



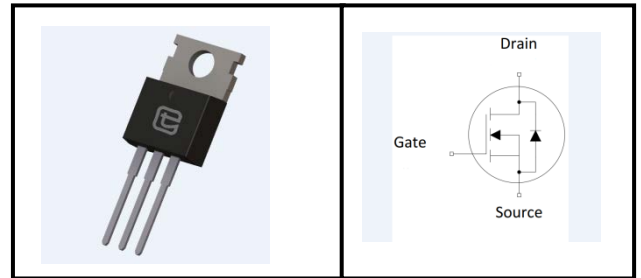
# 150V N-Channel Trench MOSFET

## FEATURES

- Trench Power MOSFET Technology
- Low  $R_{DS(ON)}$
- Low Gate Charge
- Optimized For Fast-switching Applications

## APPLICATIONS

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial



| Device Marking and Package Information |         |         |
|--|---------|---------|
| Device                                 | Package | Marking |
| TMP17N15A                              | TO-220  | 17N15A  |

| Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted |                |                           |                  |
|--|----------------|---------------------------|------------------|
| Parameter  | Symbol         | Value                     | Unit             |
| Drain-Source Voltage ( $V_{GS} = 0\text{V}$ )                              | $V_{DSS}$      | 150                       | V                |
| Continuous Drain Current   | $I_D$          | $T_C = 25^\circ\text{C}$  | 17               |
|  |                | $T_C = 100^\circ\text{C}$ | 12.7             |
| Pulsed Drain Current (note1)   | $I_{DM}$       | 68                        | A                |
| Gate-Source Voltage  | $V_{GSS}$      | $\pm 20$                  | V                |
| Single Pulse Avalanche Energy (note2)                                      | $E_{AS}$       | 10.3                      | mJ               |
| Avalanche Current  | $I_{AS}$       | 8.3                       | A                |
| Power Dissipation (note3)  | $P_D$          | $T_C = 25^\circ\text{C}$  | 78.9             |
|  |                | $T_C = 100^\circ\text{C}$ | 39.5             |
| Operating Junction and Storage Temperature Range                           | $T_J, T_{stg}$ | -55~+175                  | $^\circ\text{C}$ |

| Thermal Resistance                      |            |       |                           |
|---|------------|-------|---------------------------|
| Parameter                               | Symbol     | Value | Unit                      |
| Thermal Resistance, Junction-to-Case    | $R_{thJC}$ | 1.9   | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 60    |                           |



| Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted |               |   |       |      |           |            |
|--|---------------|---|-------|------|-----------|------------|
| Parameter  | Symbol        | Test Conditions   | Value |      |           | Unit       |
|  |               |   | Min.  | Typ. | Max.      |            |
| <b>Static</b>  |               |   |       |      |           |            |
| Drain-Source Breakdown Voltage                                   | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                                 | 150   | --   | --        | V          |
| Zero Gate Voltage Drain Current                                  | $I_{DSS}$     | $V_{DS} = 150V, V_{GS} = 0V, T_J = 25^\circ\text{C}$          | --    | --   | 1         | $\mu A$    |
|  |               | $V_{DS} = 150V, V_{GS} = 0V, T_J = 100^\circ\text{C}$         | --    | --   | 100       |            |
| Gate-Source Leakage  | $I_{GSS}$     | $V_{GS} = \pm 20V$  | --    | --   | $\pm 100$ | nA         |
| Gate-Source Threshold Voltage                                    | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                             | 3     | 4    | 5         | V          |
| Drain-Source On-Resistance                                       | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 8.5A$                                    | --    | 70   | 85        | m $\Omega$ |
| Forward Transconductance   | $g_{fs}$      | $V_{DS} = 5V, I_D = 8.5A$                                     | --    | 16.3 | --        | S          |
| <b>Dynamic</b>   |               |   |       |      |           |            |
| Input Capacitance  | $C_{iss}$     | $V_{GS} = 0V,$<br>$V_{DS} = 75V,$<br>$f = 1.0\text{MHz}$      | --    | 1440 | --        | pF         |
| Output Capacitance   | $C_{oss}$     |   | --    | 67   | --        |            |
| Reverse Transfer Capacitance                                     | $C_{rss}$     |   | --    | 26   | --        |            |
| Total Gate Charge  | $Q_g$         | $V_{DD} = 75V, I_D = 17A,$<br>$V_{GS} = 10V$                  | --    | 25   | --        | nC         |
| Gate-Source Charge   | $Q_{gs}$      |   | --    | 9    | --        |            |
| Gate-Drain Charge  | $Q_{gd}$      |   | --    | 7    | --        |            |
| Turn-on Delay Time   | $t_{d(on)}$   | $V_{DD} = 75V, I_D = 17A,$<br>$V_{GS} = 10V, R_G = 2.5\Omega$ | --    | 7    | --        | ns         |
| Turn-on Rise Time  | $t_r$         |   | --    | 13   | --        |            |
| Turn-off Delay Time  | $t_{d(off)}$  |   | --    | 12   | --        |            |
| Turn-off Fall Time   | $t_f$         |   | --    | 8    | --        |            |
| <b>Drain-Source Body Diode Characteristics</b>                   |               |   |       |      |           |            |
| Continuous Body Diode Current                                    | $I_S$         | $T_C = 25^\circ\text{C}$                                      | --    | --   | 17        | A          |
| Pulsed Diode Forward Current                                     | $I_{SM}$      |   | --    | --   | 68        |            |
| Body Diode Voltage   | $V_{SD}$      | $T_J = 25^\circ\text{C}, I_{SD} = 8.5A, V_{GS} = 0V$          | --    | --   | 1.2       | V          |
| Reverse Recovery Time  | $t_{rr}$      | $I_F = 17A,$<br>$di_F/dt = 100A/\mu s$                        | --    | 65   | --        | ns         |
| Reverse Recovery Charge  | $Q_{rr}$      |   | --    | 160  | --        | nC         |

**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}, L = 0.3\text{mH}$
3. The power dissipation PD is based on  $T_J(\text{MAX}) = 175^\circ\text{C}$ , using junction-to-case thermal resistance.



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

Figure 1. Output Characteristics

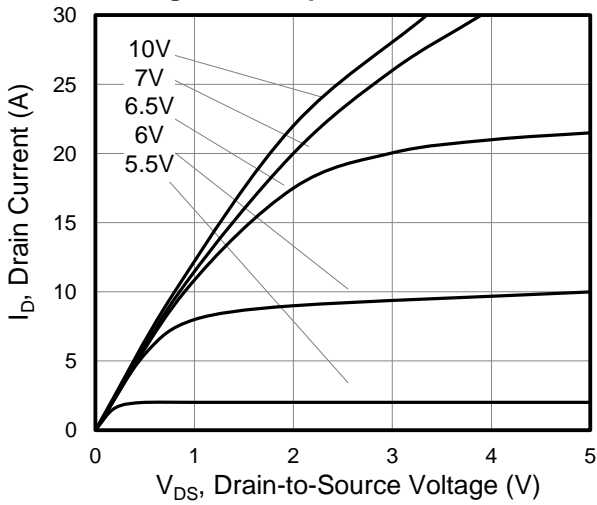


Figure 2. Transfer Characteristics

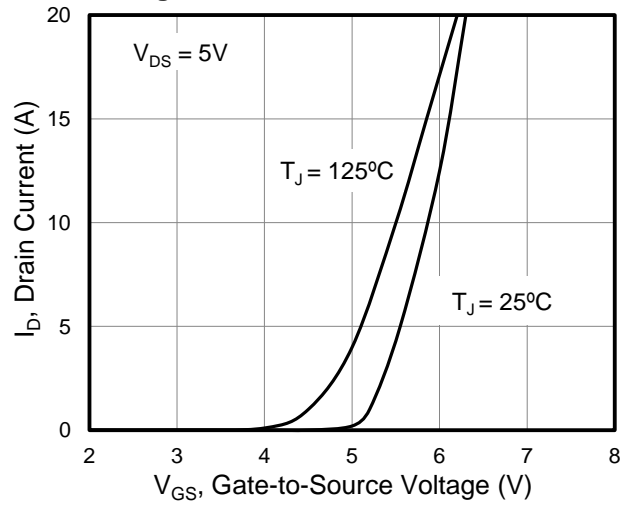


Figure 3. On-Resistance vs. Drain Current

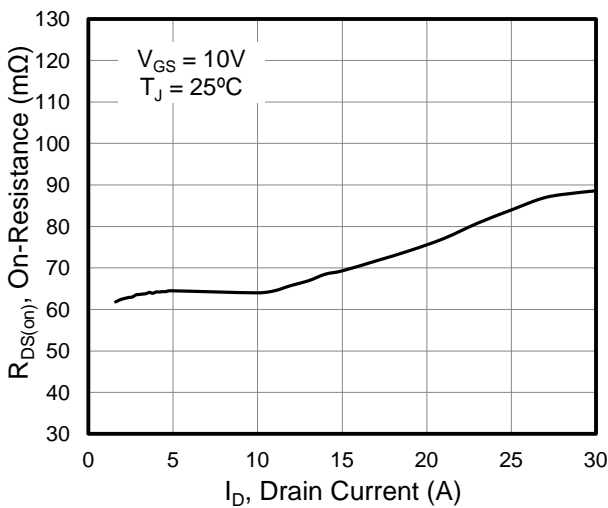


Figure 4. Capacitance

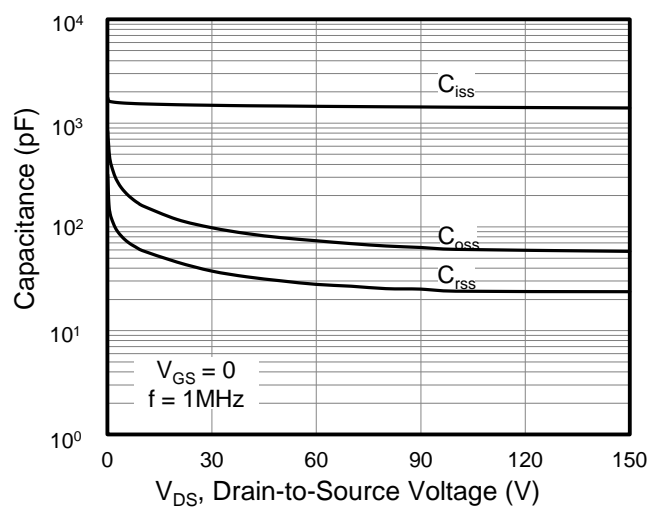


Figure 5. Gate Charge

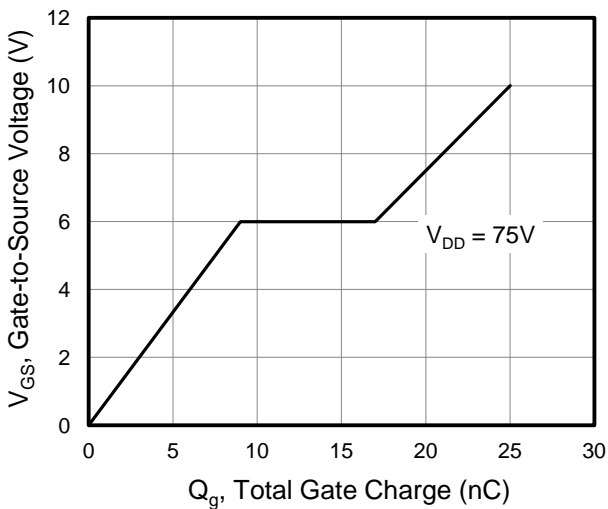
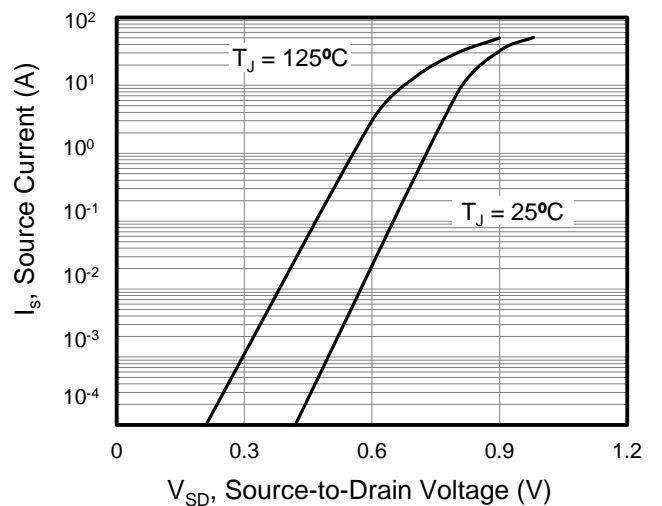


Figure 6. Body Diode Forward Voltage





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

Figure 7. On-Resistance vs. Junction Temperature

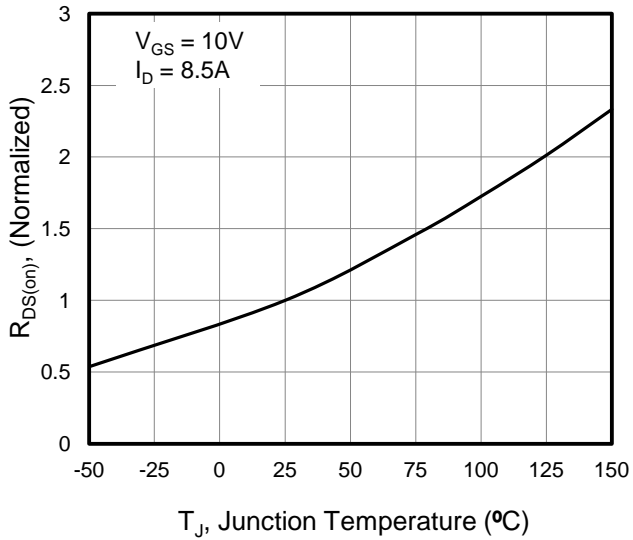


Figure 8. Threshold Voltage vs. Junction Temperature

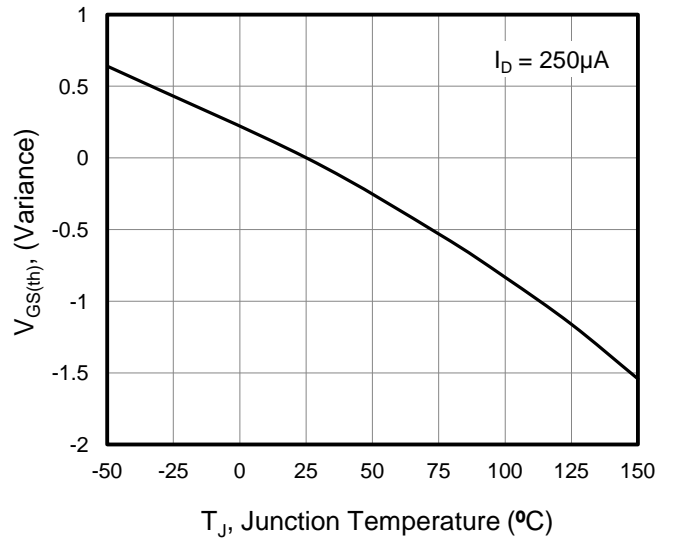


Figure 9. Transient Thermal Impedance

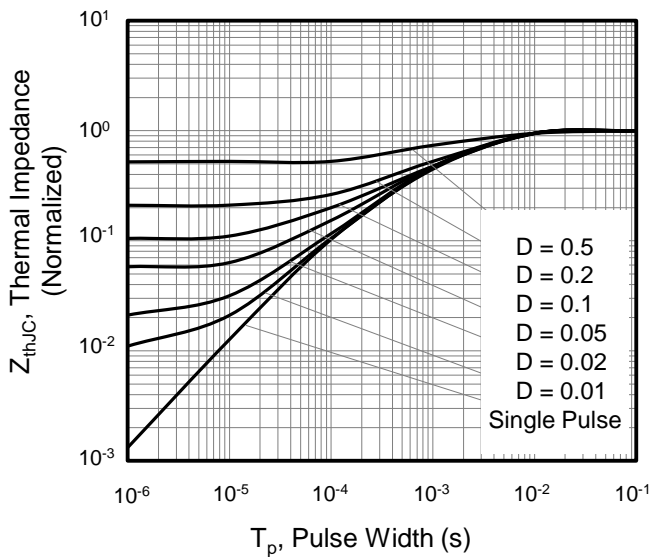


Figure 10. Safe operation area for

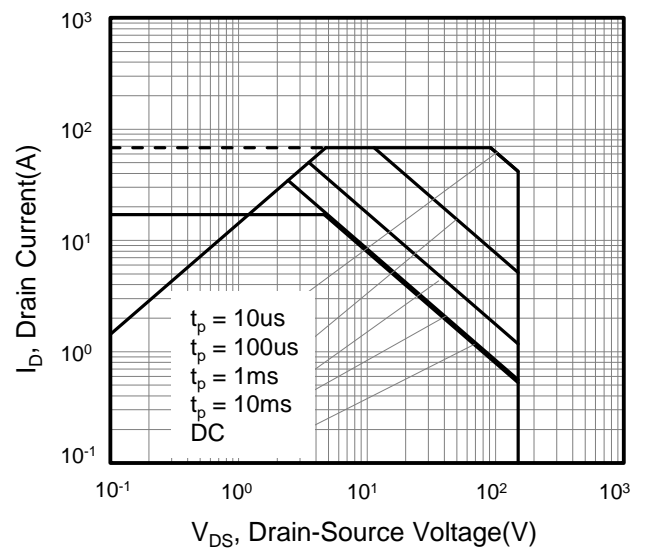




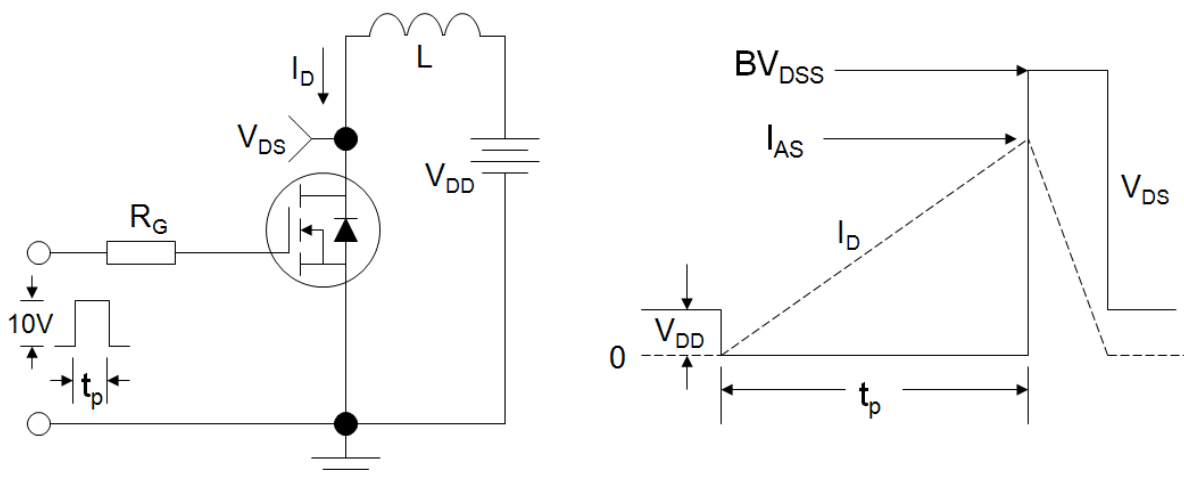
Figure A: Gate Charge Test Circuit and Waveform



Figure B: Resistive Switching Test Circuit and Waveform



Figure C: Unclamped Inductive Switching Test Circuit and Waveform







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