



15A, 500V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

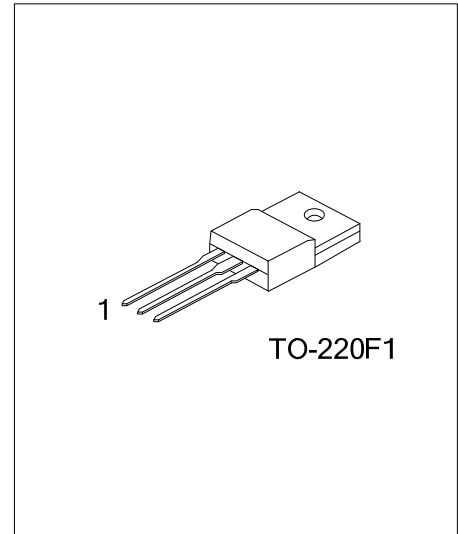
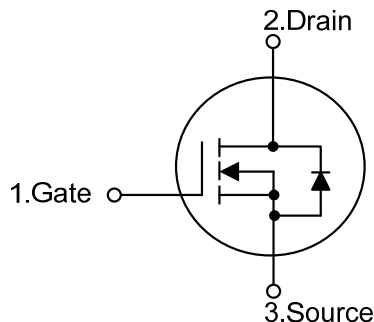
The UTC **15NM50** is an Super Junction MOSFET Structure . It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **15NM50** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

FEATURES

- * $R_{DS(ON)} < 0.35\Omega$ @ $V_{GS}=10V$, $I_D=7.5A$
- * By using Super Junction Structure
- * Fast Switching
- * With 100% Avalanche Tested

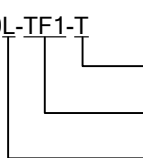
SYMBOL



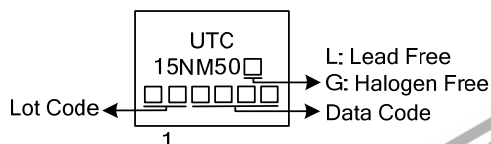
ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|---------------|----------|----------------|---|---|---------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 15NM50L-TF1-T | 15NM50G-TF1-T | TO-220F1 | G | D | S | Tube |

Note: Pin Assignment: G: Gate D: Drain S: Source

| | | |
|--|--|---|
| <p>15NM50L-TF1-T</p>  | | (1) T: Tube (2) TF1: TO-220F1 (3) L: Lead Free, G: Halogen Free and Lead Free |
|--|--|---|

MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|--|-----------------------|------------------|-------------|------|
| Drain to Source Voltage | | V _{DSS} | 500 | V |
| Gate to Source Voltage | | V _{GSS} | ±30 | V |
| Continuous Drain Current | T _C =25°C | I _D | 15 (Note 2) | A |
| | T _C =100°C | | 7 (Note 2) | A |
| Pulsed Drain Current (Note 3) | | I _{DM} | 44 (Note 2) | A |
| Single Pulsed Avalanche Energy(Note 4) | | E _{AS} | 225 | mJ |
| Peak Diode Recovery dv/dt (Note 5) | | dv/dt | 4.5 | V/ns |
| Power Dissipation | T _C =25°C | P _D | 52 | W |
| | Derate above 25°C | | 0.416 | W/°C |
| Junction Temperature | | T _J | +150 | °C |
| Storage Temperature | | T _{STG} | -55 ~ +150 | °C |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Drain current limited by maximum junction temperature

3. Repetitive Rating : Pulse width limited by maximum junction temperature

4. $L=2\text{mH}$, $I_{AS}=15\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

5. $I_{SD} \leq 11\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|---------------|---------|---------------------------|
| Junction to Ambient | θ_{JA} | 62.5 | $^\circ\text{C}/\text{W}$ |
| Junction to Case | θ_{JC} | 2.4 | $^\circ\text{C}/\text{W}$ |

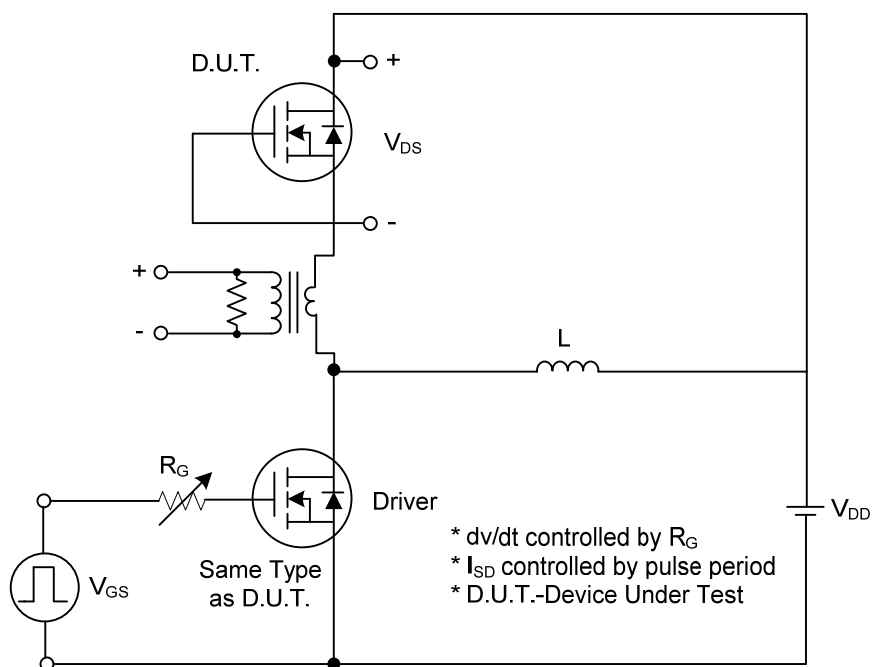
■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|-------------------------------------|---|-----|-----|------|------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =250μA | 500 | | | V |
| Breakdown Voltage Temperature Coefficient | ΔBV _{DSS} /ΔT _J | I _D =250μA, Referenced to 25°C | | 0.5 | | V/°C |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} =500V, V _{GS} =0V | | | 10 | μA |
| | | V _{DS} =500V, T _J =125°C | | | 100 | μA |
| Gate-Source Leakage Current | I _{GSS} | V _{DS} =0V , V _{GS} =±30V | | | ±100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | V _{DS} = V _{GS} , I _D =250μA | 2.5 | | 4.5 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =7.5A | | | 0.35 | Ω |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} =25V, V _{GS} =0V, f=1.0MHz | | 625 | | pF |
| Output Capacitance | C _{OSS} | | | 330 | | pF |
| Reverse Transfer Capacitance | C _{RSS} | | | 15 | | pF |
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge | Q _G | V _{DS} =50V, V _{GS} =10V, I _D =1.3A , I _G =100μA (Note 1, 2) | | 41 | | nC |
| Gate-Source Charge | Q _{GS} | | | 6 | | nC |
| Gate-Drain Charge | Q _{GD} | | | 12 | | nC |
| Turn-ON Delay Time | t _{D(ON)} | V _{DD} =30V, I _D =0.5A, R _G =25Ω V _{GS} =10V (Note 1, 2) | | 55 | | ns |
| Turn-ON Rise Time | t _R | | | 95 | | ns |
| Turn-OFF Delay Time | t _{D(OFF)} | | | 295 | | ns |
| Turn-OFF Fall Time | t _F | | | 125 | | ns |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Body-Diode Continuous Current | I _S | | | | 11 | A |
| Maximum Body-Diode Pulsed Current | I _{SM} | | | | 44 | A |
| Drain-Source Diode Forward Voltage | V _{SD} | I _S =15A, V _{GS} =0V | | | 1.4 | V |

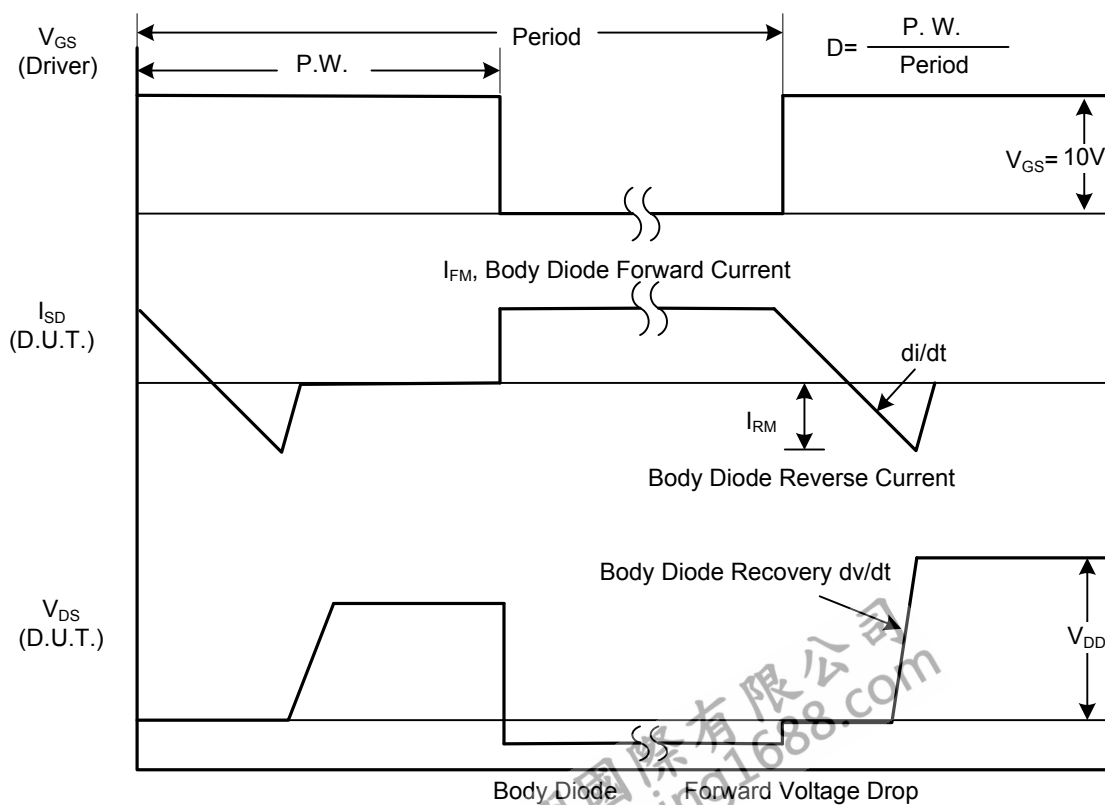
Note: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

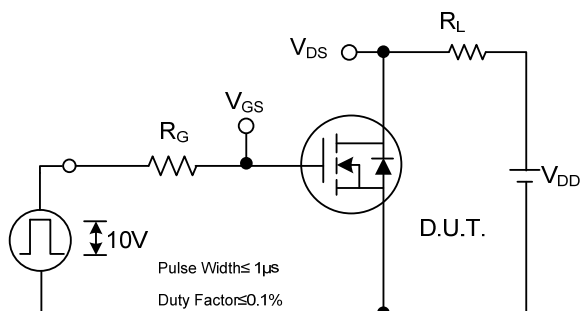


Peak Diode Recovery dv/dt Test Circuit

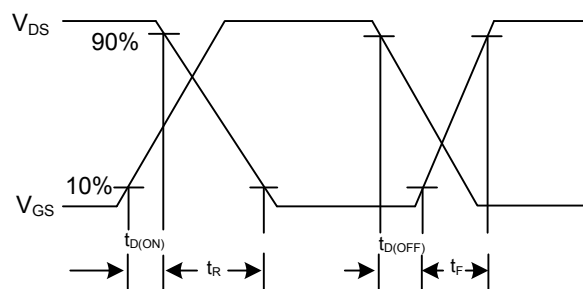


Peak Diode Recovery dv/dt Waveforms

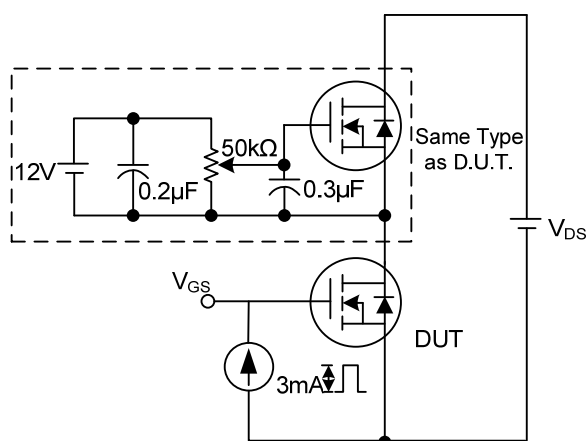
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



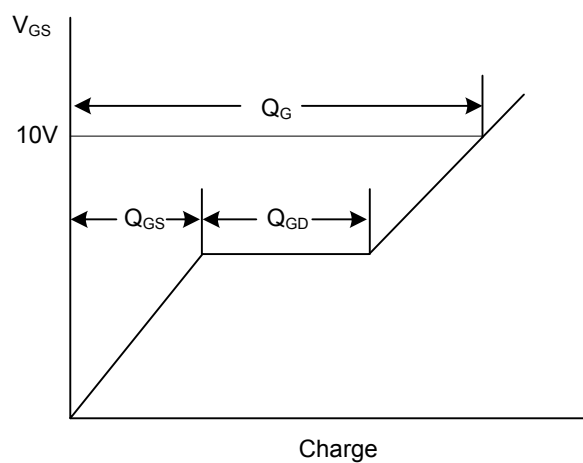
Switching Test Circuit



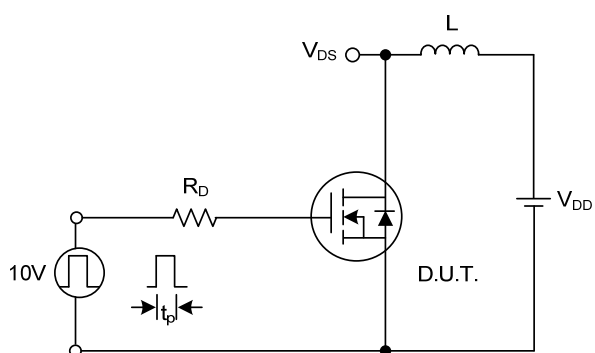
Switching Waveforms



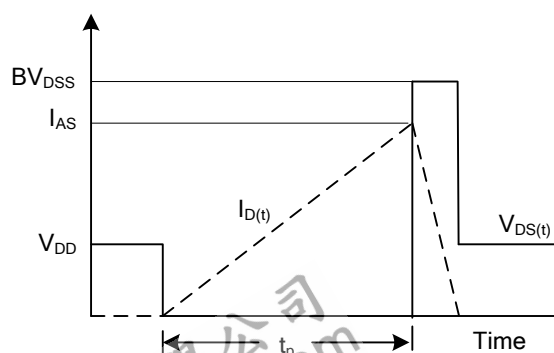
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.