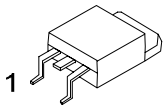
# UD4809

**Power MOSFET**

## N-CHANNEL ENHANCEMENT MODE




TO-252

*Pb-free plating product number: UD4809L

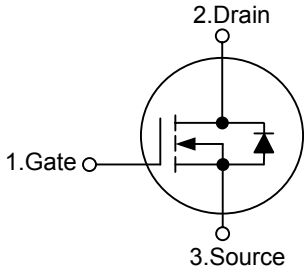
### ■ DESCRIPTION

This **UD4809** N-Channel MOSFET is produced using UTC advanced process which has been tailored to make the on-state resistance minimum and yet maintain low gate charge for superior switching performance especially. The **UD4809** is well suited for where low in-line power loss is needed in a very small outline surface mount package, such as low voltage and battery powered applications.

### ■ FEATURES

* Low $R_{DS(ON)}$
* Low capacitance
* Optimized gate charge

### ■ SYMBOL




### ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Normal | Lead Free Plating | | 1 | 2 | 3 | |
| UD4809-TN3-R | UD4809L-TN3-R | TO-252 | G | D | S | Tape Reel |
| UD4809-TN3-T | UD4809L-TN3-T | TO-252 | G | D | S | Tube |

| | |
|---|---|
| UD4809L-TN3-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Lead Plating | (1) R: Tape Reel, T: Tube<br>(2) TN3: TO-252<br>(3) L: Lead Free Plating, Blank: Pb/Sn |

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

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±20 | |
| Continuous Drain Current (Note 3) | $I_D$ | 9.0 | A |
| Drain to Source dv/dt | dv/dt | 6.0 | V/ns |
| Power Dissipation (Note 3) | $P_D$ | 1.3 | W |
| Junction Temperature | $T_J$ | +150 | °C |
| Storage Temperature | $T_{STG}$ | -55 ~ +150 | °C |

Note: 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.

## ■ THERMAL DATA

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| Junction-to-Ambient (Note 3) | $\theta_{JA}$ | | | 116 | °C/W |
| Junction-to-Case | $\theta_{JC}$ | | | 2.9 | °C/W |

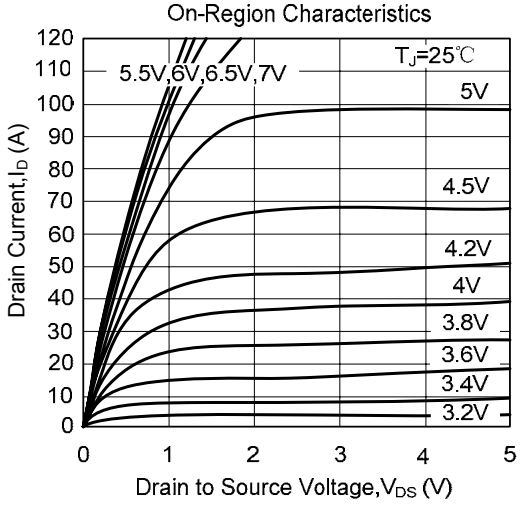
## ■ ELECTRICAL CHARACTERISTICS ($T_J$ =25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ =0 V, $I_D$ =250μA | | 30 | | | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$ =24V, $V_{GS}$ =0 V | | | | 1.0 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$ =0 V, $V_{GS}$ = ±20V | | | | ±100 | nA |
| **ON CHARACTERISTICS** | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250 μA | | 1.5 | | 2.5 | V |
| Static Drain-Source On-Resistance (Note 2) | $R_{DS(ON)}$ | $V_{GS}$ =10~11.5 V | $I_D$ =30 A | | 7.0 | 9.0 | mΩ |
| | | | $I_D$ =15 A | | 7.0 | | |
| | | $V_{GS}$ =4.5 V | $I_D$ =30 A | | 12 | 14 | mΩ |
| | | | $I_D$ =15 A | | 11 | | |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$ =12 V, $V_{GS}$ =0V, f=1MHz | | | 1456 | | pF |
| Output Capacitance | $C_{OSS}$ | | | | 315 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | | 200 | | |
| **SWITCHING PARAMETERS** | | | | | | | |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{GS}$=4.5V,$V_{DS}$=15V, $I_D$ =15A, $R_G$ =3.0Ω | | | 12.3 | | ns |
| Turn-ON Rise Time | $t_R$ | | | | 21.3 | | |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | | 15.1 | | |
| Turn-OFF Fall-Time | $t_F$ | | | | 5.3 | | |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{GS}$=11.5V,$V_{DS}$=15V, $I_D$ =15A, $R_G$ =3.0Ω | | | 7.0 | | ns |
| Turn-ON Rise Time | $t_R$ | | | | 22.7 | | |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | | 25.3 | | |
| Turn-OFF Fall-Time | $t_F$ | | | | 2.8 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{DS}$ =15V, $V_{GS}$ =4.5V, $I_D$ =30A | | | 11 | 13 | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | | 2.5 | | |
| Gate-Source Charge | $Q_{GS}$ | | | | 4.8 | | |
| Gate-Drain Charge | $Q_{GD}$ | | | | 5.0 | | |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=30A,$V_{GS}$=0V | | | 0.95 | 1.2 | V |
| Source Current (Body Diode) | $I_S$ | | | | | 43 | A |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS}$ = 0 V, dIs/dt= 100 A/ s, $I_S$ = 30 A | | | 19.5 | | ns |
| Reverse Recovery Time | $Q_{RR}$ | | | | 9.2 | | nC |

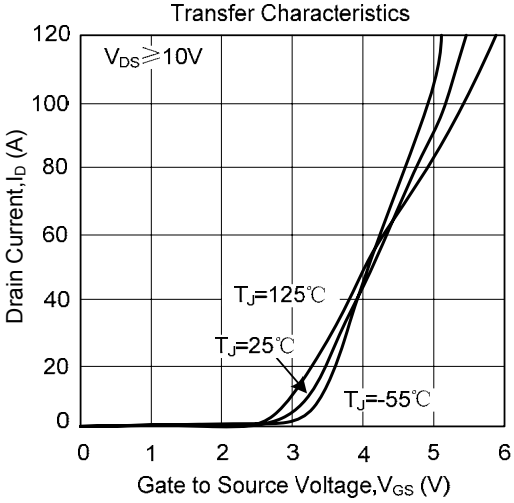
Note: 1. Pulse width limited by $T_{J(MAX)}$
2. Pulse Test: Pulse Width ≤ 300 s, Duty Cycle ≤ 2%.
3. Surface-mounted on FR4 board using the minimum recommended pad size.

## ■ TYPICAL CHARACTERISTICS

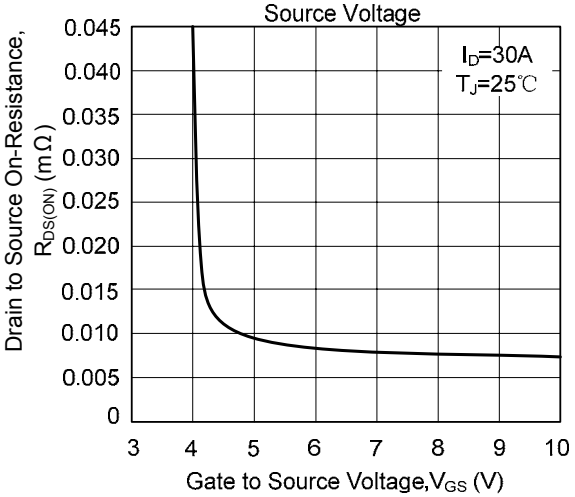
On-Region Characteristics



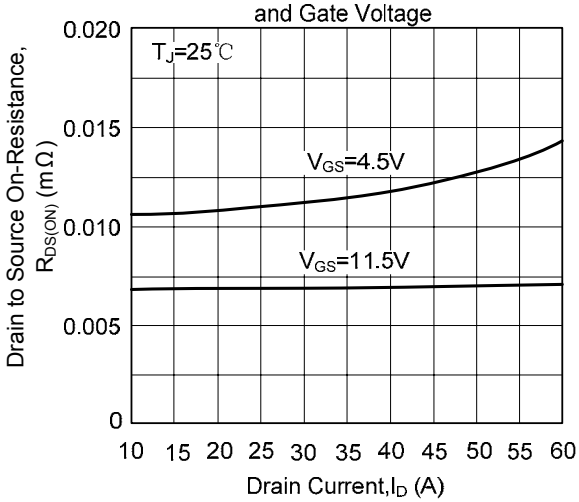

Transfer Characteristics



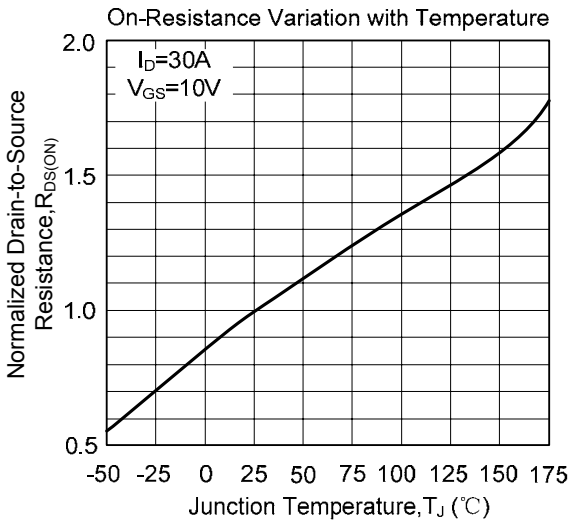

On-Resistance vs. and Gate-to-Source Voltage



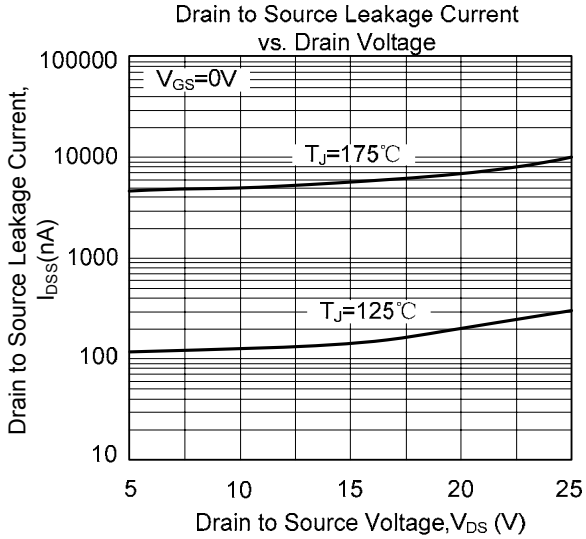

On-Resistance vs. Drain Current and Gate Voltage




On-Resistance Variation with Temperature

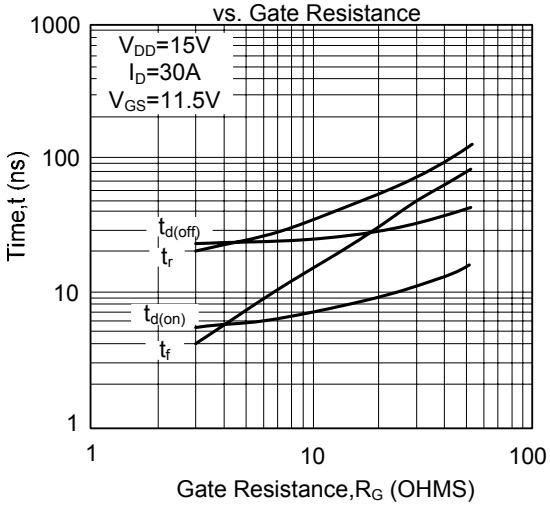



Drain to Source Leakage Current vs. Drain Voltage

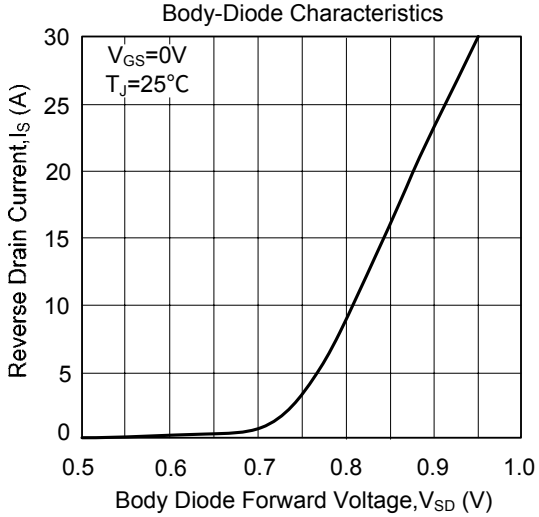


## ■ TYPICAL CHARACTERISTICS(Cont.)

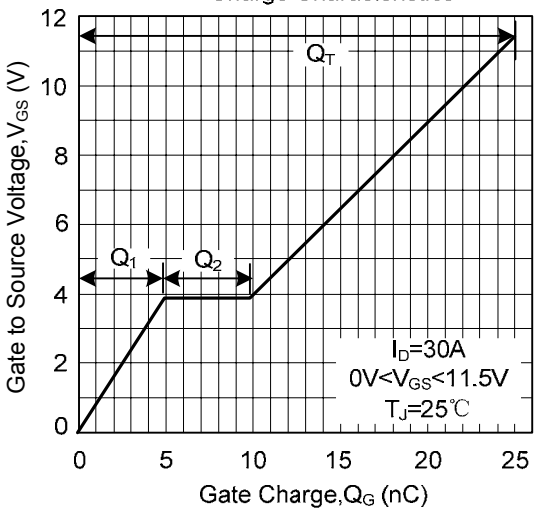
Resistive Switching Time Variation vs. Gate Resistance



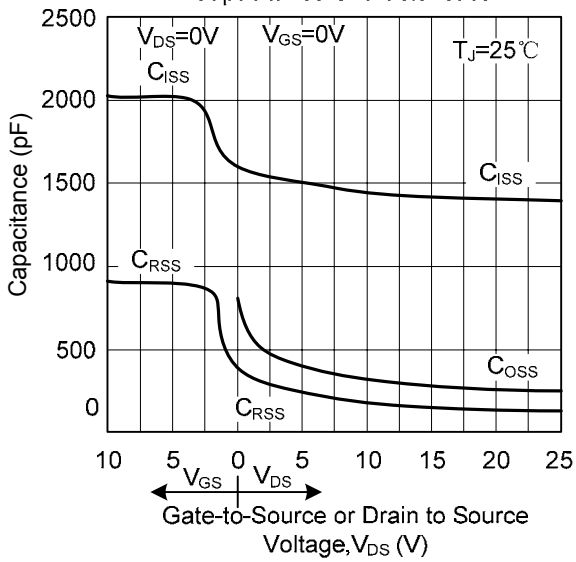

Body-Diode Characteristics



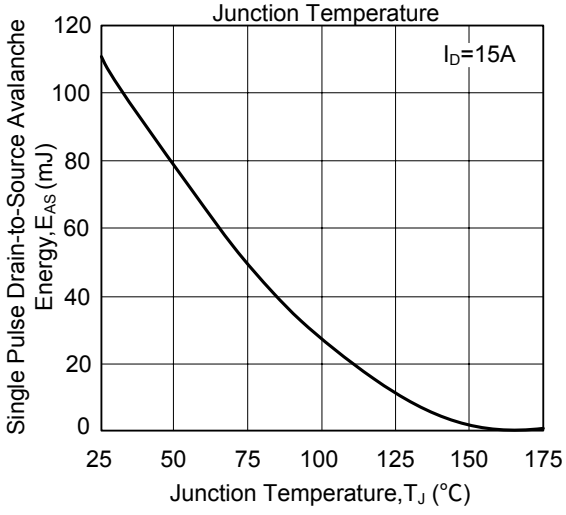

Gate-Charge Characteristics



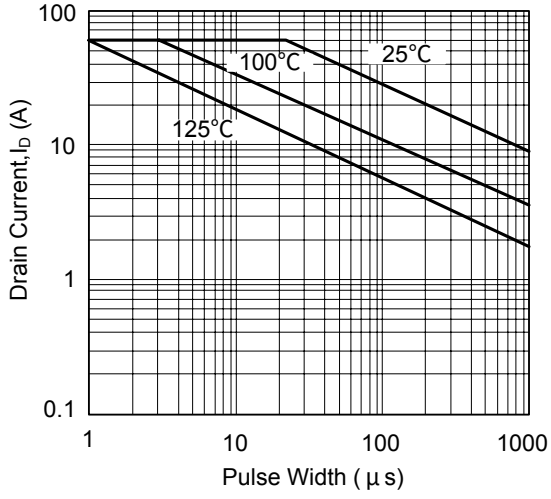

Capacitance Characteristics




Maximum Avalanche Energy vs. Starting Junction Temperature




Avalanche Characteristics



## ■ TYPICAL CHARACTERISTICS(Cont.)