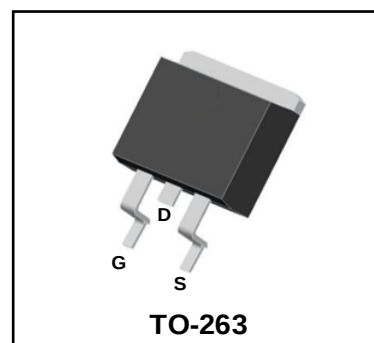


## 80V N-Channel Enhancement Mode Power MOSFET

## Description

WMM040N08HGS 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.

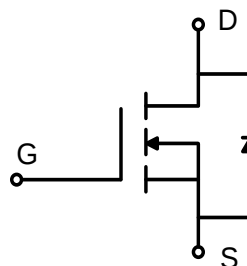


## Features

- $V_{DS} = 80V$ ,  $I_D = 180A$   
 $R_{DS(on)} < 4.8m\Omega @ V_{GS} = 10V$
- Green Device Available
- Low Gate Charge
- 100% EAS Guaranteed

## Applications

- Power Management Switches
- DC/DC Converter
- Battery Management System

RoHS  
compliantAbsolute Maximum Ratings ( $T_c = 25^\circ C$ , unless otherwise noted)

| Parameter                                        |                     | Symbol         | Value      | Unit       |
|--------------------------------------------------|---------------------|----------------|------------|------------|
| Drain-Source Voltage                             |                     | $V_{DS}$       | 80         | V          |
| Gate-Source Voltage                              |                     | $V_{GS}$       | $\pm 20$   | V          |
| Continuous Drain Current                         | $T_c = 25^\circ C$  | $I_D$          | 180        | A          |
|                                                  | $T_c = 100^\circ C$ |                | 114        |            |
| Pulsed Drain Current <sup>4</sup>                |                     | $I_{DM}$       | 720        | A          |
| Single Pulse Avalanche Energy <sup>3</sup>       |                     | EAS            | 320        | mJ         |
| Total Power Dissipation                          | $T_c = 25^\circ C$  | $P_D$          | 227.3      | 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>1</sup> | $R_{\theta JA}$ | 52    | $^\circ C/W$ |
| Thermal Resistance from Junction-to-Case                 | $R_{\theta JC}$ | 0.55  | $^\circ C/W$ |

## Electrical Characteristics (Tc = 25°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                                          | 80   | -    | -    | 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> =80V, 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>2</sup>  |                       | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                           | -    | 3.5  | 4.8  | mΩ   |
| Forward Transconductance <sup>2</sup>    |                       | g <sub>fs</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =20A                                             | -    | 85   | -    | S    |
| Dynamic Characteristics                  |                       |                      |                                                                                       |      |      |      |      |
| Input Capacitance                        |                       | C <sub>iss</sub>     | V <sub>DS</sub> = 40V, V <sub>GS</sub> =0V, f =1MHz                                   | -    | 5235 | -    | pF   |
| Output Capacitance                       |                       | C <sub>oss</sub>     |                                                                                       | -    | 985  | -    |      |
| Reverse Transfer Capacitance             |                       | C <sub>rss</sub>     |                                                                                       | -    | 58   | -    |      |
| Switching Characteristics                |                       |                      |                                                                                       |      |      |      |      |
| Gate Resistance                          |                       | R <sub>g</sub>       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f =1MHz                                   | -    | 0.8  | -    | Ω    |
| Total Gate Charge                        |                       | Q <sub>g</sub>       | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 40V, I <sub>D</sub> =20A                     | -    | 78.5 | -    | nC   |
| Gate-Source Charge                       |                       | Q <sub>gs</sub>      |                                                                                       | -    | 19.6 | -    |      |
| Gate-Drain Charge                        |                       | Q <sub>gd</sub>      |                                                                                       | -    | 17   | -    |      |
| Turn-on Delay Time                       |                       | t <sub>d(on)</sub>   | V <sub>GS</sub> =10V, V <sub>DS</sub> =40V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = 20A | -    | 15.4 | -    | ns   |
| Rise Time                                |                       | t <sub>r</sub>       |                                                                                       | -    | 13   | -    |      |
| Turn-off Delay Time                      |                       | t <sub>d(off)</sub>  |                                                                                       | -    | 34   | -    |      |
| Fall Time                                |                       | t <sub>f</sub>       |                                                                                       | -    | 6.2  | -    |      |
| Drain-Source Body Diode Characteristics  |                       |                      |                                                                                       |      |      |      |      |
| Diode Forward Voltage <sup>2</sup>       |                       | V <sub>SD</sub>      | I <sub>S</sub> = 20A, V <sub>GS</sub> = 0V                                            | -    | -    | 1.2  | V    |
| Continuous Source Current <sup>1,5</sup> |                       | I <sub>S</sub>       | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current                                    | -    | -    | 180  | A    |
| Body Diode Reverse Recovery Time         |                       | t <sub>rr</sub>      | I <sub>F</sub> = 20A, dI/dt=100A/μs                                                   | -    | 57   | -    | ns   |
| Body Diode Reverse Recovery Charge       |                       | Q <sub>rr</sub>      |                                                                                       | -    | 114  | -    | nC   |

## Notes:

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is  $V_{DD} = 35V, V_{GS} = 10V, L = 0.4mH, I_{AS} = 40A$
4. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ C$ .
5. The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

## Typical Characteristics

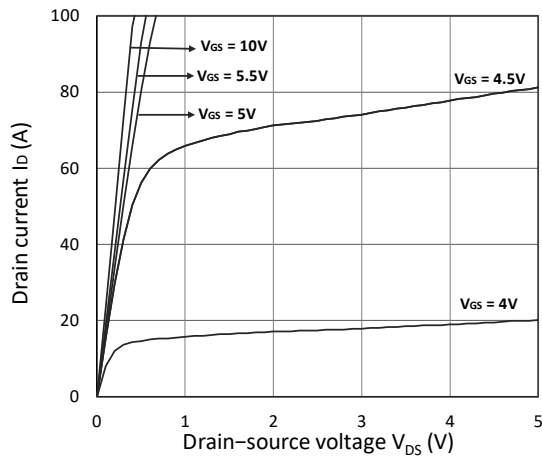


Figure 1. Output Characteristics

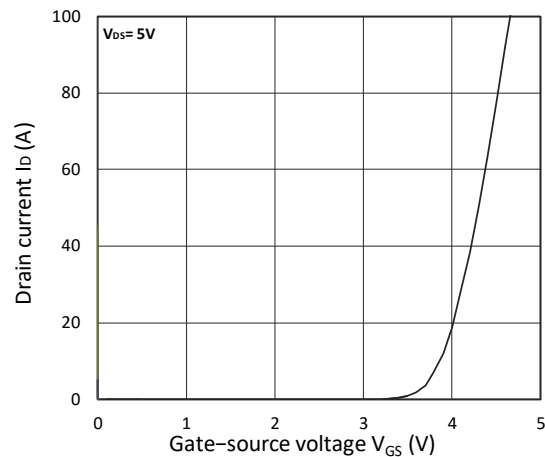


Figure 2. Transfer Characteristics

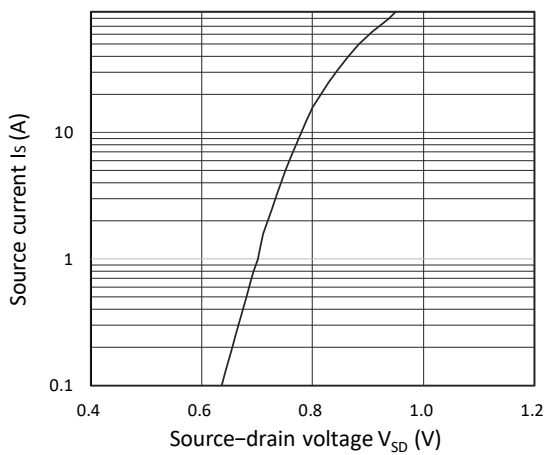
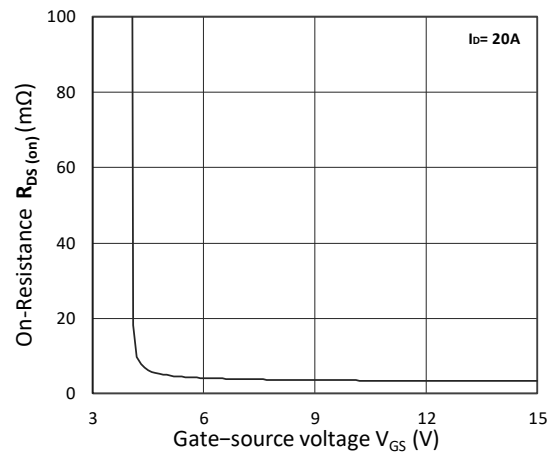
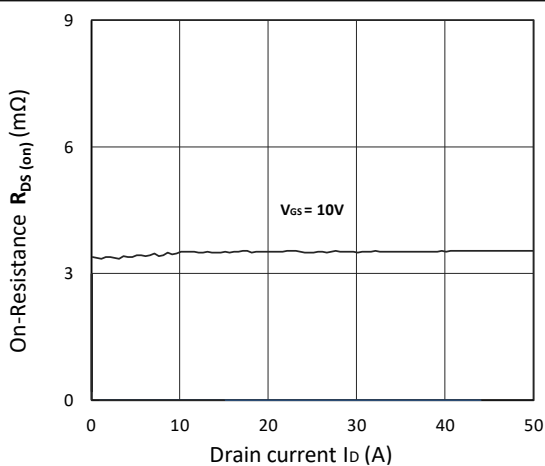
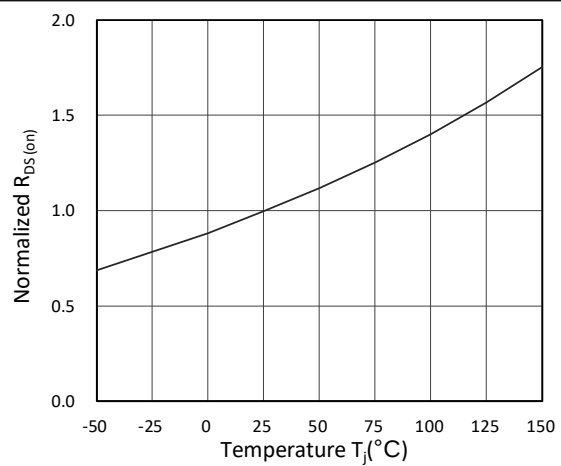


Figure 3. Forward Characteristics of Reverse

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

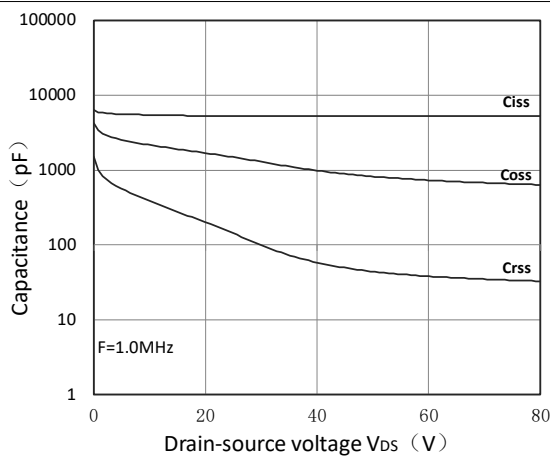


Figure 7. Capacitance Characteristics

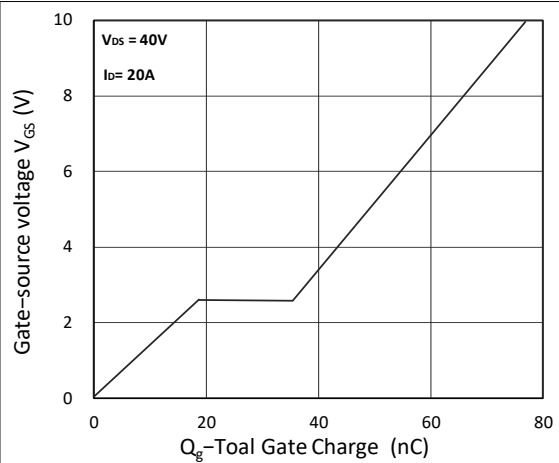


Figure 8. Gate Charge Characteristics

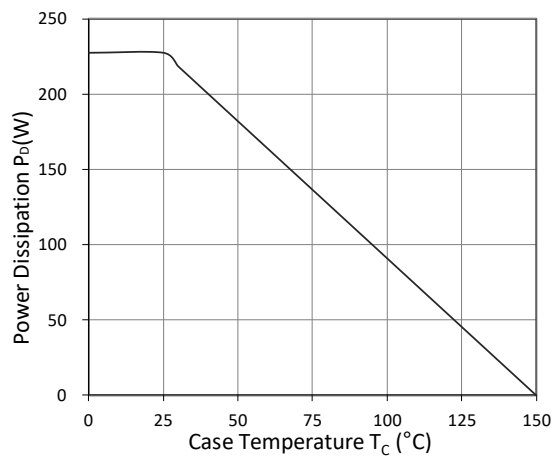


Figure 9. Power Dissipation

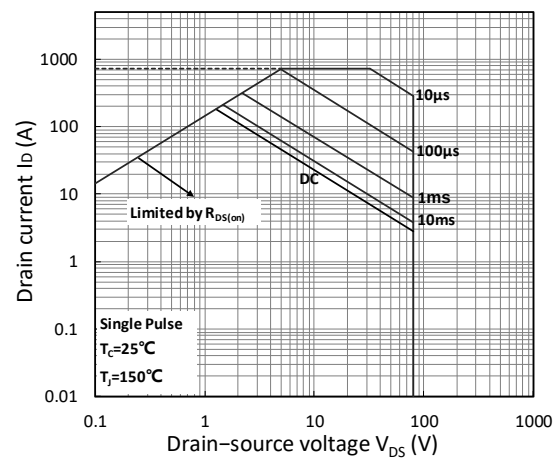


Figure10. Safe Operating Area

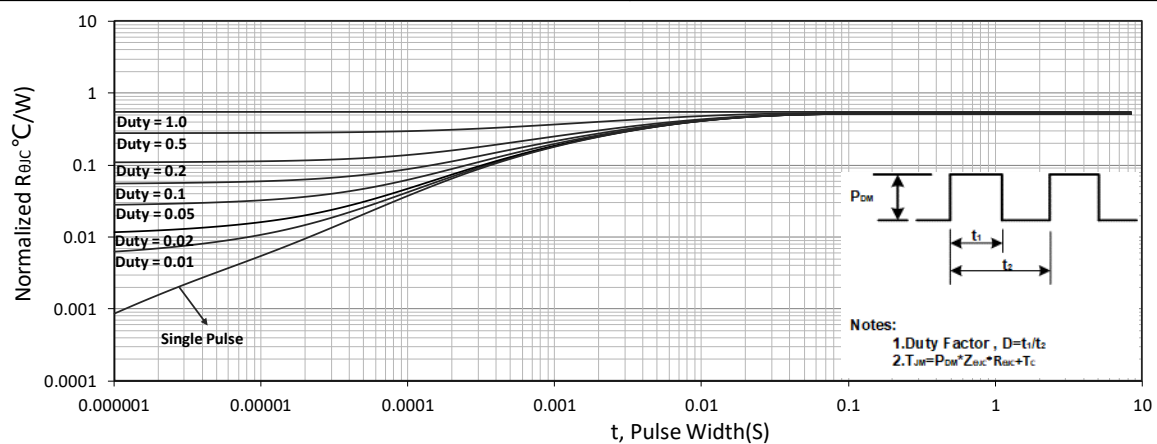


Figure 11. Normalized Maximum Transient Thermal Impedance

## Test Circuit

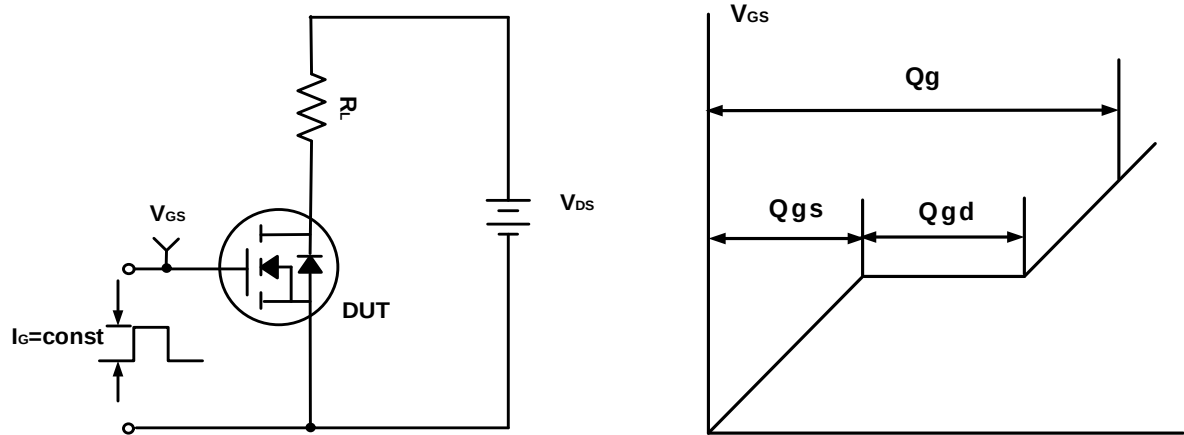


Figure A. Gate Charge Test Circuit &amp; Waveforms

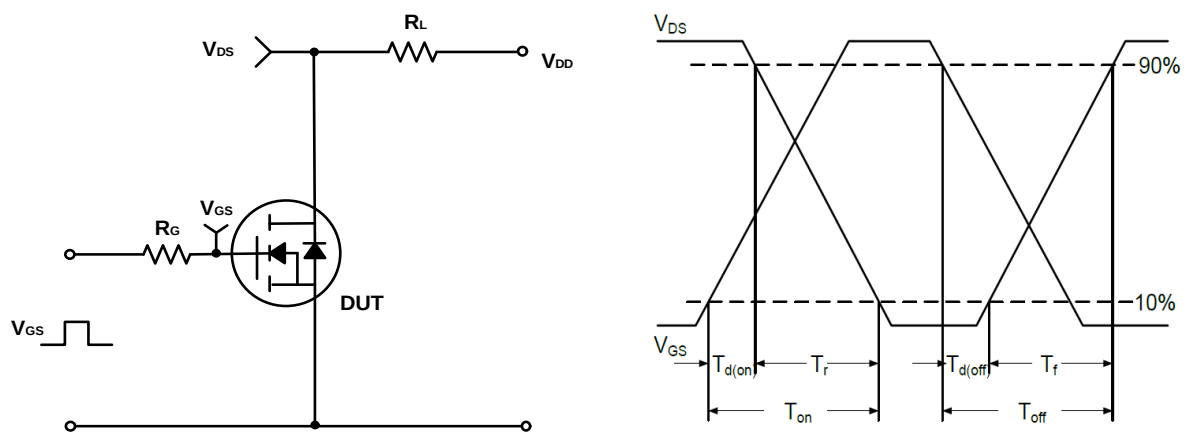


Figure B. Switching Test Circuit &amp; Waveforms

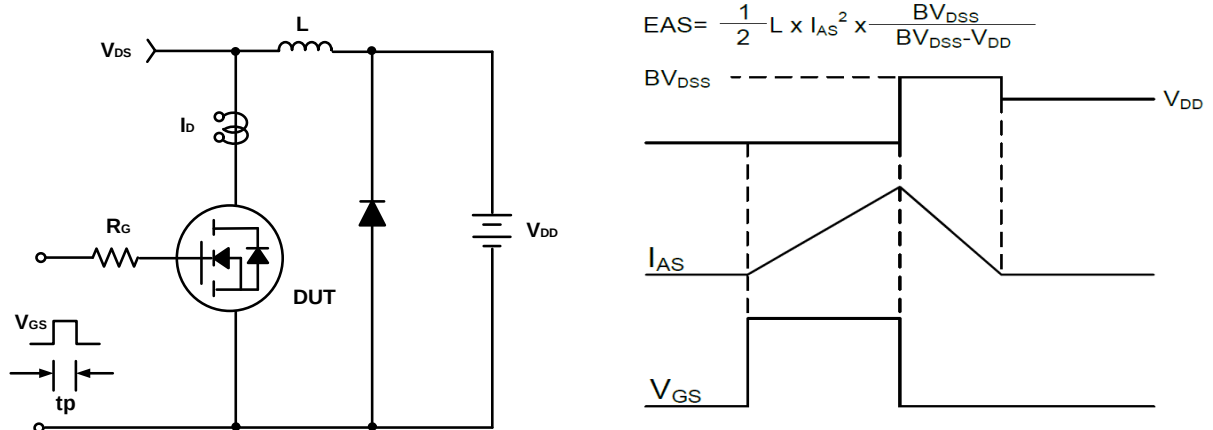
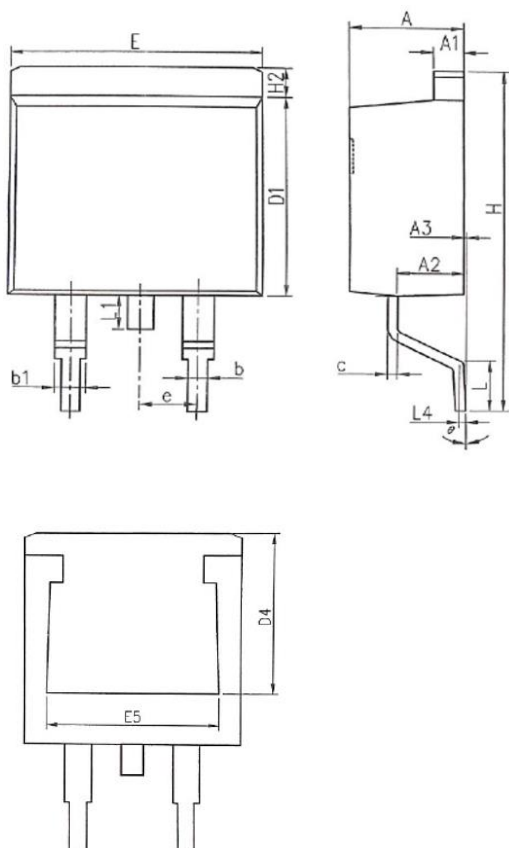


Figure C. Unclamped Inductive Switching Circuit &amp; Waveforms

## Mechanical Dimensions for TO-263

## COMMON DIMENSIONS

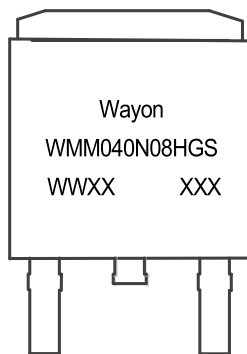


| SYMBOL   | MM       |       |
|----------|----------|-------|
|          | MIN      | MAX   |
| A        | 4.37     | 4.89  |
| A1       | 1.17     | 1.42  |
| A2       | 2.20     | 2.90  |
| A3       | 0.00     | 0.25  |
| b        | 0.70     | 0.96  |
| b1       | 1.17     | 1.47  |
| c        | 0.28     | 0.60  |
| D1       | 8.45     | 9.30  |
| D4       | 6.60     | -     |
| E        | 9.80     | 10.40 |
| E5       | 7.06     | -     |
| e        | 2.54BSC  |       |
| H        | 14.70    | 15.70 |
| H2       | 1.07     | 1.47  |
| L        | 2.00     | 2.80  |
| L1       | -        | 1.75  |
| L4       | 0.254BSC |       |
| $\theta$ | 0°       | 9°    |

## Ordering Information

| Part         | Package | Marking      | Packing method |
|--------------|---------|--------------|----------------|
| WMM040N08HGS | TO-263  | WMM040N08HGS | Tape and Reel  |

## Marking Information



WMM040N08HGS = Device code

WWXX XXX= Date code

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