

## LMN02N15TSF 150V N-Channel MOSFET

### Features

- 150V, 1A,  $R_{DS(ON)} = 480m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- TSOP-6 package design

These devices are well suited for high efficiency fast switching applications.

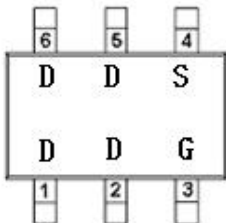
### Product Description

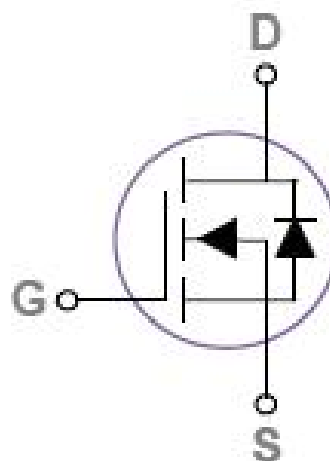
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

### Applications

- Networking
- Load Switch
- LED applications

### Pin Configuration

| LMN02N15TSF (TSOP-6)                                                                |             |  |
|-------------------------------------------------------------------------------------|-------------|--|
|  |             |  |
| PIN                                                                                 | Description |  |
| 1                                                                                   | Drain       |  |
| 2                                                                                   | Drain       |  |
| 3                                                                                   | Gate        |  |
| 4                                                                                   | Source      |  |
| 5                                                                                   | Drain       |  |
| 6                                                                                   | Drain       |  |



**Ordering Information**

| Part Number | P/N      | PKG Code | Pb Free Code | Package | Quantity Reel |
|-------------|----------|----------|--------------|---------|---------------|
| LMN02N15TSF | LMN02N15 | TS       | F            | TSOP-6  | 3000 pcs      |

**Marking Information**

| Part Marking | Part Number | LFC code |
|--------------|-------------|----------|
| 25 XWMM      | 25          | XWMM     |

**Absolute Maximum Ratings**

(T<sub>C</sub>=25°C Unless otherwise noted)

| Symbol           | Parameter                              |                       | Typical     | Unit |
|------------------|----------------------------------------|-----------------------|-------------|------|
| V <sub>DS</sub>  | Drain-Source Voltage                   |                       | 150         | V    |
| V <sub>GS</sub>  | Gate-Source Voltage                    |                       | ±20         | V    |
| I <sub>D</sub>   | Continuous Drain Current               | T <sub>A</sub> =25°C  | 1.0         | A    |
|                  |                                        | T <sub>A</sub> =100°C | 0.21        |      |
| I <sub>DM</sub>  | Pulsed Drain Current (Note 1)          |                       | 5.6         | A    |
| P <sub>D</sub>   | Power Dissipation                      | T <sub>A</sub> =25°C  | 1.14        | W    |
|                  |                                        | T <sub>A</sub> =100°C | 0.23        |      |
| T <sub>J</sub>   | Operating Junction Temperature Range   |                       | -50 to +150 | °C   |
| T <sub>STG</sub> | Storage Temperature Range              |                       | -50 to +150 | °C   |
| R <sub>θJA</sub> | Thermal Resistance-Junction to Ambient |                       | 110         | °C/W |

**Electrical Characteristics**

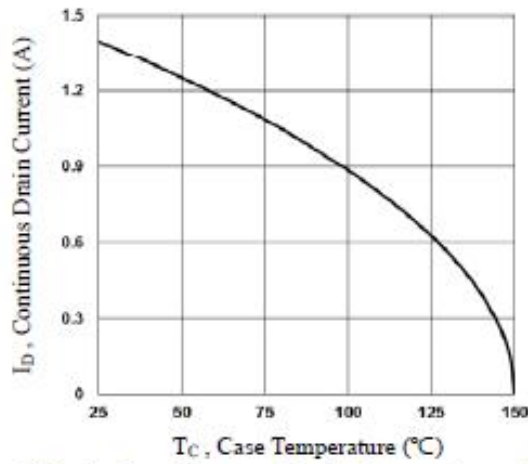
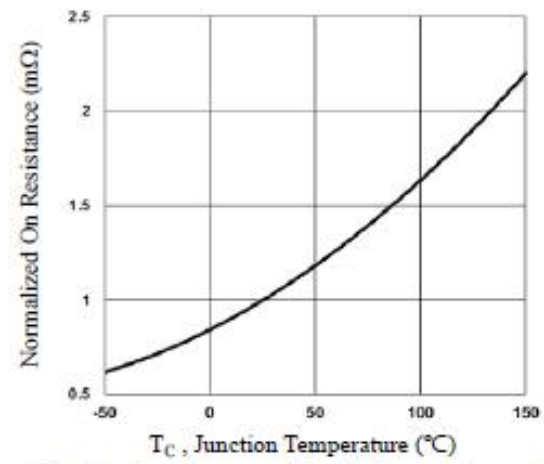
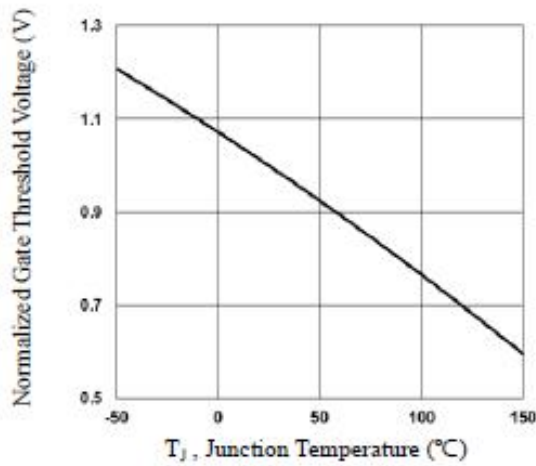
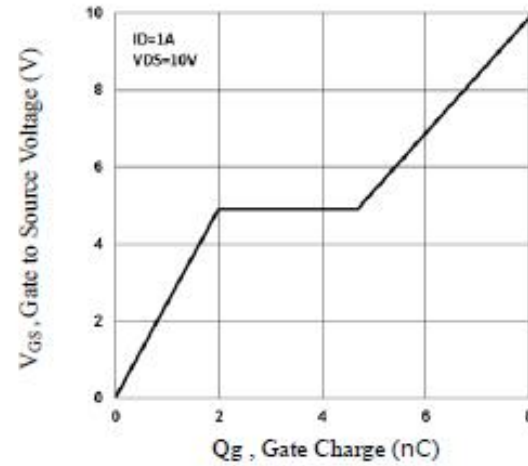
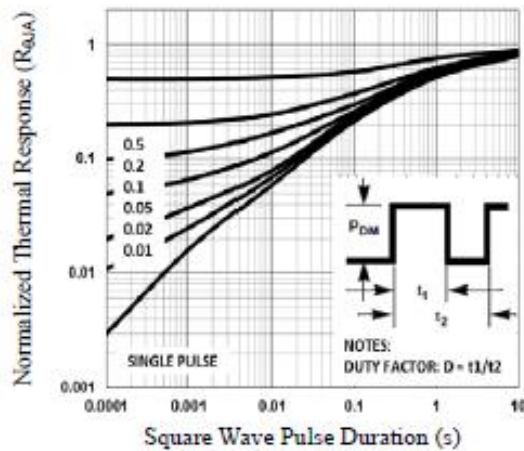
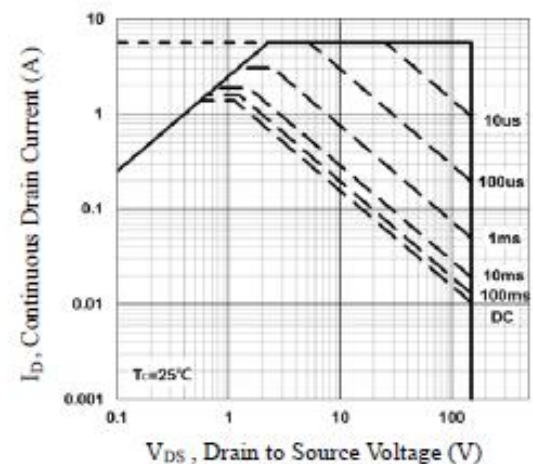
(T<sub>J</sub>=25°C Unless otherwise noted)

| Symbol               | Parameter                       | Conditions                                                                            | Min | Typ  | Max  | Unit |
|----------------------|---------------------------------|---------------------------------------------------------------------------------------|-----|------|------|------|
| Static               |                                 |                                                                                       |     |      |      |      |
| V <sub>(BR)DSS</sub> | Drain-Source Breakdown Voltage  | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                            | 150 |      |      | V    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage          | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA                              | 2   | 3    | 4    | V    |
| I <sub>GSS</sub>     | Gate Leakage Current            | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                            |     |      | ±100 | nA   |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current | V <sub>DS</sub> =150V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                      |     |      | 1    | uA   |
|                      |                                 | V <sub>DS</sub> =120V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C                     |     |      | 10   |      |
| R <sub>DS(on)</sub>  | Drain-Source On-Resistance      | V <sub>GS</sub> =10V, I <sub>D</sub> =1A                                              |     | 380  | 480  | mΩ   |
|                      |                                 | V <sub>GS</sub> =6V, I <sub>D</sub> =0.5A                                             |     | 410  | 520  |      |
| g <sub>FS</sub>      | Forward Transconductance        | V <sub>DS</sub> =10V, I <sub>D</sub> =1A                                              |     | 1.7  |      | S    |
| V <sub>SD</sub>      | Diode Forward Voltage           | V <sub>GS</sub> =0V, I <sub>S</sub> =1A                                               |     |      | 1    | V    |
| Dynamic              |                                 |                                                                                       |     |      |      |      |
| C <sub>iSS</sub>     | Input Capacitance               | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz                                     |     | 350  | 700  | pF   |
| C <sub>oSS</sub>     | Output Capacitance              |                                                                                       |     | 34   | 68   |      |
| C <sub>rSS</sub>     | Reverse Transfer Capacitance    |                                                                                       |     | 26   | 52   |      |
| Q <sub>g</sub>       | Total Gate Charge (Note 2,3)    | V <sub>DS</sub> =75V, V <sub>GS</sub> =10V, I <sub>D</sub> =1.0A                      |     | 8.1  | 16   | nC   |
| Q <sub>gs</sub>      | Gate-Source Charge (Note 2,3)   |                                                                                       |     | 2    | 4    |      |
| Q <sub>gd</sub>      | Gate-Drain Charge (Note 2,3)    |                                                                                       |     | 2.7  | 5.4  |      |
| t <sub>d(on)</sub>   | Turn-On Time (Note 2,3)         | V <sub>DD</sub> =75V, I <sub>D</sub> =1.0A, V <sub>GS</sub> =10V, R <sub>G</sub> =10Ω |     | 8.2  | 16   | ns   |
| T <sub>r</sub>       |                                 |                                                                                       |     | 5.8  | 12   |      |
| t <sub>d(off)</sub>  | Turn-Off Time (Note 2,3)        |                                                                                       |     | 14.8 | 28   |      |
| T <sub>f</sub>       |                                 |                                                                                       |     | 8.0  | 16   |      |

Note:

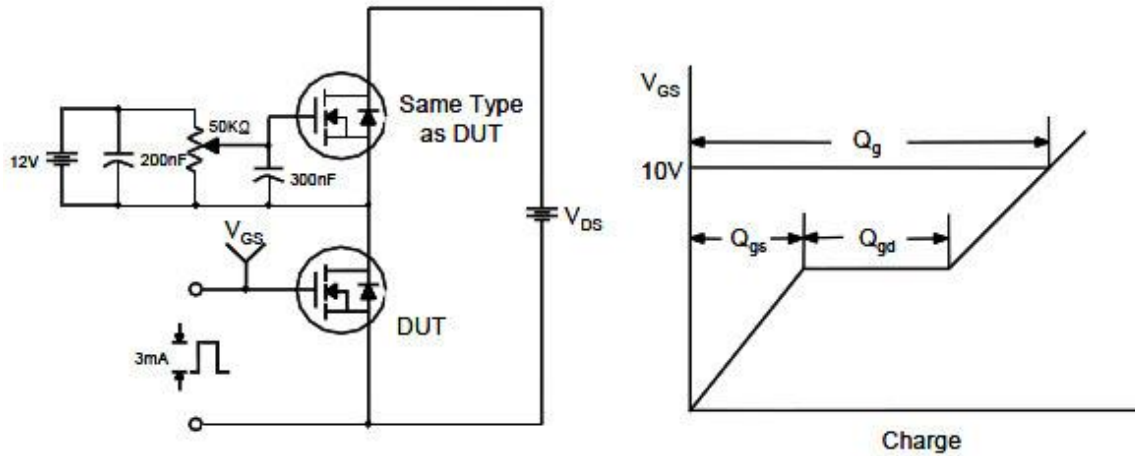
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

# Typical Performance Characteristics

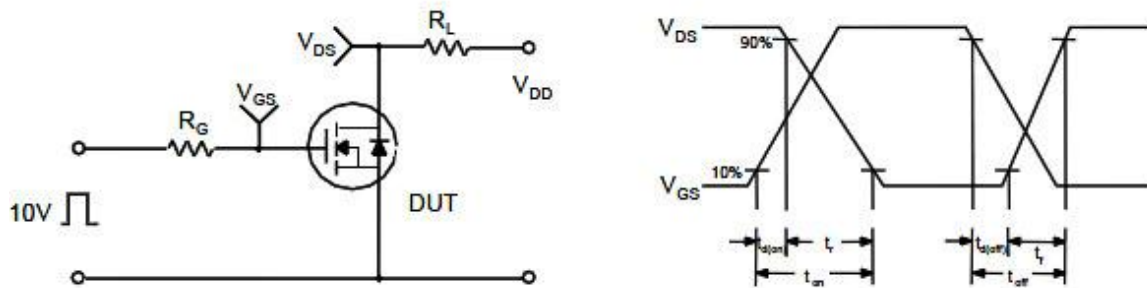

**Fig.1 Continuous Drain Current vs.  $T_C$** 

**Fig.2 Continuous Drain Current vs.  $T_C$** 

**Fig.3 Normalized  $V_{th}$  vs.  $T_J$** 

**Fig.4 Gate Charge Waveform**

**Fig.5 Normalized Transient Impedance**

**Fig.6 Maximum Safe Operation Area**

# Typical Performance Characteristics (continue.)

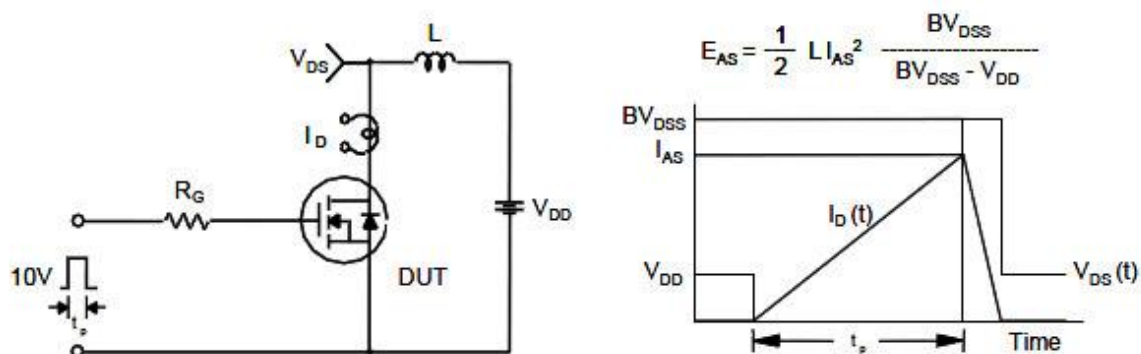
## Gate Charge Test Circuit & Waveform

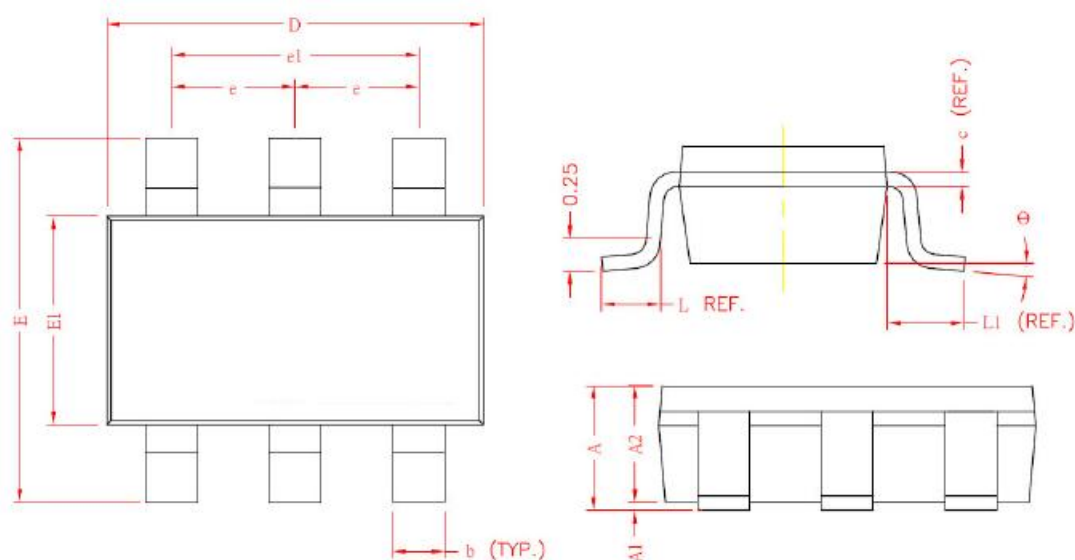


## Resistive Switching Test Circuit & Waveforms



## Unclamped Inductive Switching Test Circuit & Waveforms



**Package Dimension**
**TSOP-6**


| Dimensions |             |       |             |       |
|------------|-------------|-------|-------------|-------|
| Symbol     | Millimeters |       | Inches      |       |
|            | Min         | Max   | Min         | Max   |
| <b>A</b>   | -           | 1.450 | -           | 0.057 |
| <b>A1</b>  | 0.000       | 0.100 | 0.000       | 0.004 |
| <b>A2</b>  | 0.700       | 1.350 | 0.028       | 0.053 |
| <b>c</b>   | 0.120 (REF) |       | 0.005 (REF) |       |
| <b>D</b>   | 2.700       | 3.100 | 0.106       | 0.122 |
| <b>E</b>   | 2.600       | 3.000 | 0.102       | 0.118 |
| <b>E1</b>  | 1.400       | 1.800 | 0.055       | 0.071 |
| <b>L</b>   | 0.450 (REF) |       | 0.018 (REF) |       |
| <b>L1</b>  | 0.600 (REF) |       | 0.024 (REF) |       |
| <b>θ</b>   | 0°          | 10°   | 0°          | 10°   |
| <b>b</b>   | 0.300       | 0.500 | 0.012       | 0.020 |
| <b>e</b>   | 0.950 (REF) |       | 0.037 (REF) |       |
| <b>e1</b>  | 1.900 (REF) |       | 0.075 (REF) |       |