

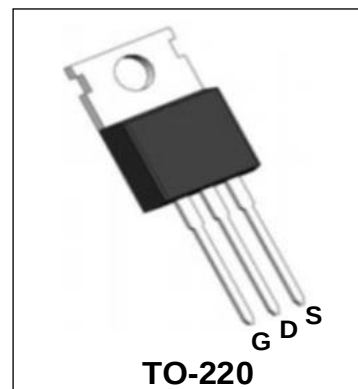
## 100V N-Channel Enhancement Mode Power MOSFET

### Description

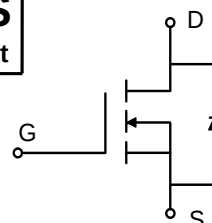
WMK25N10T1 uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

### Features

- $V_{DS} = 100V$ ,  $I_D = 25A$
- $R_{DS(on)} < 45m\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(on)} < 55m\Omega$  @  $V_{GS} = 4.5V$
- Green Device Available
- 100% EAS Guaranteed
- Optimized for High Speed Smooth Switching



**RoHS**  
compliant



### Applications

- Power Management Switches
- DC/DC Converter

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

| Parameter                                        |                     | Symbol         | Value      | Unit       |
|--------------------------------------------------|---------------------|----------------|------------|------------|
| Drain-Source Voltage                             |                     | $V_{DS}$       | 100        | V          |
| Gate-Source Voltage                              |                     | $V_{GS}$       | $\pm 20$   | V          |
| Continuous Drain Current                         | $T_c = 25^\circ C$  | $I_D$          | 25         | A          |
|                                                  | $T_c = 100^\circ C$ |                | 15.8       |            |
| Pulsed Drain Current <sup>4</sup>                |                     | $I_{DM}$       | 100        | A          |
| Single Pulse Avalanche Energy <sup>3</sup>       |                     | EAS            | 8.45       | mJ         |
| Total Power Dissipation                          | $T_c = 25^\circ C$  | $P_D$          | 53.2       | 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> | $R_{\theta JA}$ | 62    | $^\circ C/W$ |
| Thermal Resistance from Junction-to-Case                 | $R_{\theta JC}$ | 2.35  | $^\circ C/W$ |

Electrical Characteristics (T<sub>c</sub> = 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                                          | 100  | -    | -    | 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> = 100V, 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                            | 1.2  | 1.9  | 2.5  | V    |
| Drain-Source on-Resistance <sup>2</sup>  |                       | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A                                           | -    | 35   | 45   | mΩ   |
|                                          |                       |                      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A                                           | -    | 42   | 55   |      |
| Forward Transconductance <sup>2</sup>    |                       | g <sub>fs</sub>      | V <sub>DS</sub> = 10V, I <sub>D</sub> = 10A                                           | -    | 22   | -    | S    |
| Dynamic Characteristics                  |                       |                      |                                                                                       |      |      |      |      |
| Input Capacitance                        |                       | C <sub>iss</sub>     | V <sub>DS</sub> = 50V, V <sub>GS</sub> =0V, f =1MHz                                   | -    | 2332 | -    | pF   |
| Output Capacitance                       |                       | C <sub>oss</sub>     |                                                                                       | -    | 61.5 | -    |      |
| Reverse Transfer Capacitance             |                       | C <sub>rss</sub>     |                                                                                       | -    | 50   | -    |      |
| Switching Characteristics                |                       |                      |                                                                                       |      |      |      |      |
| Gate Resistance                          |                       | R <sub>G</sub>       | V <sub>DS</sub> = 0V, V <sub>GS</sub> =0V, f =1MHz                                    | -    | 0.9  | -    | Ω    |
| Total Gate Charge                        |                       | Q <sub>g</sub>       | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 50V, I <sub>D</sub> = 10A                    | -    | 37.9 | -    | nC   |
| Gate-Source Charge                       |                       | Q <sub>gs</sub>      |                                                                                       | -    | 8.3  | -    |      |
| Gate-Drain Charge                        |                       | Q <sub>gd</sub>      |                                                                                       | -    | 7.2  | -    |      |
| Turn-on Delay Time                       |                       | t <sub>d(on)</sub>   | V <sub>GS</sub> =10V, V <sub>DD</sub> = 50V,R <sub>G</sub> = 3Ω, I <sub>D</sub> = 10A | -    | 7.5  | -    | ns   |
| Rise Time                                |                       | t <sub>r</sub>       |                                                                                       | -    | 35.8 | -    |      |
| Turn-off Delay Time                      |                       | t <sub>d(off)</sub>  |                                                                                       | -    | 36.2 | -    |      |
| Fall Time                                |                       | t <sub>f</sub>       |                                                                                       | -    | 22   | -    |      |
| Drain-Source Body Diode Characteristics  |                       |                      |                                                                                       |      |      |      |      |
| Diode Forward Voltage <sup>2</sup>       |                       | V <sub>SD</sub>      | I <sub>S</sub> = 10A, 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                                    | -    | -    | 25   | A    |
| Reverse Recovery Time                    |                       | t <sub>rr</sub>      | V <sub>R</sub> =50V, I <sub>F</sub> =10A, dI <sub>F</sub> /dt=100A/μs                 | -    | 42   | -    | ns   |
| Reverse Recovery Charge                  |                       | Q <sub>rr</sub>      |                                                                                       | -    | 45   | -    | 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 ≤ 300μs, duty cycle ≤ 2%
3. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=13A
4. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
5. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

## Typical Characteristics

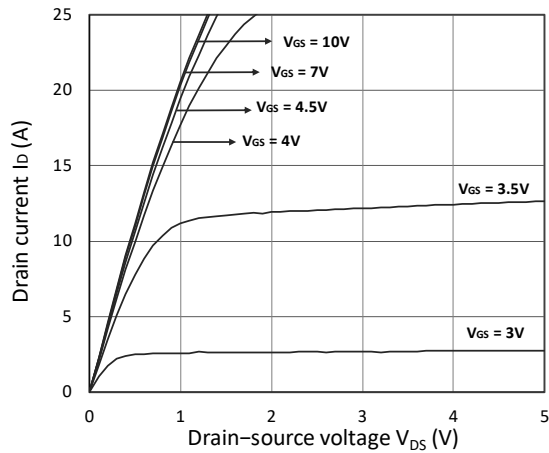


Figure 1. Output Characteristics

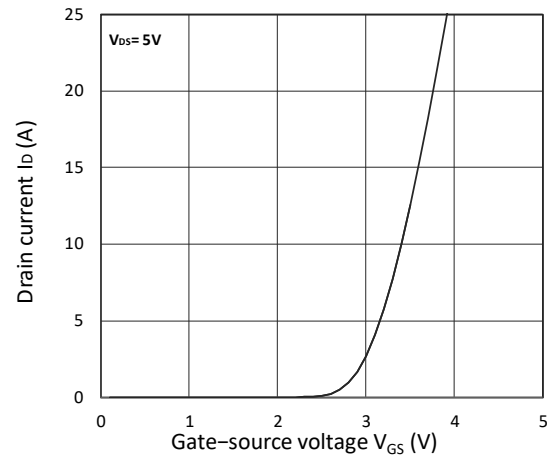


Figure 2. Transfer Characteristics

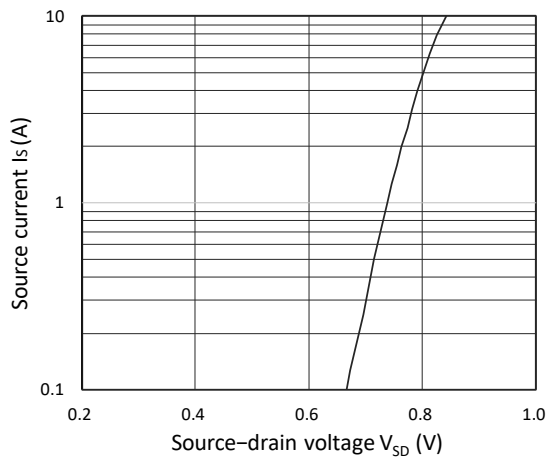
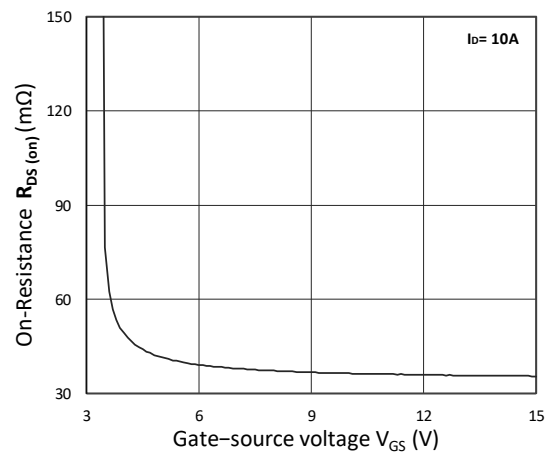
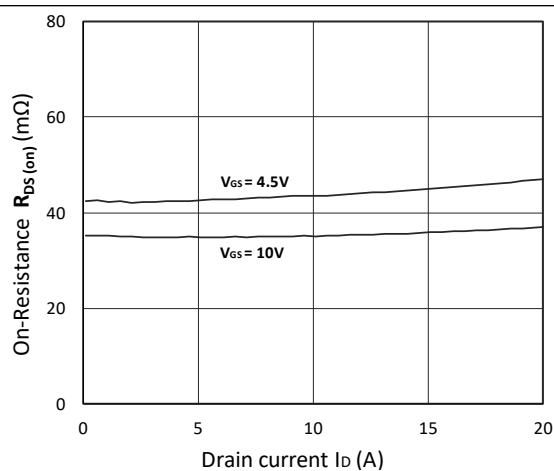
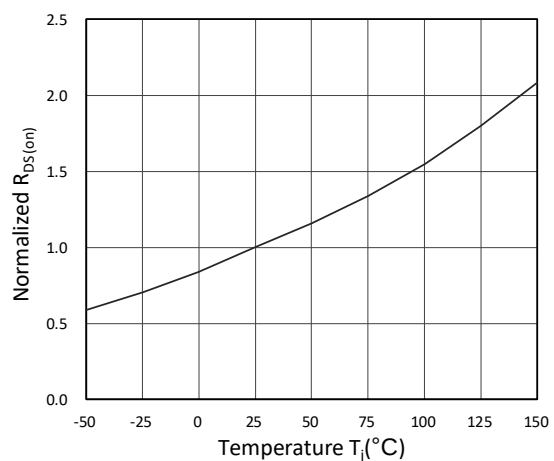


Figure 3. Forward Characteristics of Reverse

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

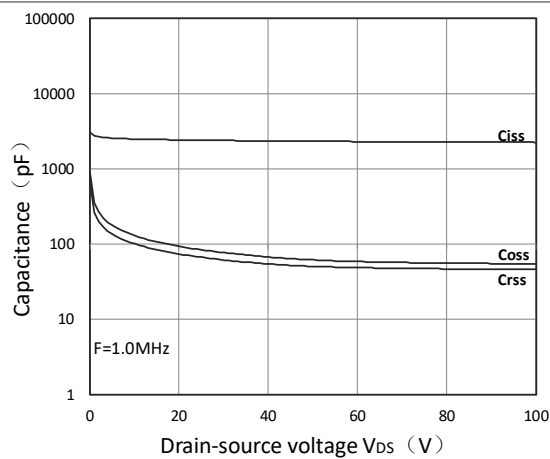


Figure 7. Capacitance Characteristics

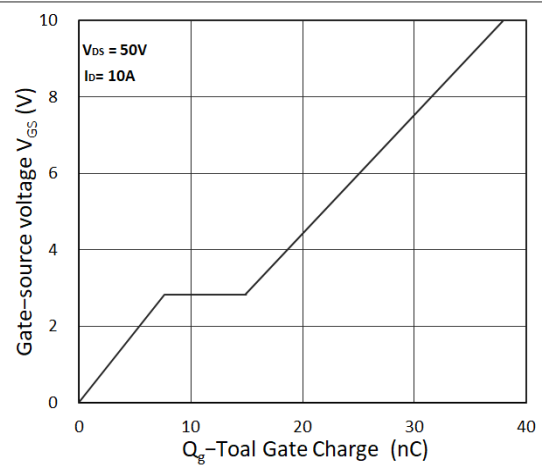


Figure 8. Gate Charge Characteristics

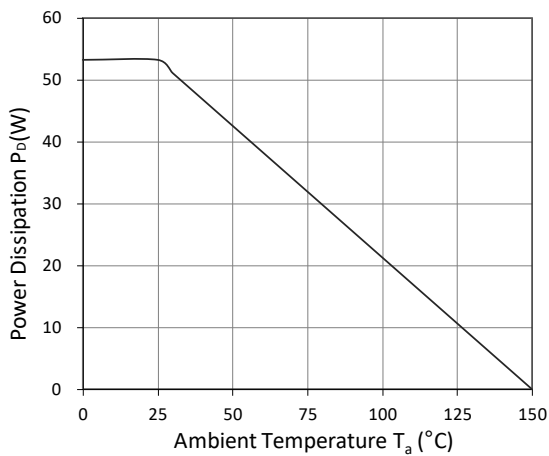


Figure 9. Power Dissipation

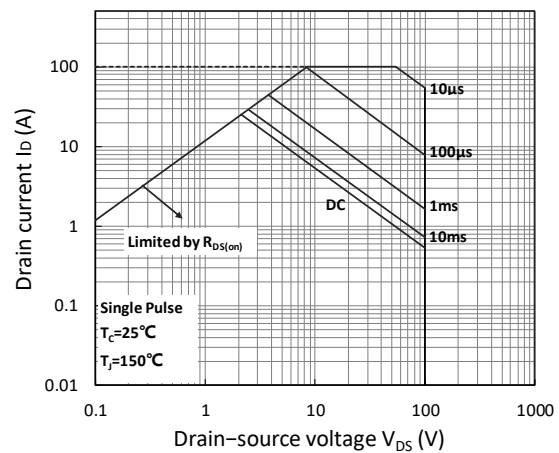


Figure 10. Safe Operating Area

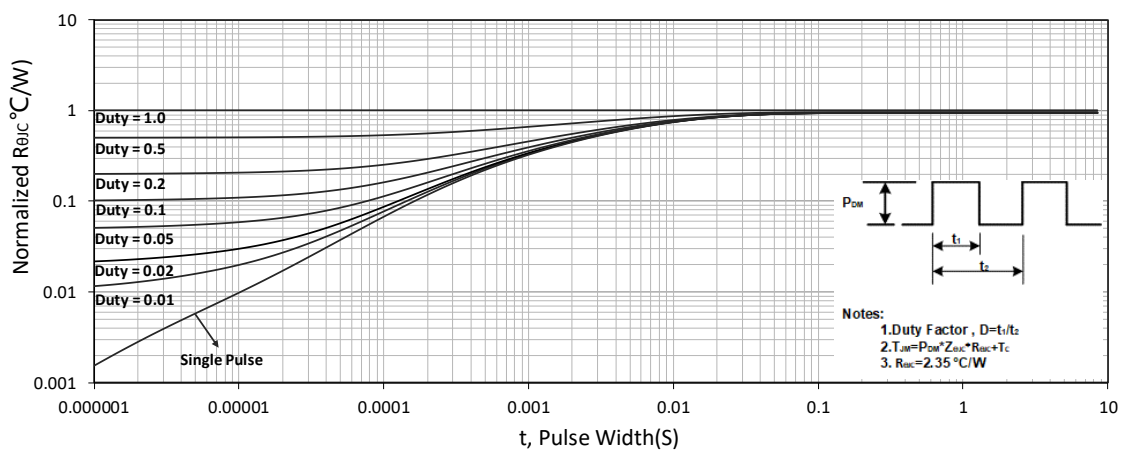


Figure 11. Normalized Maximum Transient Thermal Impedance

## Test Circuit

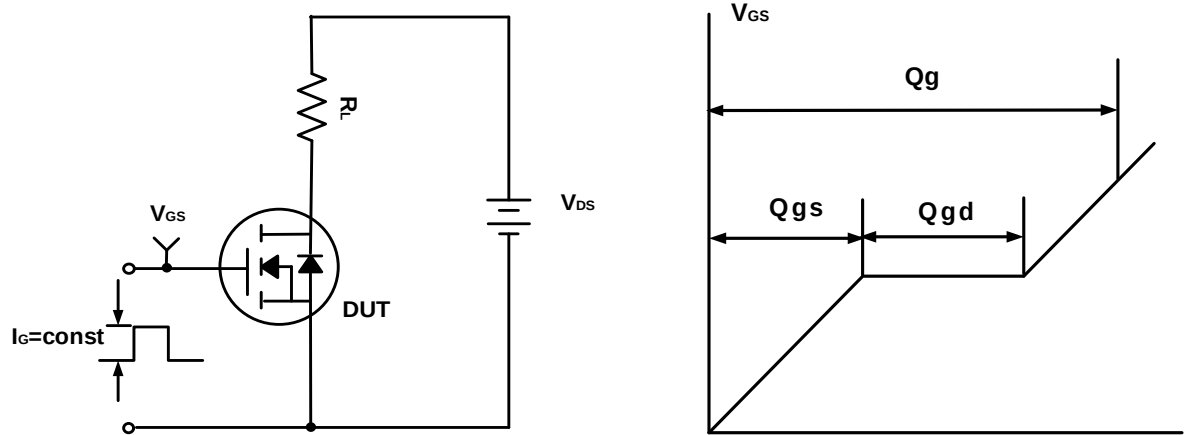


Figure A. Gate Charge Test Circuit &amp; Waveforms

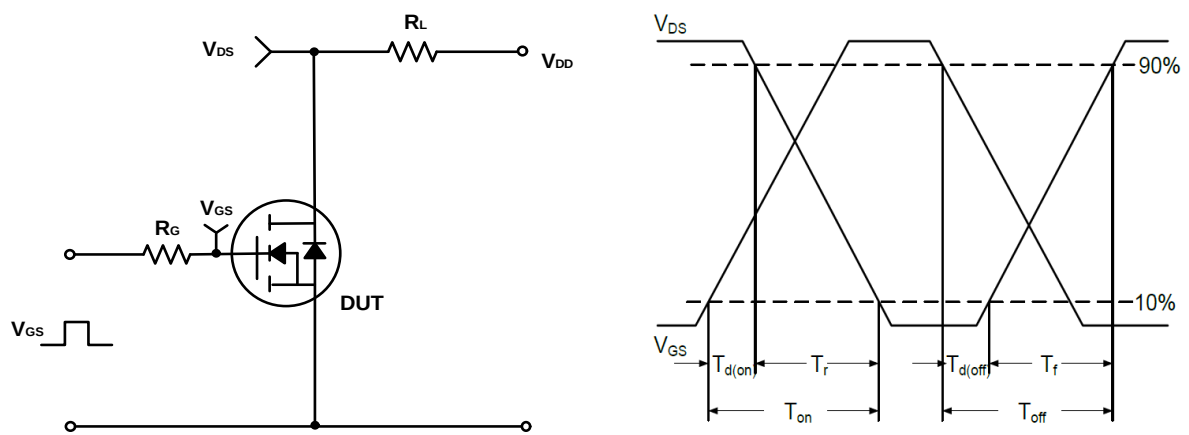


Figure B. Switching Test Circuit &amp; Waveforms

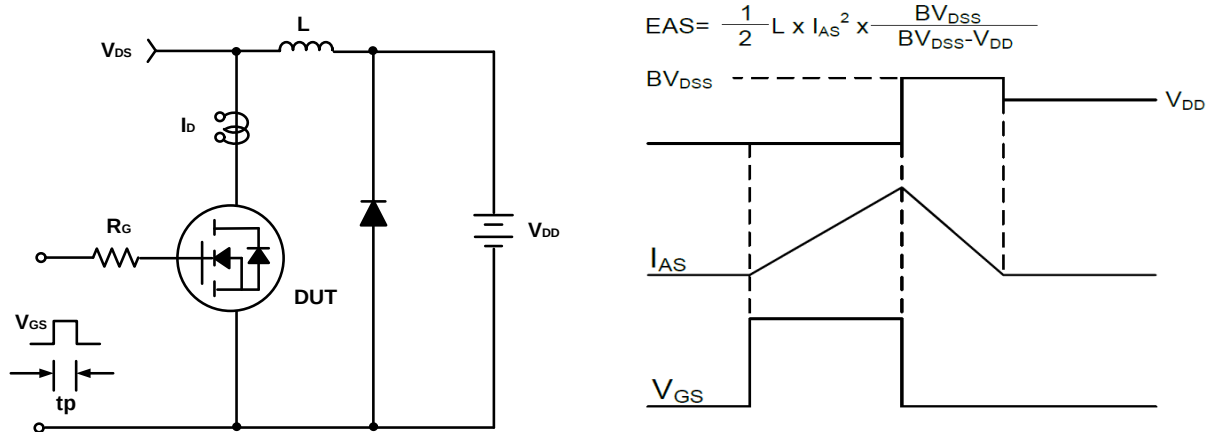
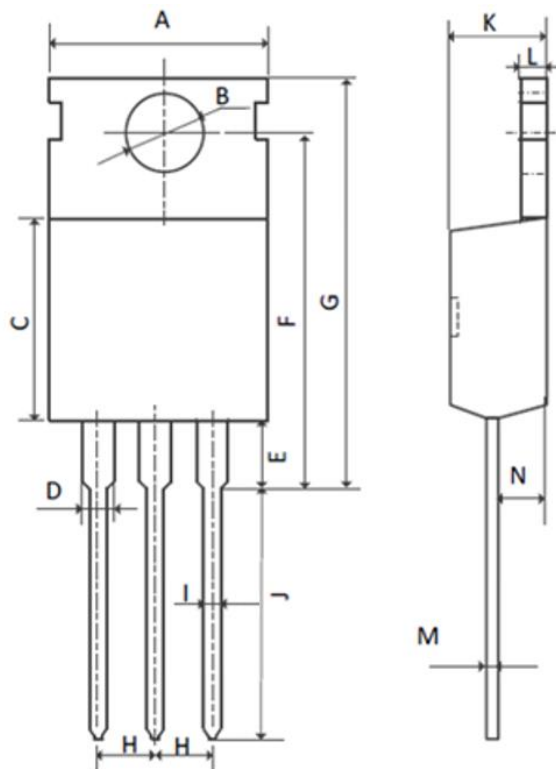


Figure C. Unclamped Inductive Switching Circuit &amp; Waveforms

## Mechanical Dimensions for TO-220

## COMMON DIMENSIONS

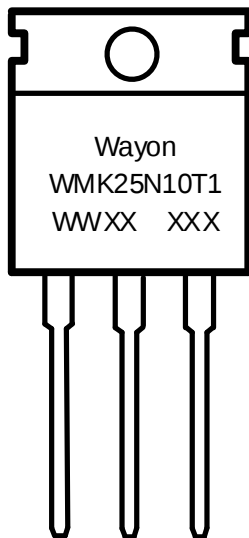


| SYMBOL | MM       |       |
|--------|----------|-------|
|        | MIN      | MAX   |
| A      | 9.70     | 10.30 |
| B      | 3.40     | 3.80  |
| C      | 8.80     | 9.40  |
| D      | 1.17     | 1.47  |
| E      | 2.60     | 3.50  |
| F      | 15.10    | 16.70 |
| G      | 19.55MAX |       |
| H      | 2.54REF  |       |
| I      | 0.70     | 0.95  |
| J      | 9.35     | 11.00 |
| K      | 4.30     | 4.77  |
| L      | 1.20     | 1.45  |
| M      | 0.40     | 0.65  |
| N      | 2.20     | 2.60  |

## Ordering Information

| Part       | Package | Marking    | Packing method |
|------------|---------|------------|----------------|
| WMK25N10T1 | TO-220  | WMK25N10T1 | Tube           |

## Marking Information



WMK25N10T1 = Device code

WWXX XXX= Date code

## Contact Information

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