

## 150V N-Channel Enhancement Mode Power MOSFET

## Description

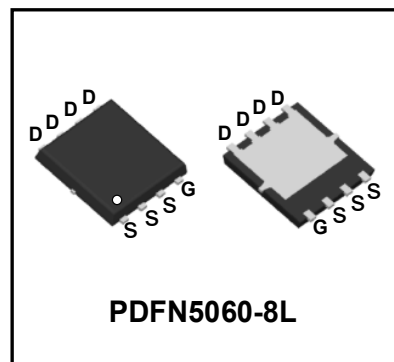
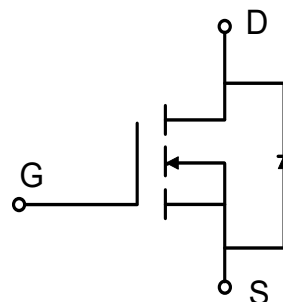
WMB115N15HGD uses Wayon's advanced power trench MOSFET technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance. This device is well suited for high efficiency fast switching applications.

## Features

- $V_{DS} = 150V$ ,  $I_D = 80A$   
 $R_{DS(on)} < 11.5m\Omega$  @  $V_{GS} = 10V$
- Green Device Available
- Low Gate Charge
- Advanced High Cell Density Trench Technology
- 100% EAS Guaranteed

## Applications

- Synchronous Rectification
- DC/DC Converter
- Motor Control

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

| Parameter                                        |                     | Symbol         | Value      | Unit       |
|--------------------------------------------------|---------------------|----------------|------------|------------|
| Drain-Source Voltage                             |                     | $V_{DS}$       | 150        | V          |
| Gate-Source Voltage                              |                     | $V_{GS}$       | $\pm 20$   | V          |
| Continuous Drain Current                         | $T_C = 25^\circ C$  | $I_D$          | 80         | A          |
|                                                  | $T_C = 100^\circ C$ |                | 50.6       |            |
| Pulsed Drain Current <sup>1</sup>                |                     | $I_{DM}$       | 320        | A          |
| Single Pulse Avalanche Energy <sup>2</sup>       |                     | <b>EAS</b>     | 231.2      | mJ         |
| Total Power Dissipation                          | $T_C = 25^\circ C$  | $P_D$          | 158        | W          |
| Operating Junction and Storage Temperature Range |                     | $T_J, T_{STG}$ | -55 to 150 | $^\circ C$ |

## Thermal Characteristics

| Parameter                                                | Symbol          | Value | Unit         |
|----------------------------------------------------------|-----------------|-------|--------------|
| Thermal Resistance from Junction-to-Ambient <sup>3</sup> | $R_{\theta JA}$ | 55    | $^\circ C/W$ |
| Thermal Resistance from Junction-to-Case                 | $R_{\theta JC}$ | 0.79  | $^\circ C/W$ |

**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                                          | 150  | -    | -    | 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> =150V, V <sub>GS</sub> = 0V                                           | -    | -    | 1    | μA   |
|                                         | T <sub>J</sub> =100°C |                      |                                                                                       | -    | -    | 100  |      |
| Gate-Threshold Voltage                  |                       | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                            | 2    | 3    | 4    | V    |
| Drain-Source on-Resistance <sup>4</sup> |                       | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                           | -    | 8.7  | 11.5 | mΩ   |
| Forward Transconductance <sup>4</sup>   |                       | g <sub>fs</sub>      | V <sub>DS</sub> =10V , I <sub>D</sub> =20A                                            | -    | 63   | -    | S    |
| Dynamic Characteristics <sup>5</sup>    |                       |                      |                                                                                       |      |      |      |      |
| Input Capacitance                       |                       | C <sub>iss</sub>     | V <sub>DS</sub> = 75V, V <sub>GS</sub> =0V, f =1MHz                                   | -    | 2145 | -    | pF   |
| Output Capacitance                      |                       | C <sub>oss</sub>     |                                                                                       | -    | 340  | -    |      |
| Reverse Transfer Capacitance            |                       | C <sub>rss</sub>     |                                                                                       | -    | 6.8  | -    |      |
| Gate Resistance                         |                       | R <sub>g</sub>       | f =1MHz                                                                               | -    | 2.4  | -    | Ω    |
| Switching Characteristics <sup>5</sup>  |                       |                      |                                                                                       |      |      |      |      |
| Total Gate Charge                       |                       | Q <sub>g</sub>       | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 75V, I <sub>D</sub> =20A                     | -    | 27.5 | -    | nC   |
| Gate-Source Charge                      |                       | Q <sub>gs</sub>      |                                                                                       | -    | 7    | -    |      |
| Gate-Drain Charge                       |                       | Q <sub>gd</sub>      |                                                                                       | -    | 5.8  | -    |      |
| Turn-On Delay Time                      |                       | t <sub>d(on)</sub>   | V <sub>GS</sub> =10V, V <sub>DD</sub> =75V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = 20A | -    | 11   | -    | ns   |
| Rise Time                               |                       | t <sub>r</sub>       |                                                                                       | -    | 22   | -    |      |
| Turn-Off Delay Time                     |                       | t <sub>d(off)</sub>  |                                                                                       | -    | 27.9 | -    |      |
| Fall Time                               |                       | t <sub>f</sub>       |                                                                                       | -    | 24.5 | -    |      |
| Body Diode Reverse Recovery Time        |                       | t <sub>rr</sub>      | I <sub>F</sub> = 20A, dI/dt=100A/μs                                                   | -    | 95   | -    | ns   |
| Body Diode Reverse Recovery Charge      |                       | Q <sub>rr</sub>      |                                                                                       | -    | 312  | -    | nC   |
| Drain-Source Body Diode Characteristics |                       |                      |                                                                                       |      |      |      |      |
| Diode Forward Voltage <sup>4</sup>      |                       | V <sub>SD</sub>      | I <sub>S</sub> = 20A, V <sub>GS</sub> = 0V                                            | -    | -    | 1.2  | V    |
| Continuous Source Current               | T <sub>C</sub> =25°C  | I <sub>S</sub>       | -                                                                                     | -    | -    | 80   | 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  $V_{DD} = 75V, V_{GS} = 10V, L = 0.4mH, I_{AS} = 34A$
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

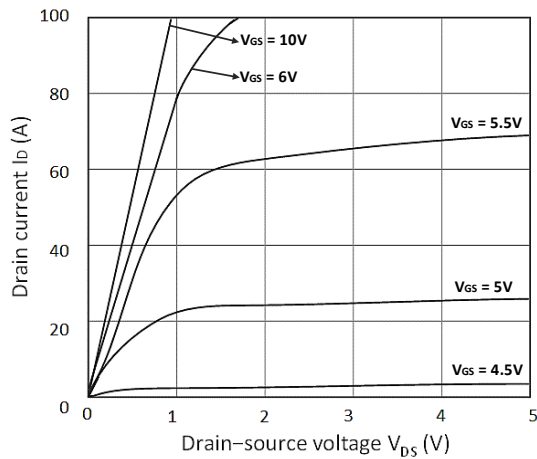


Figure 1. Output Characteristics

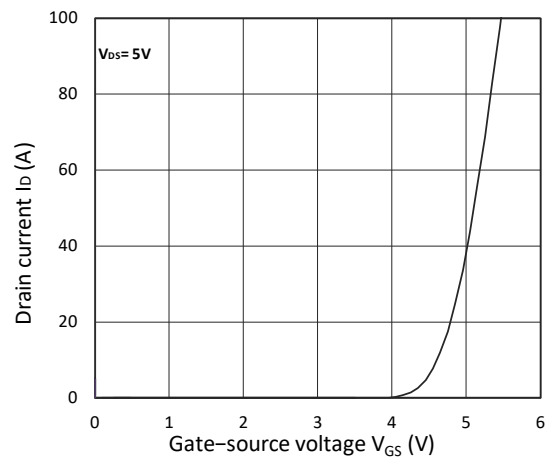


Figure 2. Transfer Characteristics

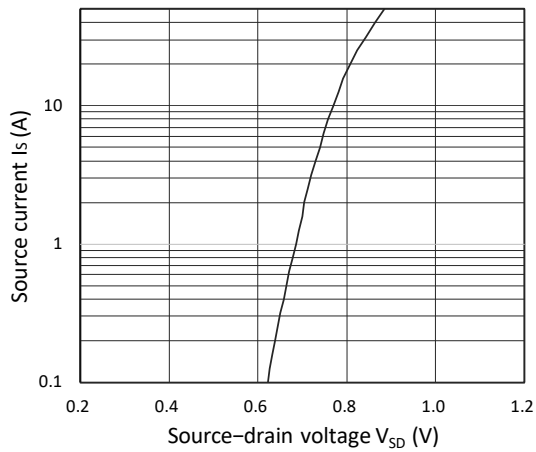
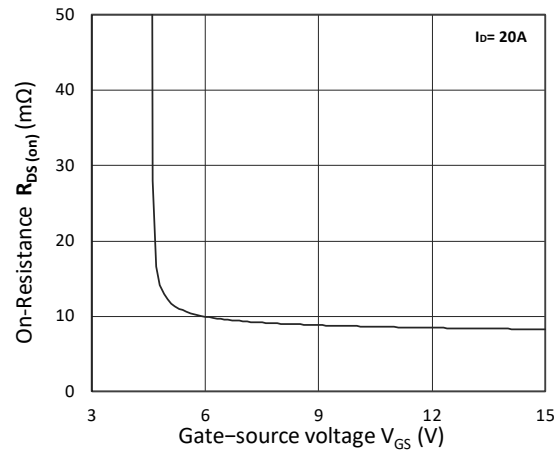
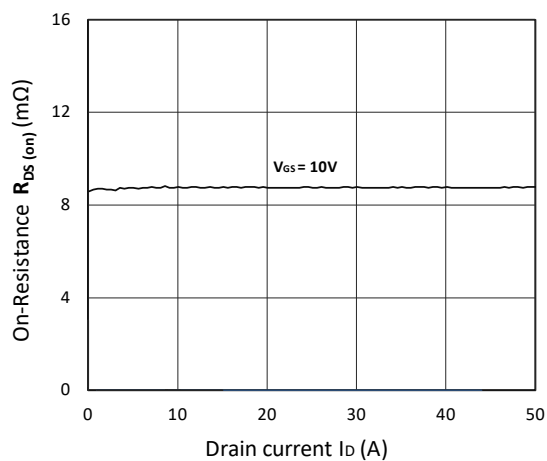
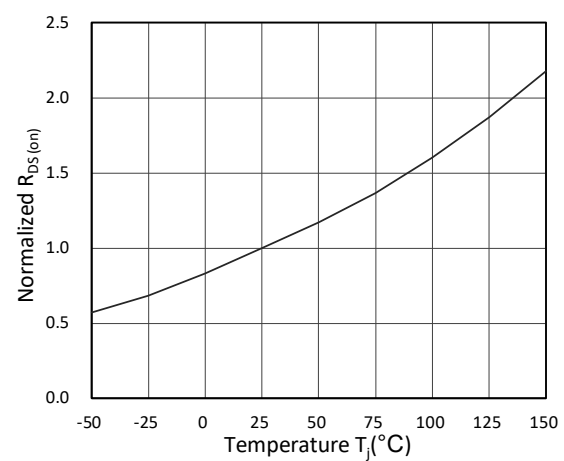


Figure 3. Forward Characteristics of Reverse

Figure 4.  $R_{DS(on)}$  vs.  $V_{GS}$ Figure 5.  $R_{DS(on)}$  vs.  $I_D$ Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

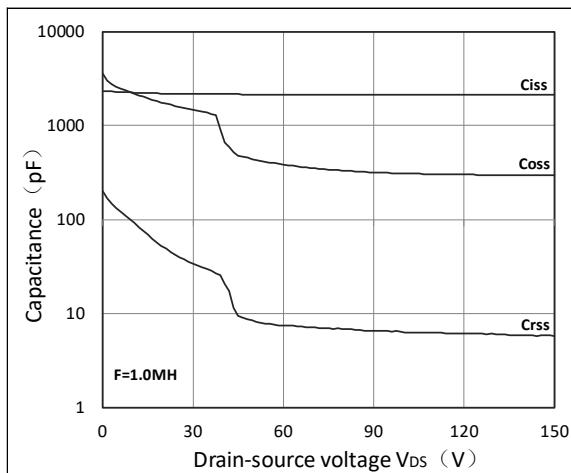


Figure 7. Capacitance Characteristics

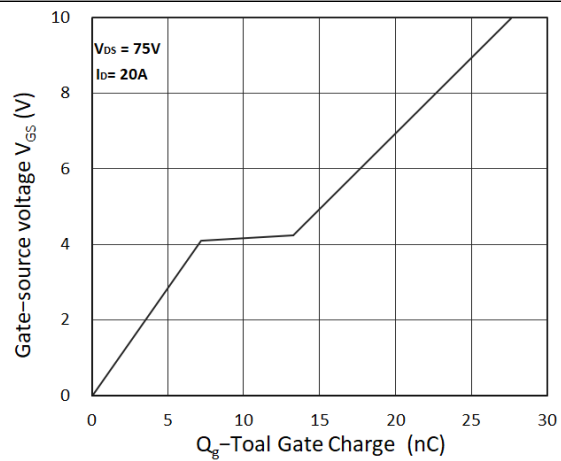


Figure 8. Gate Charge Characteristics

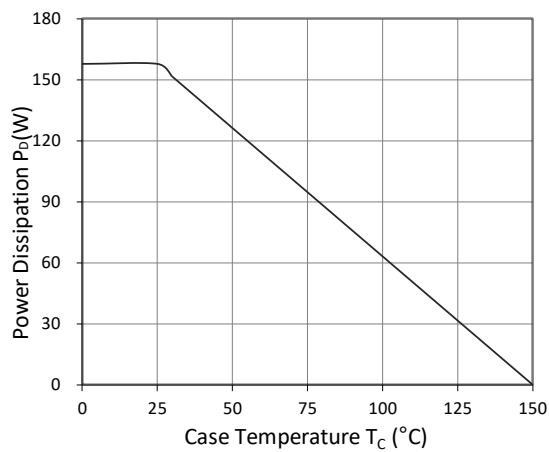


Figure 9. Power Dissipation

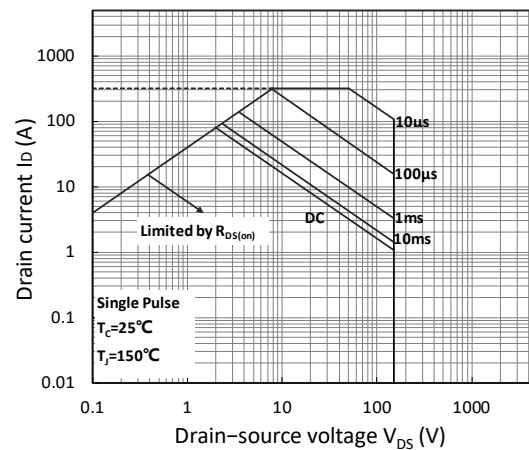


Figure10. Safe Operating Area

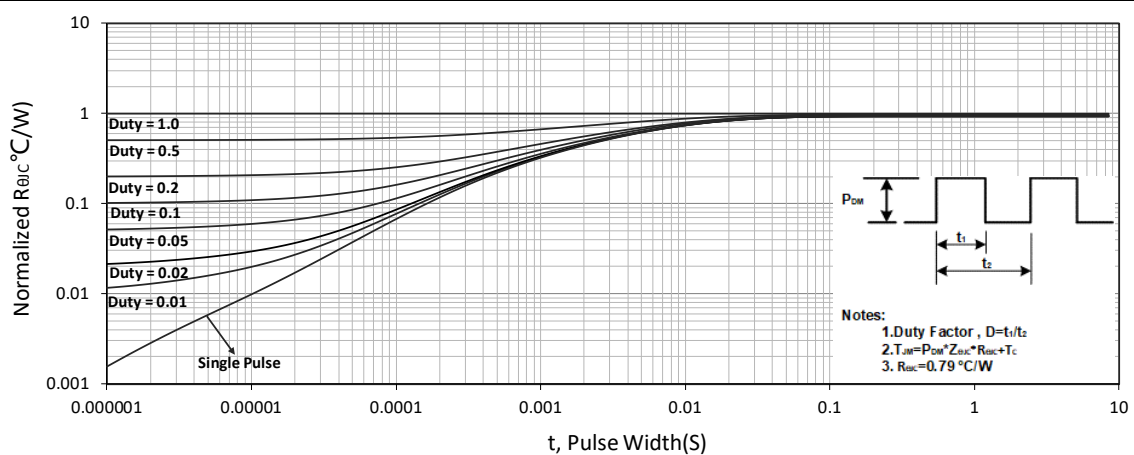


Figure 11. Normalized Maximum Transient Thermal Impedance

## Test Circuit

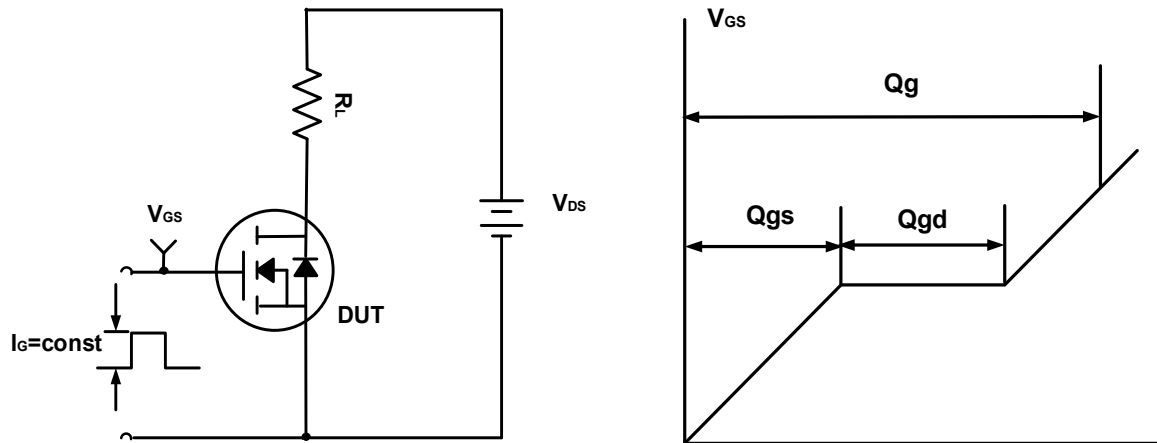


Figure A. Gate Charge Test Circuit &amp; Waveforms

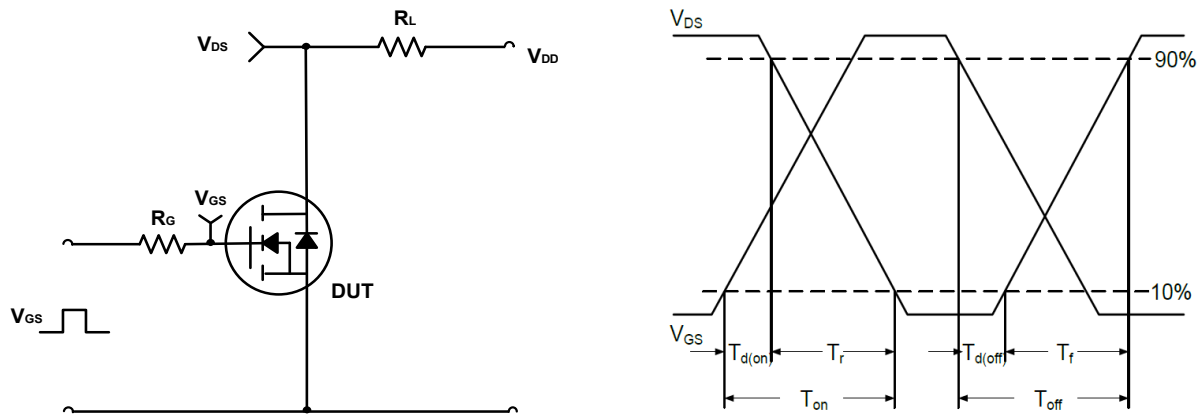


Figure B. Switching Test Circuit &amp; Waveforms

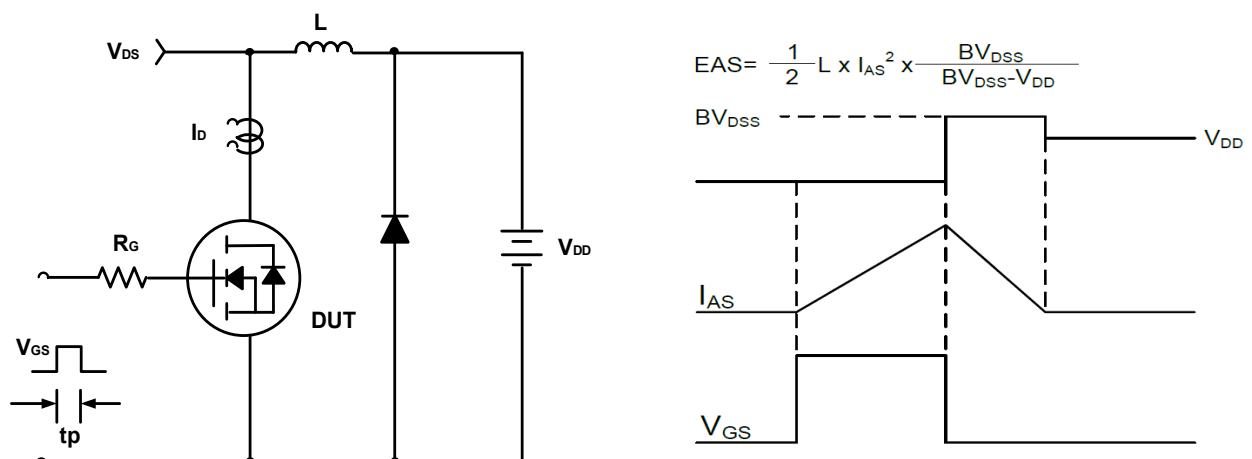
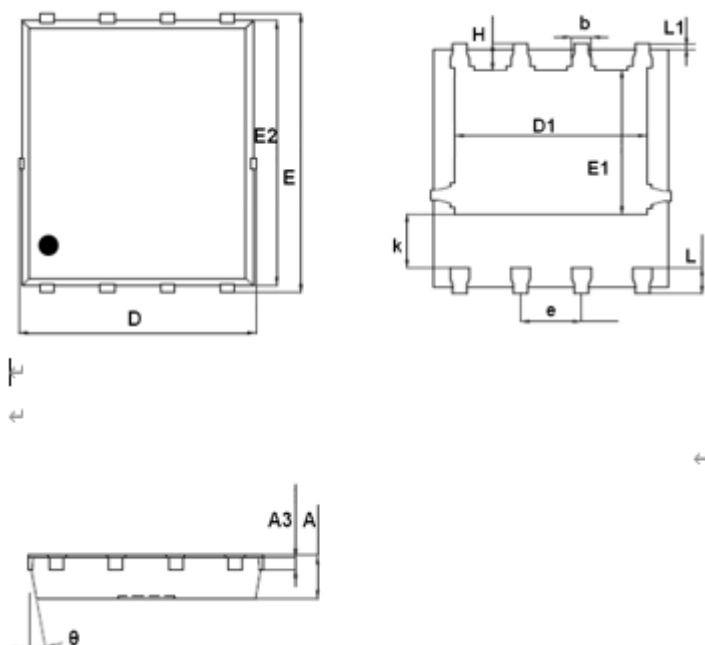


Figure C. Unclamped Inductive Switching Circuit &amp; Waveforms

## Mechanical Dimensions for PDFN5060-8L

## COMMON DIMENSIONS

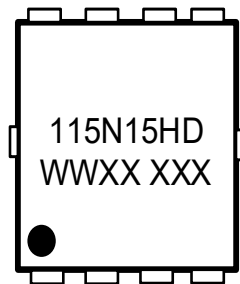


| SYMBOL   | MM      |      |
|----------|---------|------|
|          | MIN     | MAX  |
| A        | 0.90    | 1.20 |
| A3       | 0.15    | 0.35 |
| D        | 4.80    | 5.40 |
| E        | 5.90    | 6.35 |
| D1       | 3.61    | 4.31 |
| E1       | 3.30    | 3.92 |
| E2       | 5.50    | 6.06 |
| k        | 1.10    | -    |
| b        | 0.30    | 0.51 |
| e        | 1.27BSC |      |
| L        | 0.38    | 0.71 |
| L1       | 0.05    | 0.36 |
| H        | 0.38    | 0.71 |
| $\theta$ | 0°      | 12°  |

## Ordering Information

| Part         | Package     | Marking  | Packing method |
|--------------|-------------|----------|----------------|
| WMB115N15HGD | PDFN5060-8L | 115N15HD | Tape and Reel  |

## Marking Information



115N15HD = Device code

WWXX XXX= Date code

## Contact Information

No.1001, Shiwan(7) Road, Pudong District, Shanghai, P.R.China.201207

Tel: 86-21-50310888 Fax: 86-21-50757680 Email: market@way-on.com

WAYON website: <http://www.way-on.com>

For additional information, please contact your local Sales Representative.

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