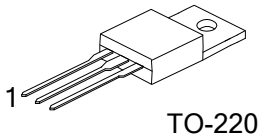
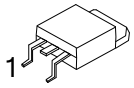
# UF9Z34

***POWER MOSFET***

## -17A, -55V P-CHANNEL POWER MOSFET




TO-220




TO-252

### ■ DESCRIPTION

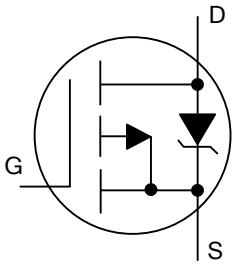
The UTC **UF9Z34** is a P-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance.

The UTC **UF9Z34** is suitable for all commercial-industrial applications, etc.

### ■ FEATURES

* $R_{DS(ON)}$ ≤ 0.1 Ω @ $V_{GS}$=-10V, $I_D$=-10A
* High Switching Speed
* Dynamic dv/dt Rating

### ■ SYMBOL



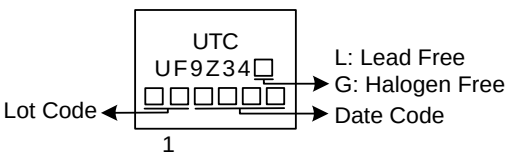

### ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UF9Z34L-TA3-T | UF9Z34G-TA3-T | TO-220 | G | D | S | Tube |
| UF9Z34L-TN3-R | UF9Z34G-TN3-R | TO-252 | G | D | S | Tape Reel |

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

| | |
|---|---|
| UF9Z34G-TA3-T<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) T: Tube, R: Tape Reel<br>(2) TA3: TO-220, TN3: TO-252<br>(3) G: Halogen Free and Lead Free, L: Lead Free |

### ■ MARKING



## ■ ABSOLUTE MAXIMUM RATING ($T_A$=25°C, unless otherwise specified)

| PARAMETER | | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -55 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Drain Current | Continuous | $V_{GS}$=-10V, $T_C$=25°C | $I_D$ | -17 | A |
| | | $V_{GS}$=10V, $T_C$=100°C | | -12 | A |
| | Pulsed (Note 2) | | $I_{DM}$ | -68 | A |
| Avalanche Current (Note 2) | | | $I_{AR}$ | -10 | A |
| Avalanche Energy | Single Pulse (Note 3) | | $E_{AS}$ | 180 | mJ |
| | Repetitive (Note 2) | | $E_{AR}$ | 5.6 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | | dv/dt | -6.7 | V/ns |
| Power Dissipation ($T_C$=25°C) | | TO-220 | $P_D$ | 56 | W |
| | | TO-252 | | 38 | W |
| Junction Temperature | | | $T_J$ | -55 ~ +150 | °C |
| Storage Temperature Range | | | $T_{STG}$ | -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. Starting $T_J$=25°C, L=3.6mH, $R_G$=25Ω, $I_{AS}$=-10A
3. $I_{SD}$≤-10A, di/dt≤-290A/μs, $V_{DD}$≤$BV_{DSS}$, $T_J$≤150°C
4. Pulse width≤300μs; duty cycle≤2%

## ■ THERMAL DATA

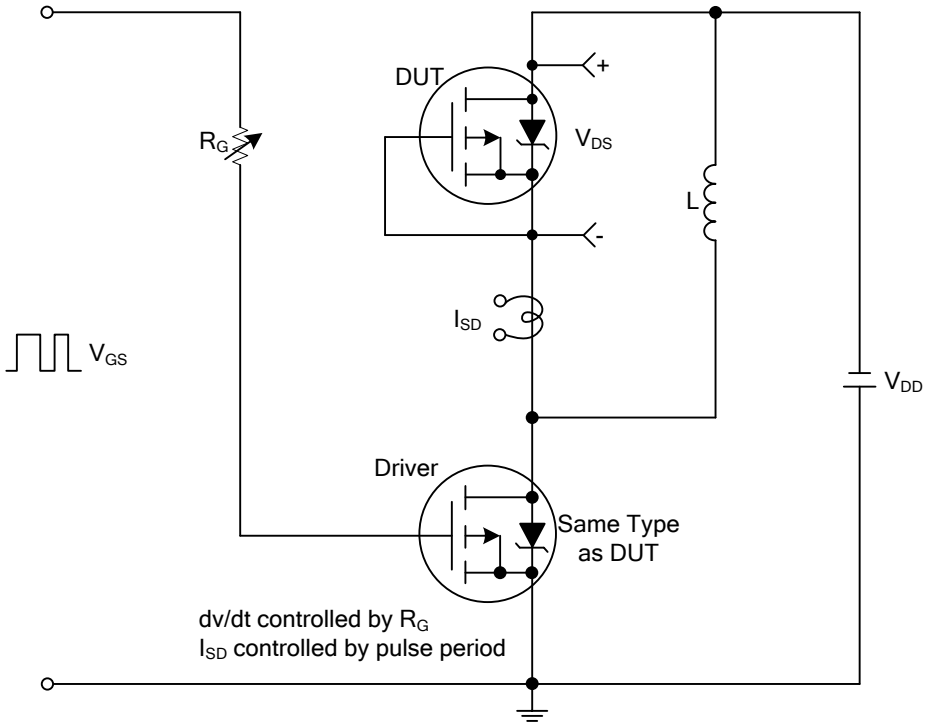
| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Junction to Ambient | TO-220 | $\theta_{JA}$ | 62 | °C/W |
| | TO-252 | | 125 | °C/W |
| Junction to Case | TO-220 | $\theta_{JC}$ | 2.2 | °C/W |
| | TO-252 | | 3.2 | °C/W |

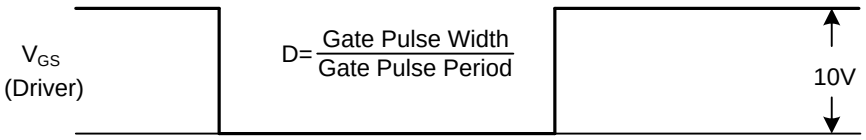
## ■ ELECTRICAL CHARACTERISTICS ($T_J$=25°C, unless otherwise specified)

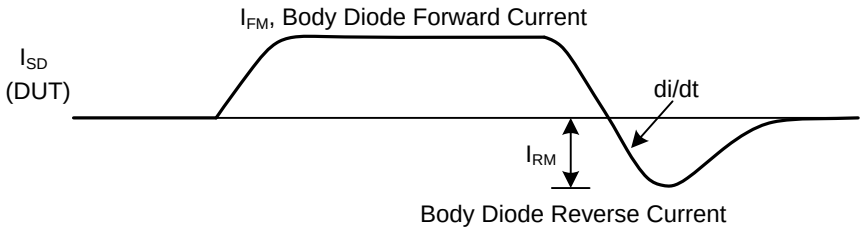
| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=-250μA | -55 | | | V |
| Breakdown Voltage Temperature Coefficient | | $\Delta BV_{DSS}/\Delta T_J$ | Reference to 25°C, $I_D$=-1mA | | -0.05 | | V/°C |
| Drain -Source Leakage Current | | $I_{DSS}$ | $V_{DS}$=-55V, $V_{GS}$=0V | | | -25 | μA |
| | | | $V_{DS}$=-44V, $V_{GS}$=0V, $T_J$=150°C | | | -250 | μA |
| Gate-Source Leakage Current | Forward | $I_{GSS}$ | $V_{GS}$=20V, $V_{DS}$=0V | | | 100 | nA |
| | Reverse | | $V_{GS}$=-20V, $V_{DS}$=0V | | | -100 | nA |
| **ON CHARACTERISTICS** | | | | | | | |
| Static Drain-Source On-State Resistance | | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-10A (Note 2) | | | 0.10 | Ω |
| Gate Threshold Voltage | | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -2.0 | | -4.0 | V |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=-25V, f=1.0MHz | | 620 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 280 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 140 | | pF |
| **SWITCHING PARAMETERS** | | | | | | | |
| Total Gate Charge | | $Q_G$ | $I_D$=-1.3A, $V_{DS}$=-50V, $V_{GS}$=-10V (Note 2) | | 35.6 | 40 | nC |
| Gate to Source Charge | | $Q_{GS}$ | | | 5.6 | 7.9 | nC |
| Gate to Drain ("Miller") Charge | | $Q_{GD}$ | | | 8.7 | 16 | nC |
| Turn-ON Delay Time | | $t_{D(ON)}$ | $V_{DD}$=-30V, $I_D$=-0.5A, $R_G$=25Ω, $R_D$=2.6Ω (Note 2) | | 30 | | ns |
| Rise Time | | $t_R$ | | | 60 | | ns |
| Turn-OFF Delay Time | | $t_{D(OFF)}$ | | | 360 | | ns |
| Fall Time | | $t_F$ | | | 115 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Maximum Body Diode Continuous Source Current | | $I_S$ | | | | -17 | A |
| Maximum Body-Diode Pulsed Current (Note 1) | | $I_{SM}$ | | | | -68 | A |
| Drain-Source Diode Forward Voltage | | $V_{SD}$ | $T_J$=25°C, $I_S$=-10A, $V_{GS}$=0V (Note 2) | | | -1.3 | V |
| Body Diode Reverse Recovery Time | | $t_{RR}$ | $T_J$=25°C, $I_F$=-10A, di/dt=-100A/μs (Note 2) | | 54 | 82 | ns |
| Body Diode Reverse Recovery Charge | | $Q_{RR}$ | | | 110 | 160 | nC |

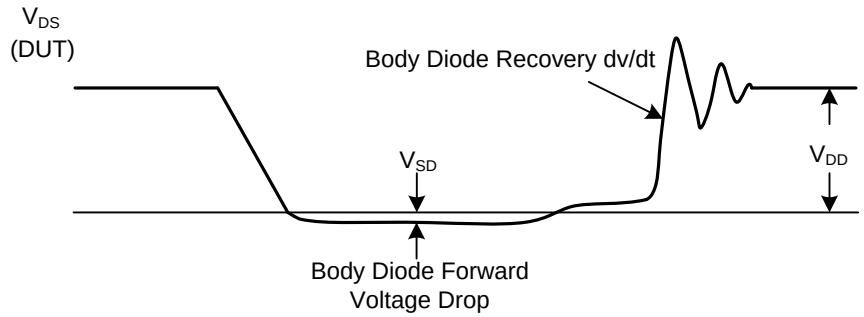
Notes: 1. Starting $T_J$=25°C, L=3.6mH, $R_G$=25Ω, $I_{AS}$=-10A
2. Pulse width≤300μs; duty cycle≤2%

## ■ TEST CIRCUITS AND WAVEFORMS



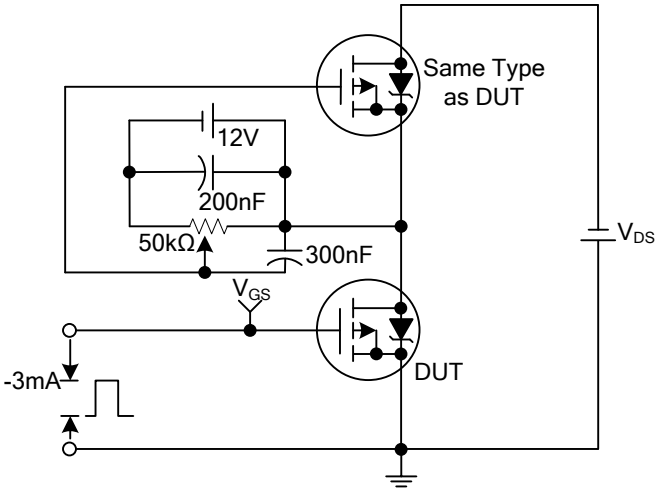



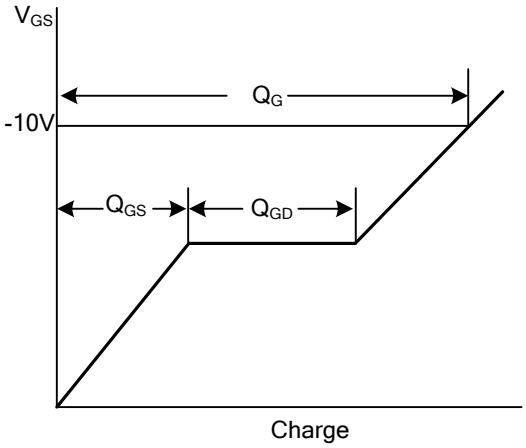




Peak Diode Recovery dv/dt Test Circuit and Waveforms

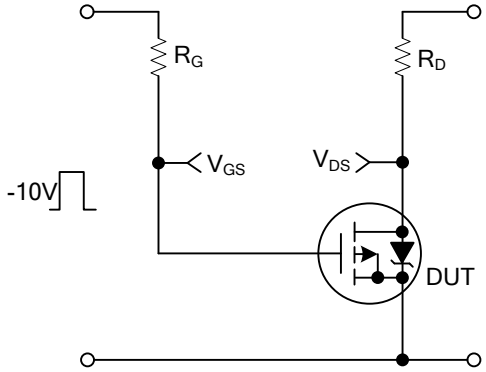
## ■ TEST CIRCUITS AND WAVEFORMS



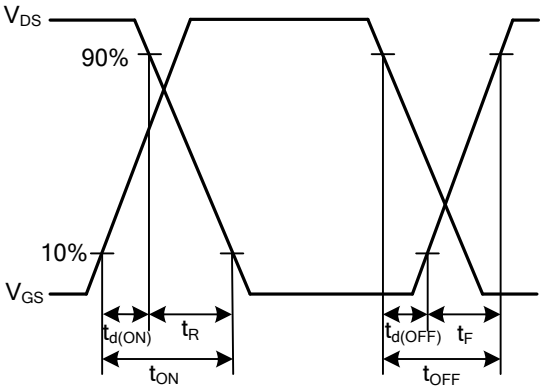

Gate Charge Test Circuit




Gate Charge Waveforms



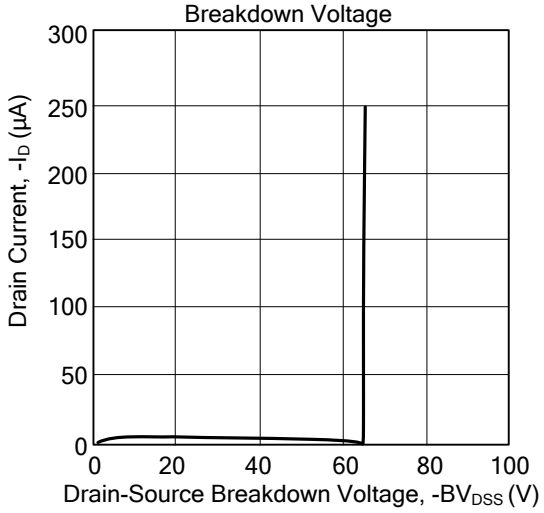

Resistive Switching Test Circuit



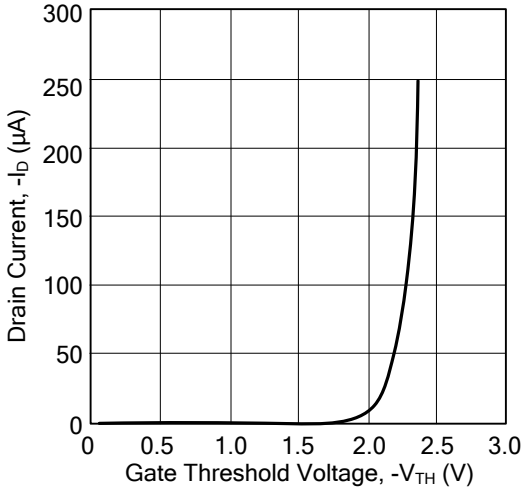

Resistive Switching Waveforms

## ■ TYPICAL CHARACTERISTICS

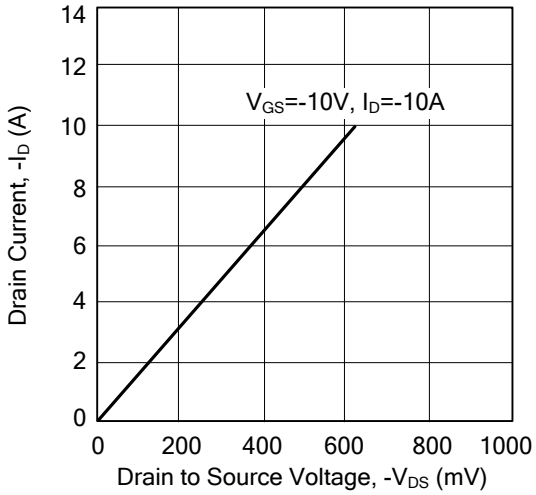
Drain Current vs. Drain-Source Breakdown Voltage




Drain Current vs. Gate Threshold Voltage




Drain-Source On-State Resistance Characteristics




Continuous Drain-Source Current vs. Source to Drain Voltage