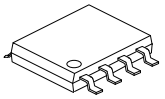
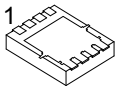
# UT4421

**Power MOSFET**

## -6.2A, -60V P-CHANNEL POWER MOSFET



SOP-8




PDFN5×6

### ■ DESCRIPTION

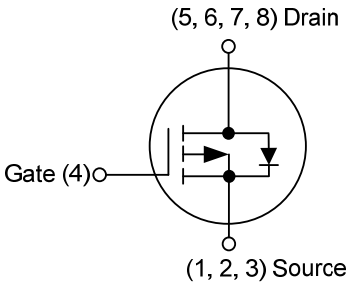
The UTC **UT4421** is a P-channel MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance and high switching speed.

The UTC **UT4421** is suitable for load switch and battery protection applications.

### ■ FEATURES

* $R_{DS(ON)} \leq 48\ m\Omega$ @ $V_{GS}$=-10V, $I_D$=-6.2A
  $R_{DS(ON)} \leq 63\ m\Omega$ @ $V_{GS}$=-4.5V, $I_D$=-5.0A
* High switching speed

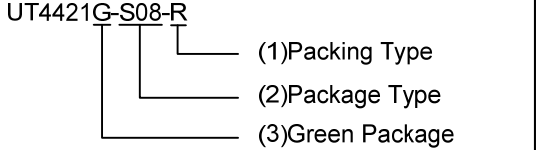
### ■ SYMBOL




### ■ ORDERING INFORMATION

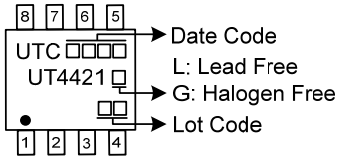
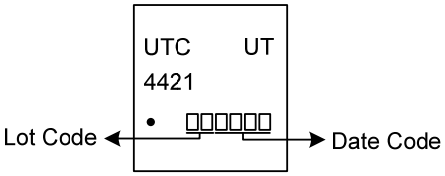
| Ordering Number | | Package | Pin Assignment | | | | | | | | Packing |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| UT4421L-S08-R | UT4421G-S08-R | SOP-8 | S | S | S | G | D | D | D | D | Tape Reel |
| UT4421L-P5060-R | UT4421G-P5060-R | PDFN5×6 | S | S | S | G | D | D | D | D | Tape Reel |

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




(1) R: Tape Reel
(2) S08: SOP-8, P5060: PDFN5×6
(3) G: Halogen Free and Lead Free, L: Lead Free

### ■ MARKING

| SOP-8 | PDFN5×6 |
|---|---|
|  |  |

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

| PARAMETER | | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -60 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Drain Current | Continuous | $T_A$=25°C | $I_D$ | -6.2 | A |
| | | $T_A$=70°C | | -5 | A |
| | Pulsed | | $I_{DM}$ | -40 | A |
| Power Dissipation | | SOP-8 | $P_D$ | 2 | W |
| | | PDFN5×6 ($T_C$=25°C) | | 31 | W |
| Junction Temperature | | | $T_J$ | -55 ~ +150 | °C |
| Storage Temperature Range | | | $T_{STG}$ | -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 | RATINGS | UNIT |
|---|---|---|---|---|
| Junction to Ambient | SOP-8 | $\theta_{JA}$ | 75 | °C/W |
| | PDFN5×6 | | 65 | °C/W |
| Junction to Case | SOP-8 | $\theta_{JC}$ | 30 (Note) | °C/W |
| | PDFN5×6 | | 4 (Note) | °C/W |

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

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

| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **STATIC PARAMETERS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $I_D$=-250μA, $V_{GS}$=0V | -60 | | | V |
| Zero Gate Voltage Drain Current | | $I_{DSS}$ | $V_{DS}$=-48V, $V_{GS}$=0V | | | -1 | μA |
| | | | $V_{DS}$=-48V, $V_{GS}$=0V, $T_J$=55°C | | | -5 | 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** | | | | | | | |
| Gate Threshold Voltage | | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -1.0 | | -3.0 | V |
| On State Drain Current | | $I_{D(ON)}$ | $V_{GS}$=-10V, $V_{DS}$=-5V | -40 | | | A |
| Static Drain-Source On-State Resistance | | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-6.2A | | 34 | 48 | mΩ |
| | | | $V_{GS}$=-4.5V, $I_D$=-5.0A | | 46 | 63 | mΩ |
| Forward Transconductance | | $g_{FS}$ | $V_{DS}$=-5V, $I_D$=-6.2A | | 18 | | S |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=-30V, f=1.0MHz | | 1500 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 115 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 100 | | pF |
| Gate Resistance | | $R_G$ | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | | | 10 | Ω |
| **SWITCHING PARAMETERS** | | | | | | | |
| Total Gate Charge | | $Q_G$ | $V_{GS}$=-4.5V, $V_{DS}$=-30V, $I_D$=-6.2A | | 19 | | nC |
| Total Gate Charge | | $Q_G$ | $V_{GS}$=-10V, $V_{DS}$=-30V, $I_D$=-6.2A | | 36 | 55 | nC |
| Gate to Source Charge | | $Q_{GS}$ | | | 5 | | nC |
| Gate to Drain Charge | | $Q_{GD}$ | | | 8 | | nC |
| Turn-ON Delay Time | | $t_{D(ON)}$ | $V_{GS}$=-10V, $V_{DS}$=-30V, $R_L$=4.7Ω, $R_{GEN}$=3Ω | | 8 | | ns |
| Rise Time | | $t_R$ | | | 17 | | ns |
| Turn-OFF Delay Time | | $t_{D(OFF)}$ | | | 40 | | ns |
| Fall-Time | | $t_F$ | | | 21 | | ns |

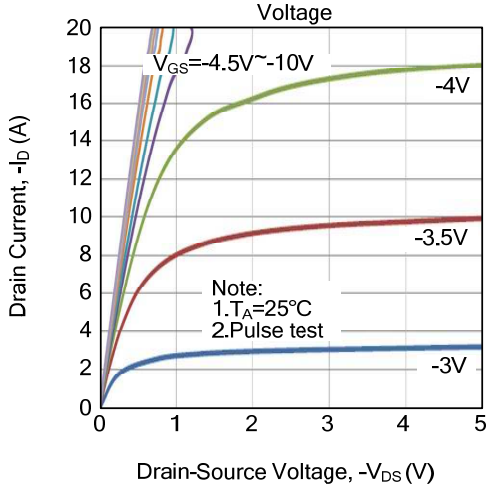
Notes: 1. The value of $\theta_{JA}$ is measured with the device mounted on 1in$^2$FR-4 board with 2oz. Copper, in a still air environment with $T_A$=25°C.The value in any a given application depends on the user's specific board design. The current rating is based on the t ≤10s thermal resistance rating.

2. Repetitive rating, pulse width limited by junction temperature.

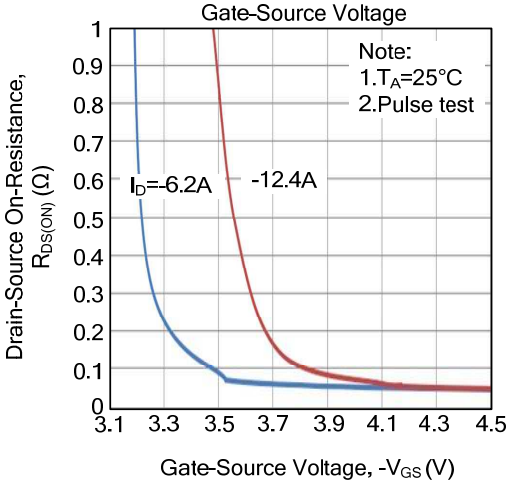
3. The $\theta_{JA}$ is the sum of the thermal impedence from junction to lead $\theta_{JL}$ and lead to ambient.

## ■ TYPICAL CHARACTERISTICS

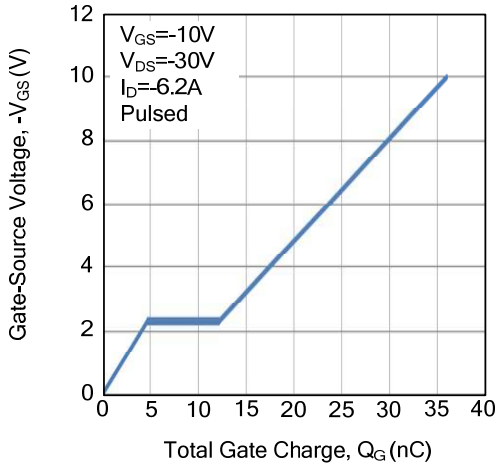
Drain Current vs. Drain-Source Voltage



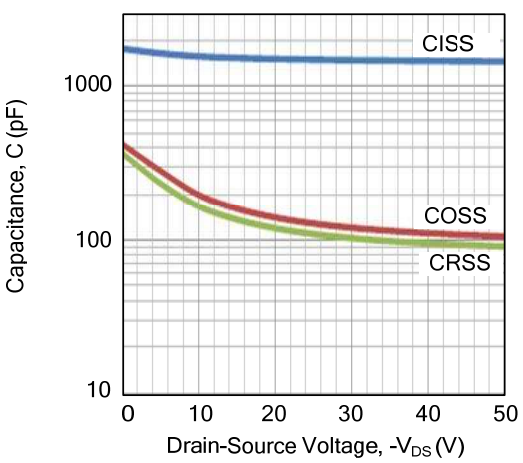

Drain-Source On-Resistance vs. Gate-Source Voltage



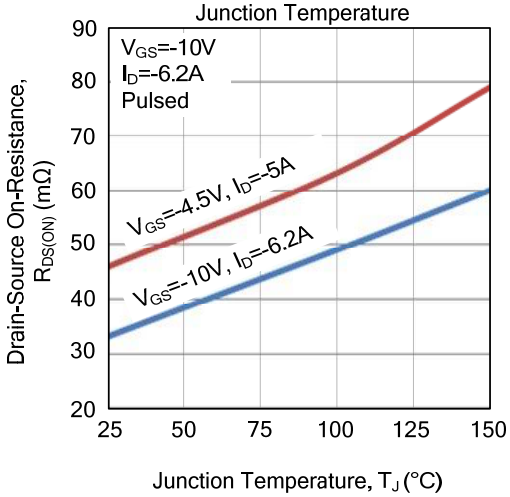

Gate Charge Characteristics



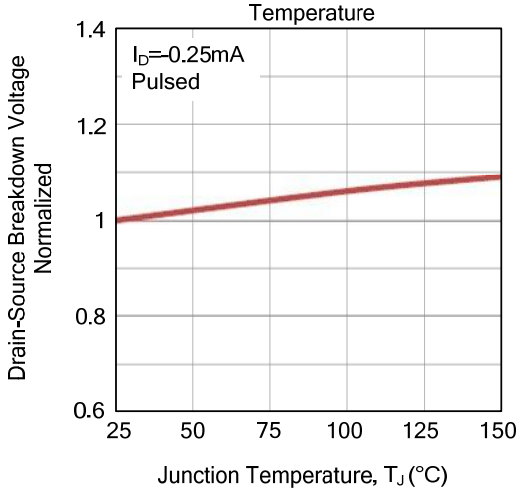

Capacitance Characteristics




Drain-Source On-Resistance vs. Junction Temperature

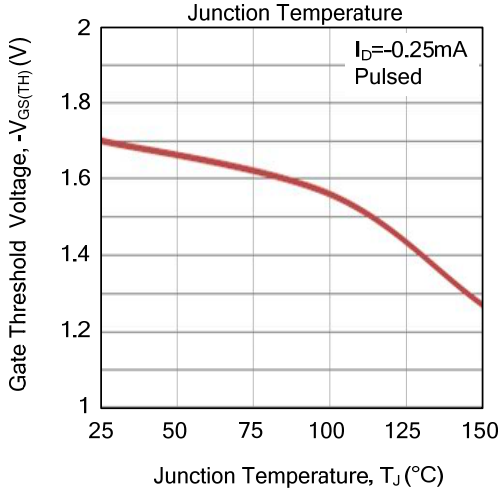



Breakdown Voltage vs. Junction Temperature

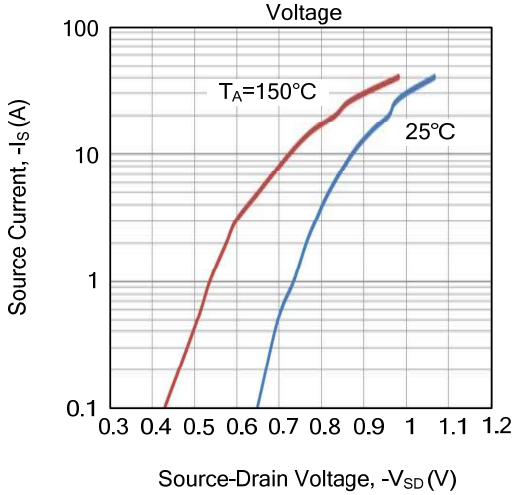


## ■ TYPICAL CHARACTERISTICS (Cont.)

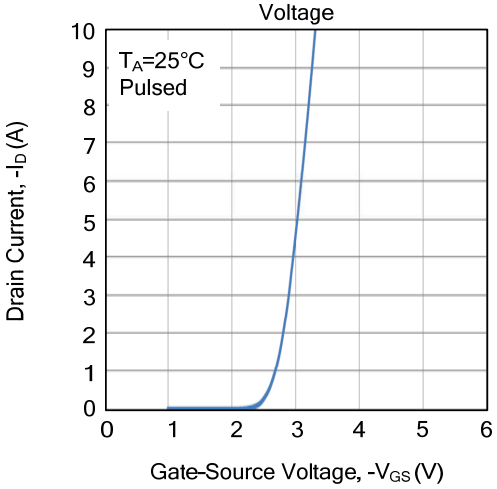
Gate Threshold Voltage vs. Junction Temperature



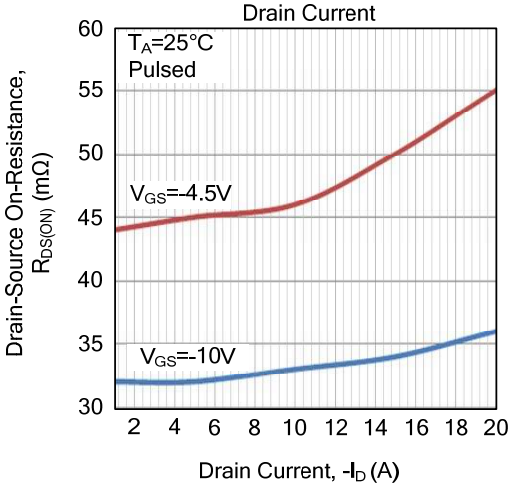

Source Current vs. Source-Drain Voltage



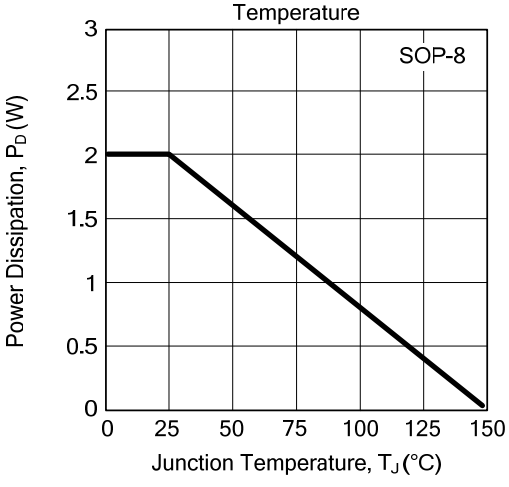

Drain Current vs. Gate-Source Voltage



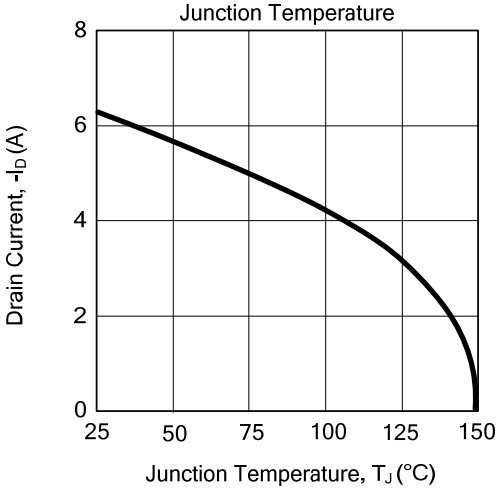

Drain-Source On-Resistance vs. Drain Current




Power Dissipation vs. Junction Temperature




Drain Current vs. Junction Temperature



## ■ TYPICAL CHARACTERISTICS (Cont.)