

**UF634Z-Q**

Preliminary

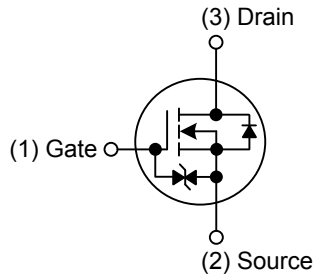
**Power MOSFET****8.1A, 250V N-CHANNEL  
POWER MOSFET****DESCRIPTION**

These kinds of N-channel power MOSFET field effect transistor have low conduction power loss, high input impedance, and high switching speed, Linear Transfer Characteristics, so can be use in a variety of power conversion applications.

The **UF634Z-Q** suitable for resonant and PWM converter topologies.

**FEATURES**

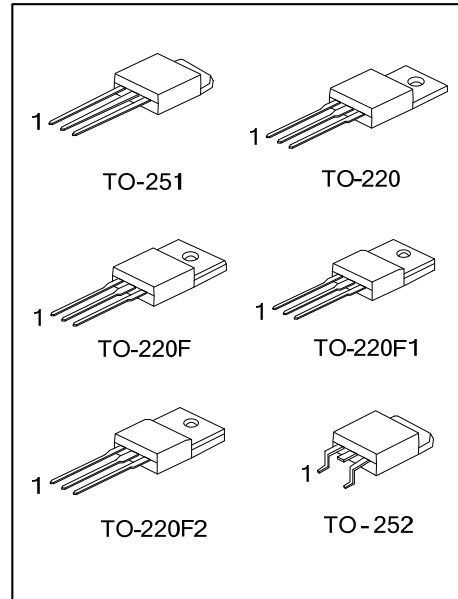
- \*  $R_{DS(ON)} \leq 0.6 \Omega$  @  $V_{GS}=10V$ ,  $I_D=4.0A$
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

**SYMBOL****ORDERING INFORMATION**

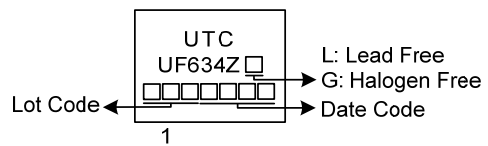
| Ordering Number |               | Package  | Pin Assignment |   |   | Packing   |
|-----------------|---------------|----------|----------------|---|---|-----------|
| Lead Free       | Halogen Free  |          | 1              | 2 | 3 |           |
| UF634ZL-TA3-T   | UF634ZG-TA3-T | TO-220   | G              | D | S | Tube      |
| UF634ZL-TF1-T   | UF634ZG-TF1-T | TO-220F1 | G              | D | S | Tube      |
| UF634ZL-TF3-T   | UF634ZG-TF3-T | TO-220F2 | G              | D | S | Tube      |
| UF634ZL-TF3-T   | UF634ZG-TF3-T | TO-220F  | G              | D | S | Tube      |
| UF634ZL-TM3-T   | UF634ZG-TM3-T | TO-251   | G              | D | S | Tube      |
| UF634ZL-TN3-R   | UF634ZG-TN3-R | TO-252   | G              | D | S | Tape Reel |

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

|                                                                                               |  |                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>UF634ZG-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p> |  | <p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|-----------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## ■ MARKING



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

| PARAMETER                                     |                  | SYMBOL    | RATINGS    | UNIT             |
|-----------------------------------------------|------------------|-----------|------------|------------------|
| Drain-Source Voltage                          |                  | $V_{DSS}$ | 250        | V                |
| Gate-Source Voltage                           |                  | $V_{GSS}$ | $\pm 20$   | V                |
| Continuous Drain Current                      |                  | $I_D$     | 8.1        | A                |
| Pulsed Drain Current (Note 2)                 |                  | $I_{DM}$  | 32.4       | A                |
| Single Pulse Avalanche Energy Rating (Note 2) |                  | $E_{AS}$  | 210        | mJ               |
| Peak Diode Recovery dv/dt (Note 4)            |                  | dv/dt     | 2.15       | V/ns             |
| Maximum Power Dissipation                     | TO-220           | $P_D$     | 70         | W                |
|                                               | TO-220F/TO-220F1 |           | 38         | W                |
|                                               | TO-220F2         |           |            |                  |
|                                               | TO-251/TO-252    |           | 50         | W                |
| Junction Temperature                          |                  | $T_J$     | +150       | $^\circ\text{C}$ |
| Storage Temperature                           |                  | $T_{STG}$ | -55 ~ +150 | $^\circ\text{C}$ |

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.  $L=30\text{mH}$ ,  $I_{AS}=3.74\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=27\ \Omega$ , Starting  $T_J=25^\circ\text{C}$ .

4.  $I_{SD} \leq 8.1\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$ .

■ **THERMAL DATA**

| PARAMETER           | PACKAGE           | SYMBOL        | RATINGS    | UNIT                      |
|---------------------|-------------------|---------------|------------|---------------------------|
| Junction to Ambient | TO-220/TO-220F    | $\theta_{JA}$ | 62.5       | $^\circ\text{C}/\text{W}$ |
|                     | TO-220F1/TO-220F2 |               |            |                           |
|                     | TO-251/TO-252     |               | 110        | $^\circ\text{C}/\text{W}$ |
| Junction to Case    | TO-220            | $\theta_{JC}$ | 1.01       | $^\circ\text{C}/\text{W}$ |
|                     | TO-220F/TO-220F1  |               | 3.29       | $^\circ\text{C}/\text{W}$ |
|                     | TO-220F2          |               |            |                           |
|                     | TO-251/TO-252     |               | 2.5 (Note) | $^\circ\text{C}/\text{W}$ |

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

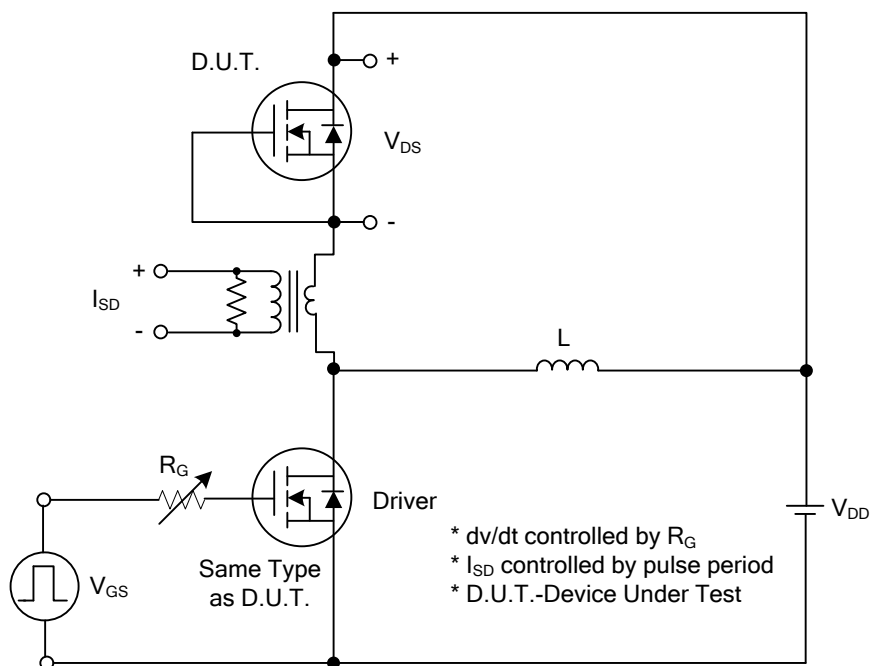
■ **ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| 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                                                            | 250 |      |      | V    |
| Drain-Source Leakage Current                | I <sub>DSS</sub>    | V <sub>DS</sub> =250V, V <sub>GS</sub> =0V                                                            |     |      | 10   | μA   |
| Gate-Source Leakage Current                 | I <sub>GSS</sub>    | V <sub>GS</sub> =20V                                                                                  |     |      | 10   | μA   |
|                                             |                     | V <sub>GS</sub> =-20V                                                                                 |     |      | -10  | μA   |
| 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    |
| Drain-Source On Resistance                  | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =4.0A                                                            |     |      | 0.6  | Ω    |
| DYNAMIC PARAMETERS                          |                     |                                                                                                       |     |      |      |      |
| Input Capacitance                           | C <sub>ISS</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz                                                     |     | 440  |      | pF   |
| Output Capacitance                          | C <sub>OSS</sub>    |                                                                                                       |     | 92   |      | pF   |
| Reverse Transfer Capacitance                | C <sub>RSS</sub>    |                                                                                                       |     | 30.2 |      | pF   |
| Gate Resistance                             | R <sub>G</sub>      | V <sub>DS</sub> =0V, f=1MHz                                                                           |     | 5    |      | Ω    |
| SWITCHING PARAMETERS                        |                     |                                                                                                       |     |      |      |      |
| Total Gate Charge                           | Q <sub>G</sub>      | V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =7.0A<br>(Note 1, 2)                      |     | 27   |      | nC   |
| Gate Source Charge                          | Q <sub>GS</sub>     |                                                                                                       |     | 8    |      | nC   |
| Gate Drain Charge                           | Q <sub>GD</sub>     |                                                                                                       |     | 7    |      | nC   |
| Turn-ON Delay Time                          | t <sub>D(ON)</sub>  | V <sub>DD</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =7.0A,<br>R <sub>G</sub> =25Ω (Note 1, 2) |     | 9    |      | ns   |
| Turn-ON Rise Time                           | t <sub>R</sub>      |                                                                                                       |     | 17   |      | ns   |
| Turn-OFF Delay Time                         | t <sub>D(OFF)</sub> |                                                                                                       |     | 60   |      | ns   |
| Turn-OFF Fall-Time                          | t <sub>F</sub>      |                                                                                                       |     | 25.3 |      | ns   |
| SOURCE TO DRAIN DIODE SPECIFICATIONS        |                     |                                                                                                       |     |      |      |      |
| Continuous Source Current<br>(body diode)   | I <sub>S</sub>      |                                                                                                       |     |      | 8.1  | A    |
| Pulse Source Current (body diode)<br>(Note) | I <sub>SM</sub>     |                                                                                                       |     |      | 32.4 | A    |
| Diode Forward Voltage (Note)                | V <sub>SD</sub>     | I <sub>S</sub> =8.1A, V <sub>GS</sub> =0V                                                             |     |      | 1.4  | V    |
| Reverse Recovery Time                       | t <sub>rr</sub>     | I <sub>S</sub> =8.1A, dI <sub>S</sub> /dt=100A/μs                                                     |     | 160  |      | ns   |
| Reverse Recovery Charge                     | Q <sub>rr</sub>     |                                                                                                       |     | 2.2  |      | μC   |

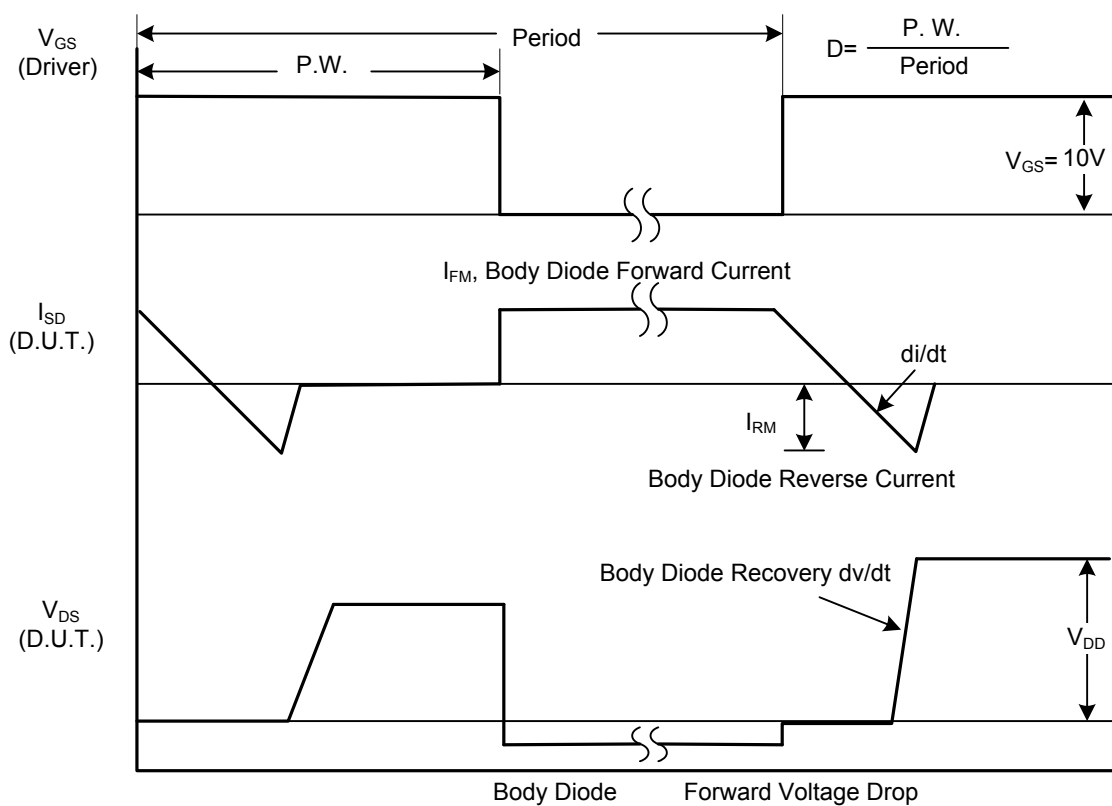
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

### ■ TEST CIRCUITS AND WAVEFORMS

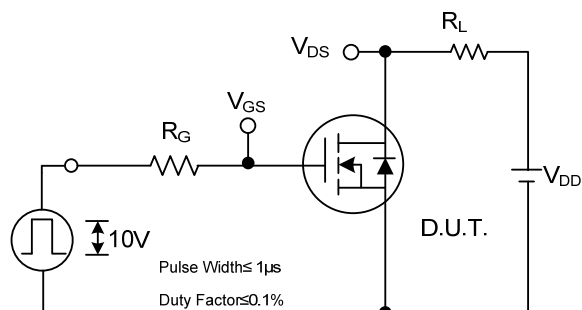


Peak Diode Recovery dv/dt Test Circuit

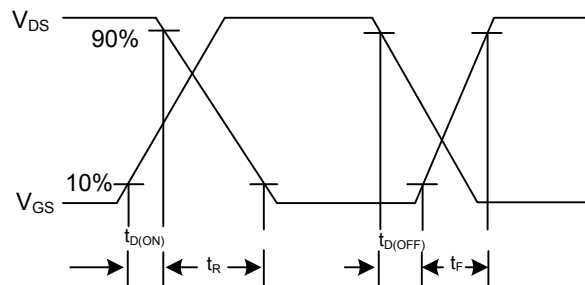


Peak Diode Recovery dv/dt Waveforms

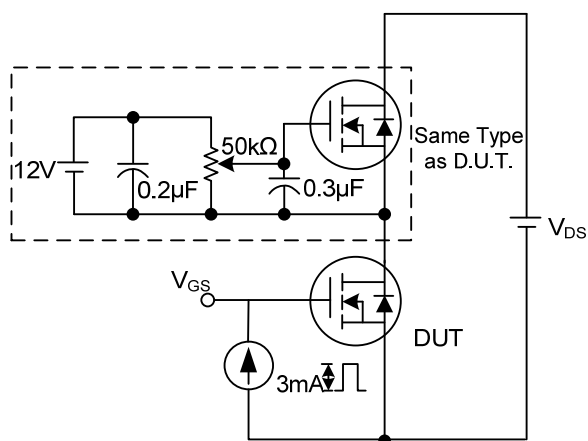
### ■ TEST CIRCUITS AND WAVEFORMS



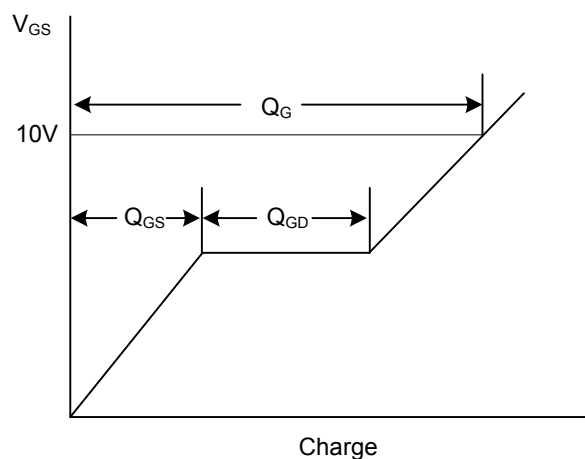
Switching Test Circuit



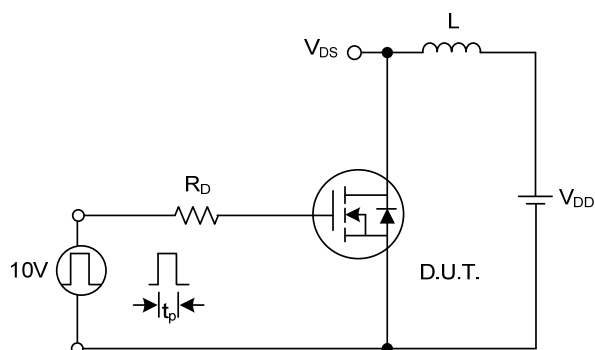
Switching Waveforms



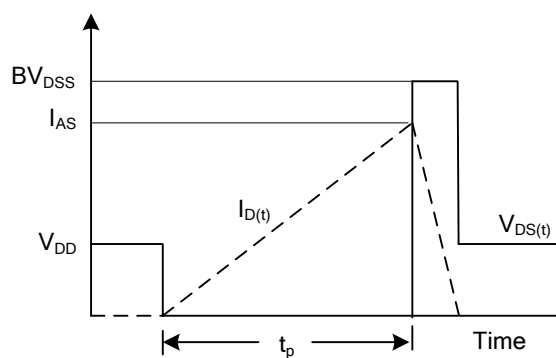
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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