

**FUF830K-TC**

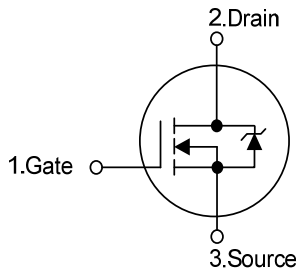
Preliminary

**Power MOSFET****4.5A, 500V N-CHANNEL  
POWER MOSFET****DESCRIPTION**

The UTC FUF830K-TC is a N-Channel enhancement mode silicon gate power MOSFET with Fast Body Diode. is designed high voltage, high speed power switching applications such. such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics.

**FEATURES**

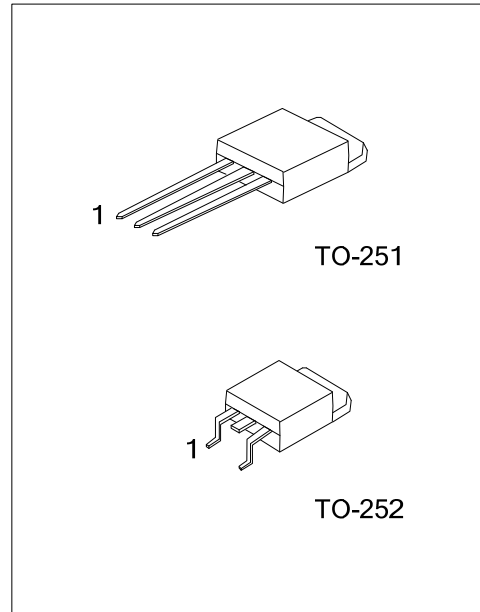
- \*  $R_{DS(ON)} \leq 1.9 \Omega @ V_{GS}=10V, I_D=2.5A$
- \* Fast body diode MOSFET technology
- \* Single Pulse Avalanche Energy Rated
- \* Rugged- SOA is Power Dissipation Limited
- \* Fast Switching Speeds
- \* Linear Transfer Characteristics
- \* High Input Impedance

**SYMBOL****ORDERING INFORMATION**

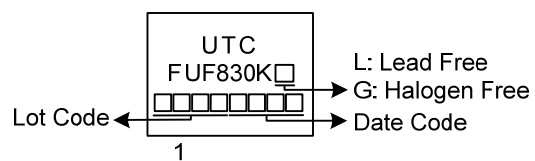
| Ordering Number |                | Package | Pin Assignment |   |   | Packing   |
|-----------------|----------------|---------|----------------|---|---|-----------|
| Lead Free       | Halogen Free   |         | 1              | 2 | 3 |           |
| FUF830KL-TM3-T  | FUF830KG-TM3-T | TO-251  | G              | D | S | Tube      |
| FUF830KL-TN3-R  | FUF830KG-TN3-R | TO-252  | G              | D | S | Tape Reel |

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

|                           |  |                                                                                                    |
|---------------------------|--|----------------------------------------------------------------------------------------------------|
| <b>FUF830KG-TM3-T</b><br> |  | (1) T: Tube<br>(2) TF1: TO-220F1, TF2: TO-220F2<br>(3) G: Halogen Free and Lead Free, L: Lead Free |
|---------------------------|--|----------------------------------------------------------------------------------------------------|



## ■ MARKING



### ■ ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C, Unless Otherwise Specified)

| PARAMETER                                                                 |            | SYMBOL           | RATINGS    | UNIT |
|---------------------------------------------------------------------------|------------|------------------|------------|------|
| Drain to Source Voltage (T <sub>J</sub> =25°C ~125°C)                     |            | V <sub>DS</sub>  | 500        | V    |
| Drain to Gate Voltage (R <sub>G</sub> =20kΩ, T <sub>J</sub> =25°C ~125°C) |            | V <sub>DGR</sub> | 500        | V    |
| Gate to Source Voltage                                                    |            | V <sub>GS</sub>  | ±30        | V    |
| Drain Current                                                             | Continuous | I <sub>D</sub>   | 4.5        | A    |
|                                                                           | Pulsed     | I <sub>DM</sub>  | 18         | A    |
| Single Pulse Avalanche Energy Rating (Note 2)                             |            | E <sub>AS</sub>  | 154        | mJ   |
| Peak Diode Recovery dv/dt (Note 3)                                        |            | dv/dt            | 4.3        | V/ns |
| Power Dissipation                                                         |            | P <sub>D</sub>   | 46         | W    |
| Junction Temperature                                                      |            | T <sub>J</sub>   | +150       | °C   |
| Storage Temperature                                                       |            | T <sub>STG</sub> | -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. Repetitive Rating : Pulse width limited by maximum junction temperature.

3. L=30mH, I<sub>AS</sub>=2.2A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub> = 25°C

4. I<sub>SD</sub> ≤ 4.5A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C

### ■ THERMAL DATA

| PARAMETER           | SYMBOL          | RATING | UNIT |
|---------------------|-----------------|--------|------|
| Junction to Ambient | θ <sub>JA</sub> | 100.3  | °C/W |
| Junction to Case    | θ <sub>JC</sub> | 2.7    | °C/W |

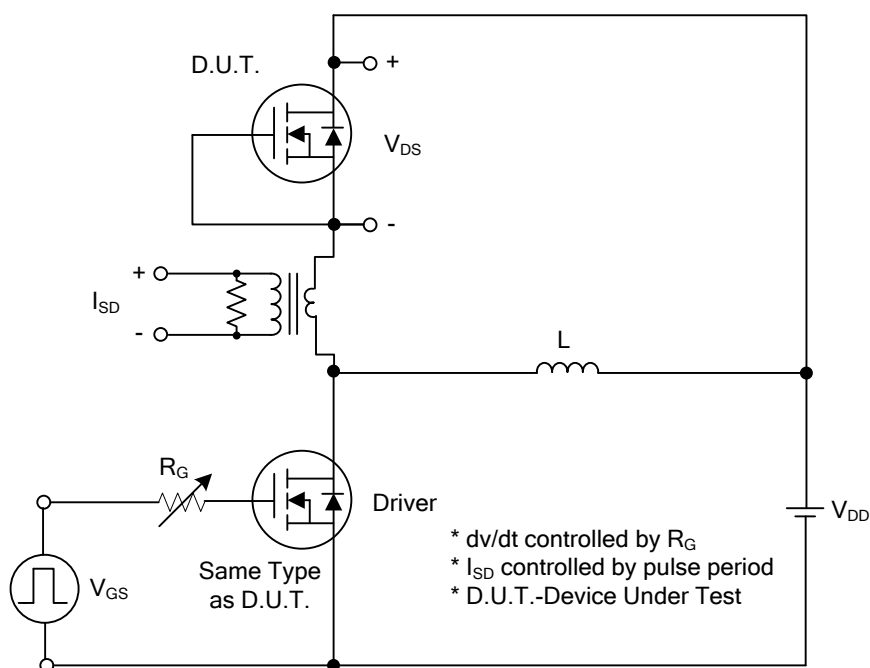
### ■ ELECTRICAL SPECIFICATIONS (T<sub>J</sub>=25°C, unless otherwise specified)

| PARAMETER                               | SYMBOL              | TEST CONDITIONS                                                                                      | MIN | TYP  | MAX  | UNIT |
|-----------------------------------------|---------------------|------------------------------------------------------------------------------------------------------|-----|------|------|------|
| OFF CHARACTERISTICS                     |                     |                                                                                                      |     |      |      |      |
| Drain-Source Breakdown Voltage          | BV <sub>DSS</sub>   | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                                           | 500 |      |      | V    |
| Drain-Source Leakage Current            | I <sub>DSS</sub>    | V <sub>DS</sub> = Rated BV <sub>DSS</sub> , V <sub>GS</sub> =0V                                      |     |      | 25   | μA   |
| Gate-Source Leakage Current             | I <sub>GSS</sub>    | V <sub>GS</sub> =±30V                                                                                |     |      | ±100 | nA   |
| ON CHARACTERISTICS                      |                     |                                                                                                      |     |      |      |      |
| Gate Threshold Voltage                  | V <sub>GS(TH)</sub> | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA                                             | 2.0 |      | 4.0  | V    |
| Static Drain-Source On-State Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =2.5A                                                           |     |      | 1.9  | Ω    |
| DYNAMIC PARAMETERS                      |                     |                                                                                                      |     |      |      |      |
| Input Capacitance                       | C <sub>ISS</sub>    | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz                                                  |     | 575  |      | pF   |
| Output Capacitance                      | C <sub>OSS</sub>    |                                                                                                      |     | 63   |      | pF   |
| Reverse Transfer Capacitance            | C <sub>RSS</sub>    |                                                                                                      |     | 3.5  |      | pF   |
| SWITCHING PARAMETERS                    |                     |                                                                                                      |     |      |      |      |
| Total Gate Charge (Note 1)              | Q <sub>G</sub>      | V <sub>DS</sub> =400V, V <sub>GS</sub> =10V, I <sub>D</sub> =4.5A<br>I <sub>G</sub> = 1mA (Note1, 2) |     | 16   |      | nC   |
| Gate-Source Charge                      | Q <sub>GS</sub>     |                                                                                                      |     | 6    |      | nC   |
| Gate-Drain Charge                       | Q <sub>GD</sub>     |                                                                                                      |     | 2    |      | nC   |
| Turn-On Delay Time (Note 1)             | t <sub>D(ON)</sub>  | V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =4.5A,<br>R <sub>G</sub> =25Ω (Note1, 2) |     | 7    |      | ns   |
| Turn-On Rise Time                       | t <sub>R</sub>      |                                                                                                      |     | 16   |      | ns   |
| Turn-Off Delay Time                     | t <sub>D(OFF)</sub> |                                                                                                      |     | 34   |      | ns   |
| Turn-Off Fall Time                      | t <sub>F</sub>      |                                                                                                      |     | 25   |      | ns   |
| SOURCE TO DRAIN DIODE SPECIFICATIONS    |                     |                                                                                                      |     |      |      |      |
| Continuous Source to Drain Current      | I <sub>S</sub>      | (Note 4)                                                                                             |     |      | 4.5  | A    |
| Pulse Source to Drain Current           | I <sub>SD</sub>     |                                                                                                      |     |      | 18   | A    |
| Source to Drain Diode Voltage (Note 1)  | V <sub>SD</sub>     | I <sub>SD</sub> =4.5A, V <sub>GS</sub> =0V                                                           |     |      | 1.6  | V    |
| Reverse Recovery Time (Note 1)          | t <sub>rr</sub>     | I <sub>SD</sub> =4.5A, V <sub>GS</sub> =0V,                                                          |     | 82   |      | nS   |
| Reverse Recovery Charge                 | Q <sub>rr</sub>     | dl <sub>F</sub> / dt =100A/μs                                                                        |     | 0.27 |      | μC   |

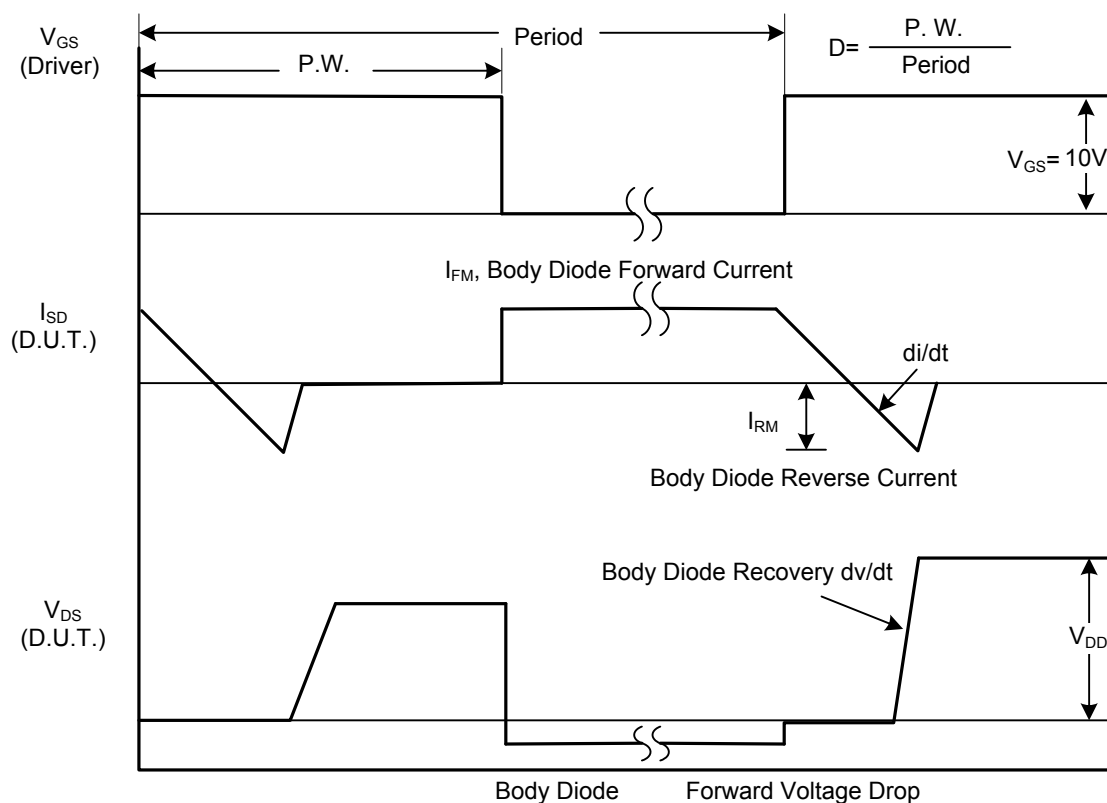
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

# ■ TEST CIRCUITS AND WAVEFORMS

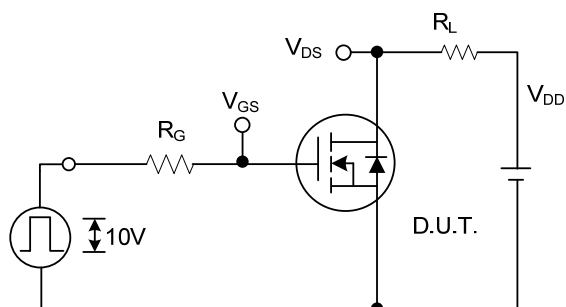


Peak Diode Recovery  $dv/dt$  Test Circuit

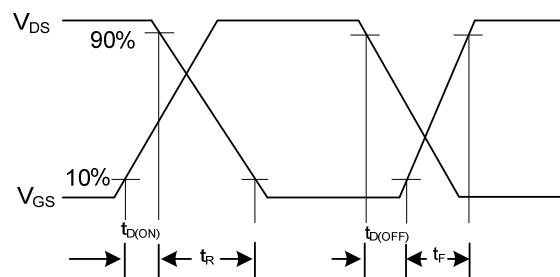


Peak Diode Recovery  $dv/dt$  Waveforms

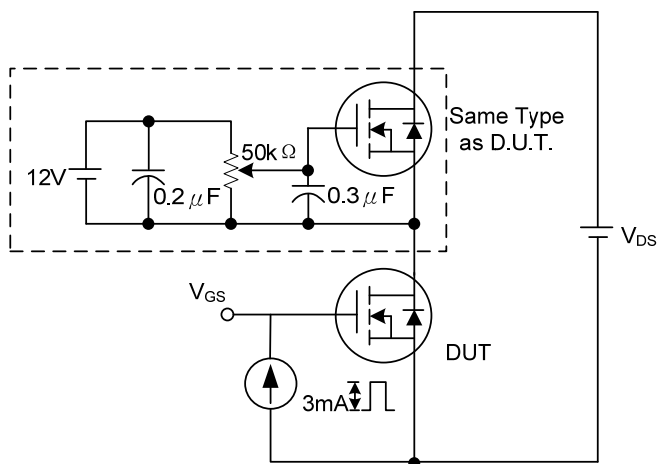
## ■ TEST CIRCUITS AND WAVEFORMS



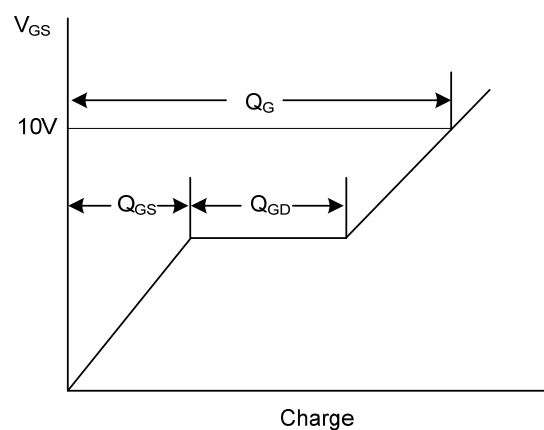
Switching Test Circuit



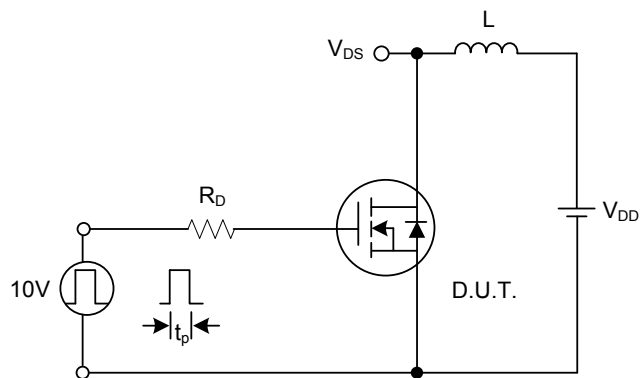
Switching Waveforms



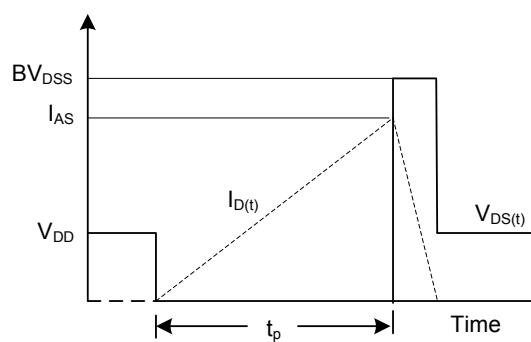
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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