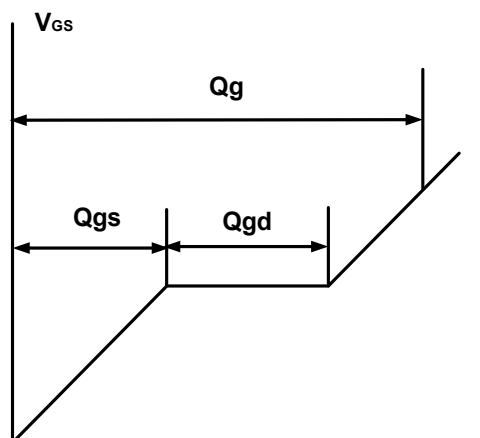
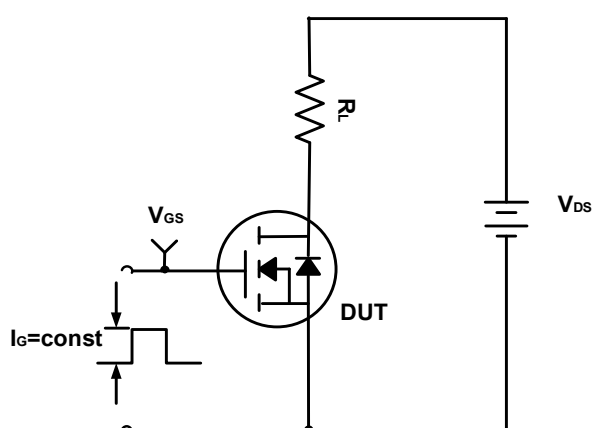


Figure A. Gate Charge Test Circuit & Waveforms

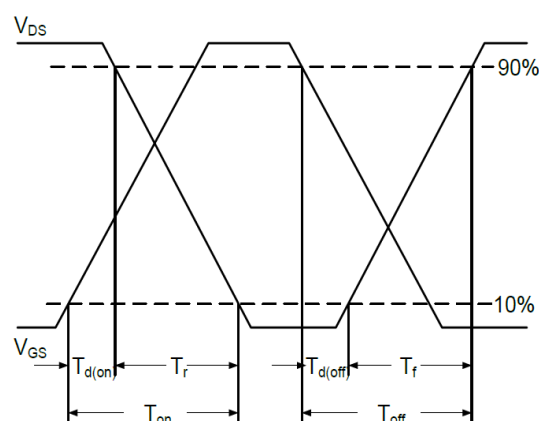
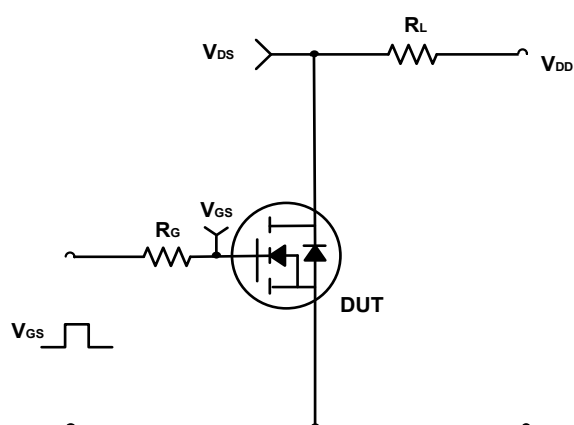


Figure B. Switching Test Circuit & Waveforms

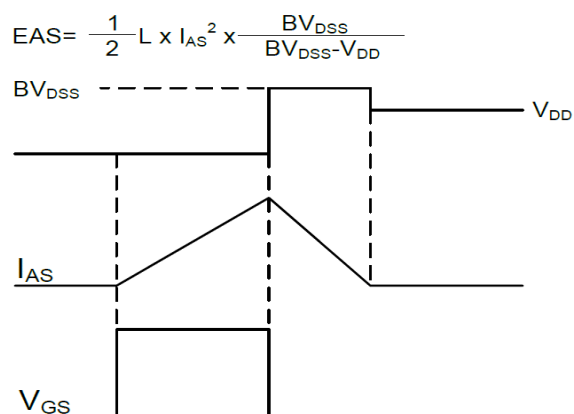
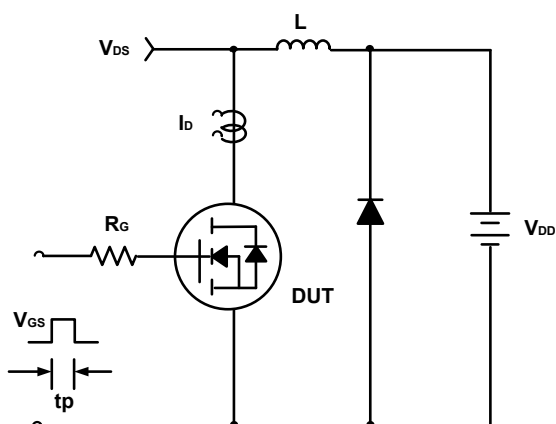
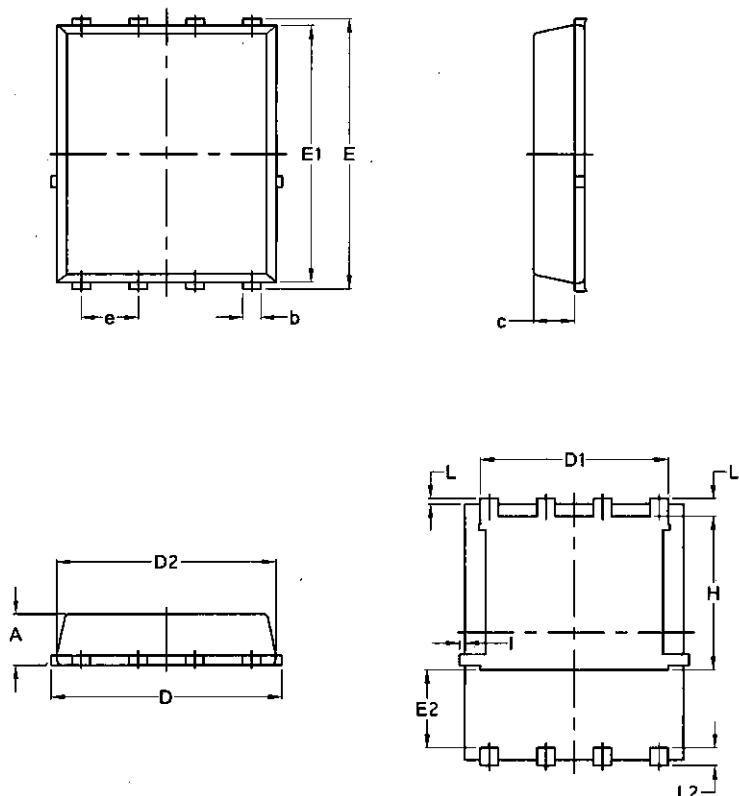


Figure C. Unclamped Inductive Switching Circuit & Waveforms

### Package Mechanical Data-PDFN5060-8L(CLIP)- 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 |