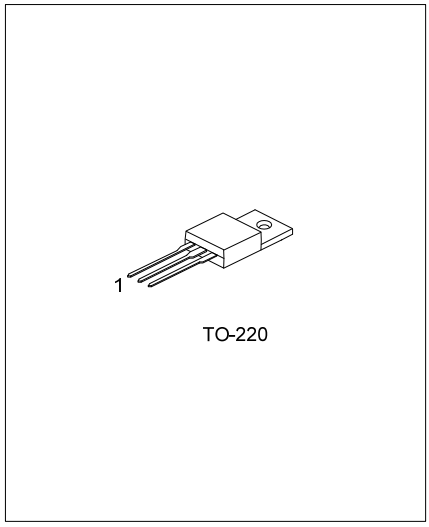
# UF1010E

**Power MOSFET**

## HEXFET POWER MOSFET




Lead-free: UF1010EL
Halogen-free: UF1010EG

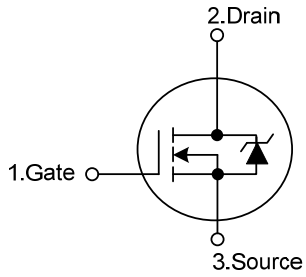
### ■ DESCRIPTION

Using high technology of UTC, UTC **UF1010E** has the features such as: low $R_{DS(ON)}$, fast switching, and low gate charge. Like features of all HEFET power MOSFET devices' features, UTC **UF1010E** can satisfy almost all the requirements of high efficient device form customers.

### ■ FEATURES

* $R_{DS(ON)}$<12 mΩ @$V_{GS}$=10V
* Ultra low gate charge :130 nC
* Low $C_{RSS}$ = 140 pF(typ. )
* Fast switching capability
* Avalanche energy specified
* Improved dv/dt capability
* High ruggedness

### ■ SYMBOL




### ■ ORDERING INFORMATION

| Ordering Number | | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|---|
| Normal | Lead Free Plating | Halogen Free | | 1 | 2 | 3 | |
| UF1010E-TA3-T | UF1010EL-TA3-T | UF1010EG-TA3-T | TO-220 | G | D | S | Tube |

| | |
|---|---|
| UF1010EL-TA3-T<br>(1)Packing Type<br>(2)Package Type<br>(3)Lead Plating | (1) T: Tube<br>(2) TA3: TO-220<br>(3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn |

## ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Gate to Source Voltage | | $V_{GSS}$ | ±20 | V |
| Drain Current | Continuous ($V_{GS}$=10V) | $I_D$ | 84 | A |
| | Pulsed (Note 2) | $I_{DM}$ | 330 | |
| Avalanche Current (Note 2) | | $I_{AR}$ | 50 | A |
| Avalanche Energy | Repetitive (Note 2) | $E_{AR}$ | 17 | mJ |
| | Single Pulsed (Note3) | $E_{AS}$ | 1180 | mJ |
| Power Dissipation ($T_C$=25°C) | | $P_D$ | 200 | W |
| Junction Temperature | | $T_J$ | +175 | °C |
| Storage Temperature | | $T_{STG}$ | -55 ~ +175 | °C |

Note: 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. Pulse width limited by $T_{J(MAX)}$
3. $T_J$=25°C, L=260μH, $R_G$=25Ω, $I_{AS}$=50A

## ■ THERMAL DATA

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | | | 62 | °C/W |
| Junction to Case | $\theta_{Jc}$ | | | 0.75 | °C/W |

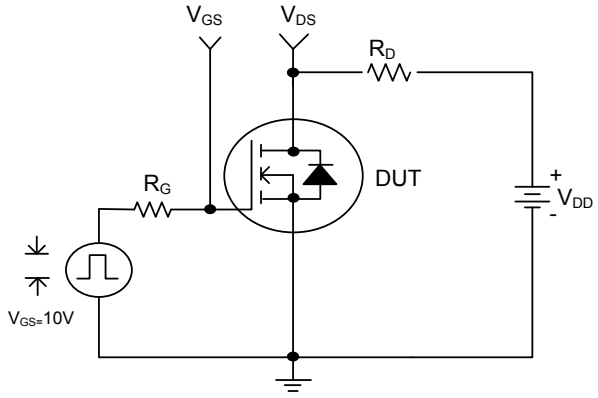
## ■ ELECTRICAL CHARACTERISTICS ($T_J$=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0 V, $I_D$=250 μA | 60 | | | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=60 V,$V_{GS}$=0 V | | | 25 | μA |
| | | $V_{DS}$=48 V,$V_{GS}$=0 V,$T_J$=150°C | | | 250 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20 V, $V_{DS}$=0 V | | | ±100 | nA |
| Breakdown Voltage Temperature Coefficient | $\triangle BV_{DSS}/\triangle T_J$ | Reference to 25°C, $I_D$=1 mA | | 0.064 | | V/°C |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250 μA | 2.0 | | 4.0 | V |
| Static Drain-Source On Resistance(Note) | $R_{DS(ON)}$ | $V_{GS}$=10 V, $I_D$=50 A | | | 12 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$=25 V, $V_{GS}$=0 V,f=1MHz | | 3210 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 690 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 140 | | pF |
| **SWITCHING PARAMETERS** | | | | | | |
| Total Gate Charge | $Q_G$ | $I_D$ =50A,$V_{DS}$ =48V,$V_{GS}$ =10V | | | 130 | nC |
| Gate-to-Source Charge | $Q_{GS}$ | | | | 28 | nC |
| Gate-to-Drain ("Miller") Charge | $Q_{GD}$ | | | | 44 | nC |
| Turn ON Delay Time | $t_{D(ON)}$ | $V_{DD}$ =30V,$I_D$ =50A,$R_G$ =3.6Ω $V_{GS}$ = 10V | | 12 | | ns |
| Turn ON Rise Time | $t_R$ | | | 78 | | ns |
| Turn OFF Delay Time | $t_{D(OFF)}$ | | | 48 | | ns |
| Turn OFF Fall Time | $t_F$ | | | 53 | | ns |
| Internal Drain Inductance | $L_D$ | | | 4.5 | | nH |
| Internal Source Inductance | $L_S$ | | | 7.5 | | nH |
| Diode Forward Voltage | $V_{SD}$ | $T_J$ = 25°C, $I_S$ = 50A,$V_{GS}$ = 0V | | | 1.3 | V |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | | | | 84 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | | | 330 | A |
| Reverse Recovery Time | $t_{RR}$ | $T_J$=25°C,$I_F$=50A, di/dt=100A/μs | | 73 | 110 | ns |
| Reverse Recovery Charge | $Q_{RR}$ | | | 220 | 330 | nC |

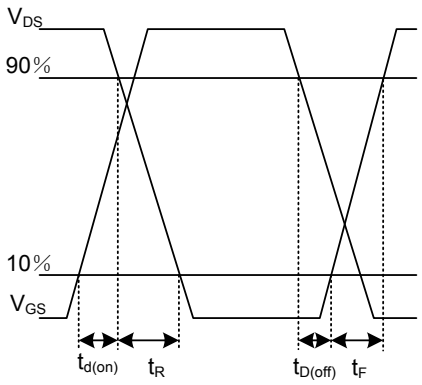
Note: Pulse width ≤ 400μs; duty cycle ≤ 2%.

## ■ TEST CIRCUITS AND WAVEFORMS

Switching Time Test Circuit

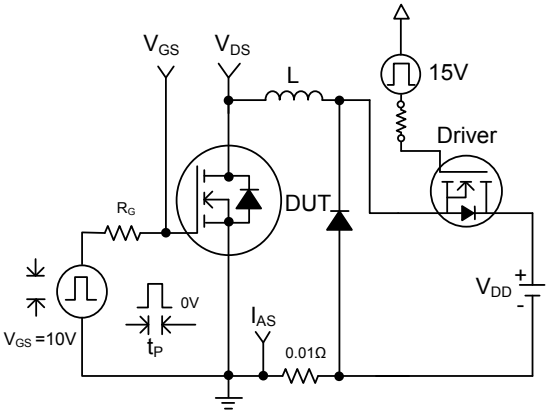



Switching Time Waveforms

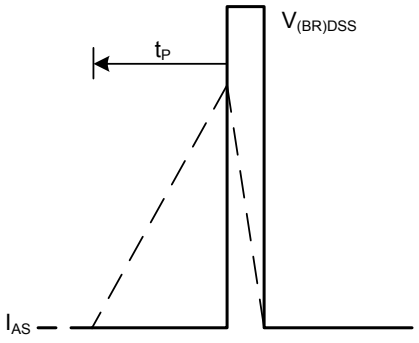



Pulse Width≤1μs Duty Cycle≤0.1%

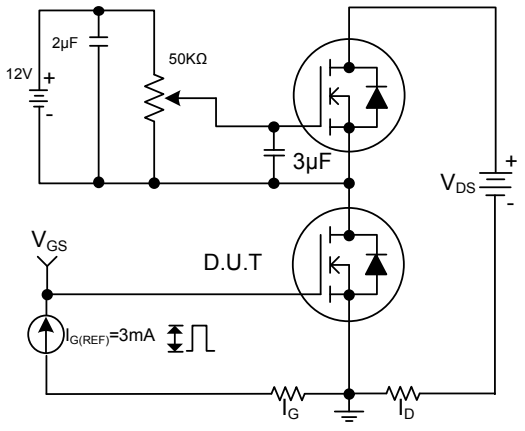
Unclamped Inductive Test Circuit



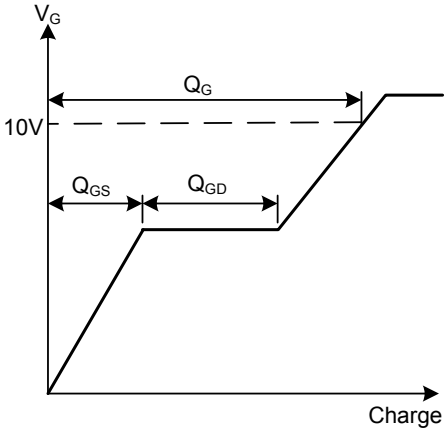

Unclamped Inductive Waveforms




Gate Charge Test Circuit

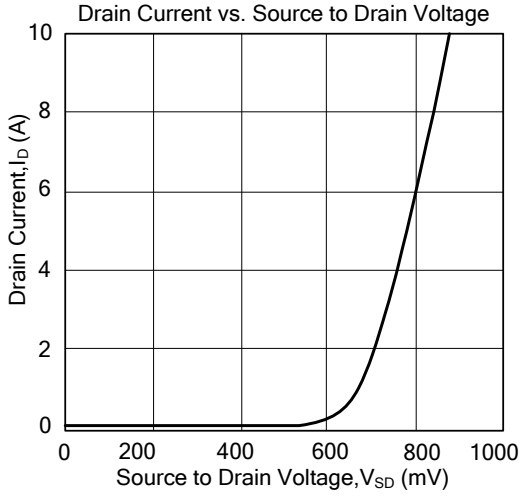



Basic Gate Charge Waveform

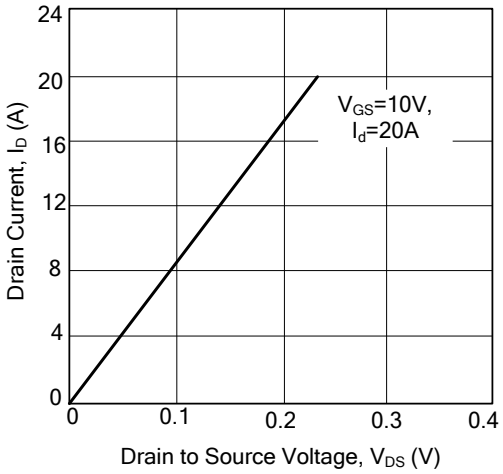


## ■ TYPICAL CHARACTERISTICS

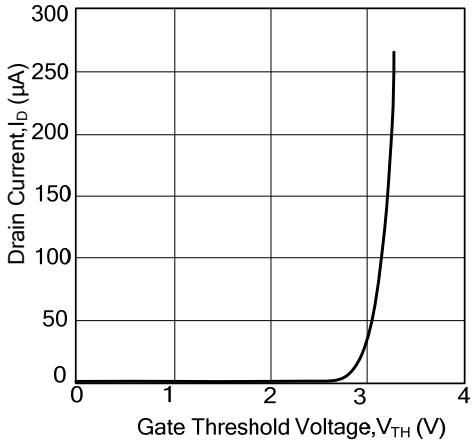
Drain Current vs. Source to Drain Voltage




Drain-Source On-State Resistance Characteristics




Drain Current vs. Gate Threshold Voltage




Drain Current vs. Drain-Source Breakdown Voltage