



# UT2309

Power MOSFET

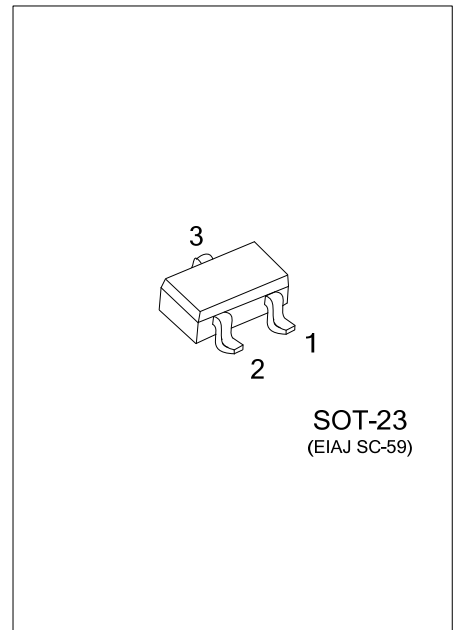
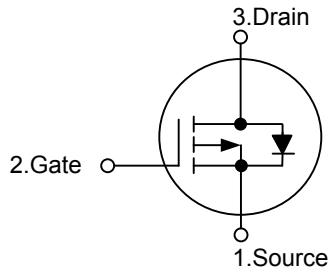
## P-CHANNEL ENHANCEMENT MODE

### DESCRIPTION

The **UT2309** is P-channel power MOSFET, designed with high density cell with fast switching speed, ultra low on-resistance and excellent thermal and electrical capabilities.

Used in commercial and industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

### SYMBOL

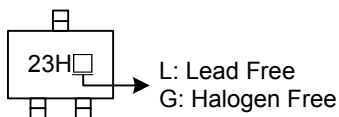


### ORDERING INFORMATION

| Ordering Number |               | Package | Pin Assignment |   |   | Packing   |
|-----------------|---------------|---------|----------------|---|---|-----------|
| Lead Free       | Halogen Free  |         | 1              | 2 | 3 |           |
| UT2309L-AE3-R   | UT2309G-AE3-R | SOT-23  | S              | G | D | Tape Reel |

|                      |  |   |
|----------------------|--|---|
| <p>UT2309L-AE3-R</p> | <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Plating</p> | <p>(1) R: Tape Reel</p> <p>(2) AE3: SOT-23</p> <p>(3) L: Lead Free, G: Halogen Free</p> |
|----------------------|--|---|

### MARKING



## ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER                         | SYMBOL    | RATINGS    | UNIT        |
|-----------------------------------|-----------|------------|-------------|
| Drain-Source Voltage              | $V_{DSS}$ | -30        | V           |
| Gate-Source Voltage               | $V_{GSS}$ | $\pm 20$   | V           |
| Continuous Drain Current (Note 3) | $I_D$     | -3.7       | A           |
| Pulsed Drain Current (Note 1, 2)  | $I_{DM}$  | -12        | A           |
| Total Power Dissipation           | $P_D$     | 1.38       | W           |
| Junction Temperature              | $T_J$     | +150       | $^{\circ}C$ |
| Storage Temperature               | $T_{STG}$ | -55 ~ +150 | $^{\circ}C$ |

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 (Note 3) | $\theta_{JA}$ | 90      | $^{\circ}C/W$ |

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

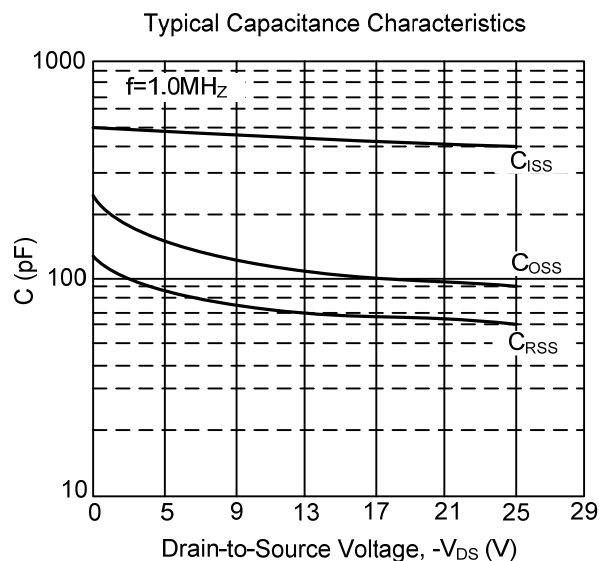
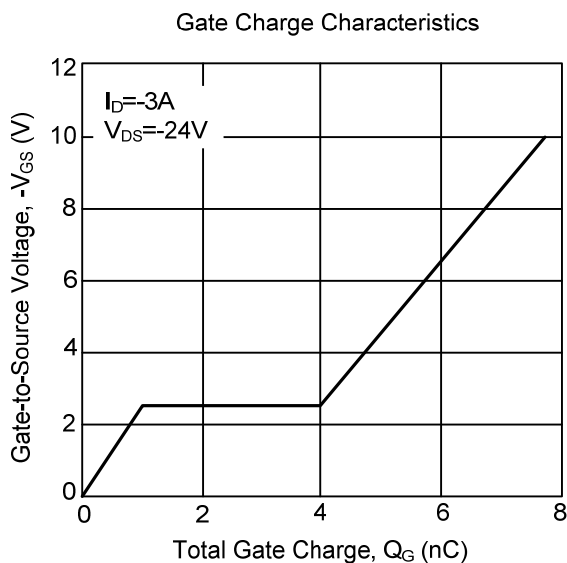
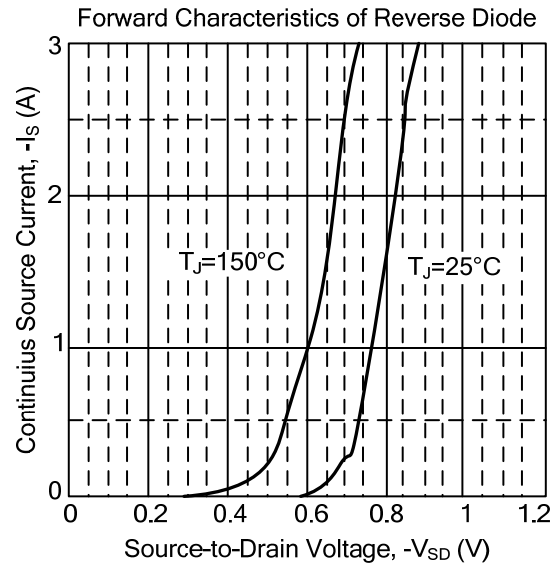
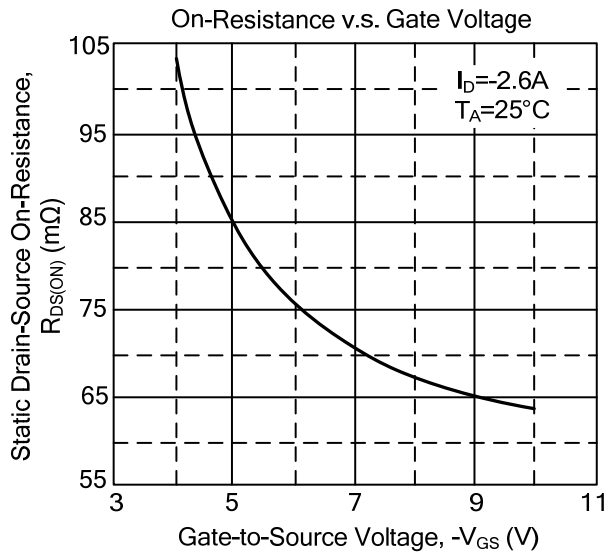
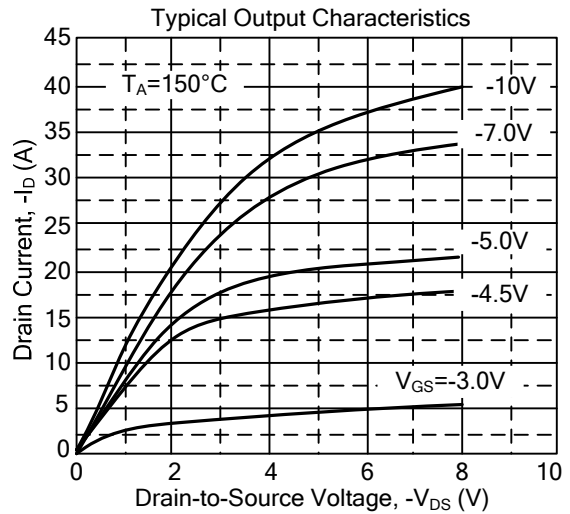
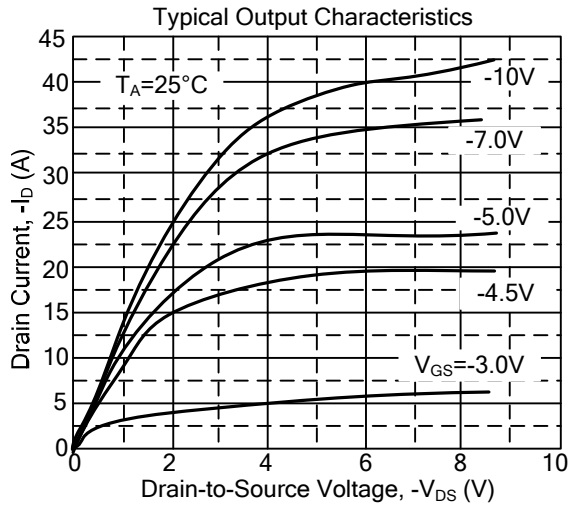
| PARAMETER  | SYMBOL                       | TEST CONDITIONS  | MIN | TYP   | MAX  | UNIT          |
|--|------------------------------|--|-----|-------|------|---------------|
| <b>OFF CHARACTERISTICS</b>                             |                              |  |     |       |      |               |
| Drain-Source Breakdown Voltage                         | $BV_{DSS}$                   | $V_{GS} = 0V, I_D = -250 \mu A$  | -30 |       |      | V             |
| Drain-Source Leakage Current                           | $I_{DSS}$                    | $V_{DS} = -30V, V_{GS} = 0V$   |     |       | -0.5 | $\mu A$       |
| Gate-Source Leakage Current                            | $I_{GSS}$                    | $V_{GS} = \pm 20V, V_{DS} = 0V$  |     |       | 100  | nA            |
| Breakdown Voltage Temperature Coefficient              | $\Delta BV_{DSS}/\Delta T_J$ | Reference to $25^{\circ}C, I_D = -1mA$                                     |     | -0.02 |      | $V/^{\circ}C$ |
| <b>ON CHARACTERISTICS</b>                              |                              |  |     |       |      |               |
| Gate Threshold Voltage                                 | $V_{GS(TH)}$                 | $V_{DS} = V_{GS}, I_D = -250 \mu A$  | -1  |       | -3   | V             |
| Static Drain-Source On-Resistance (Note 2)             | $R_{DS(ON)}$                 | $V_{GS} = -10V, I_D = -3A$   |     |       | 75   | $m\Omega$     |
|  |                              | $V_{GS} = -4.5V, I_D = -2.6A$  |     |       | 120  | $m\Omega$     |
| <b>DYNAMIC CHARACTERISTICS</b>                         |                              |  |     |       |      |               |
| Input Capacitance                                      | $C_{ISS}$                    | $V_{GS} = 0V, V_{DS} = -25V, f = 1.0MHz$                                   |     | 412   | 660  | pF            |
| Output Capacitance                                     | $C_{OSS}$                    |  |     | 91    |      | pF            |
| Reverse Transfer Capacitance                           | $C_{RSS}$                    |  |     | 62    |      | pF            |
| <b>SWITCHING CHARACTERISTICS</b>                       |                              |  |     |       |      |               |
| Turn-ON Delay Time (Note 2)                            | $t_{D(ON)}$                  | $V_{DS} = -15V, I_D = -1A, R_G = 3.3\Omega, V_{GS} = -10V, R_D = 15\Omega$ |     | 8     |      | ns            |
| Turn-ON Rise Time                                      | $t_R$                        |  |     | 5     |      | ns            |
| Turn-OFF Delay Time                                    | $t_{D(OFF)}$                 |  |     | 20    |      | ns            |
| Turn-OFF Fall Time                                     | $t_F$                        | $V_{DS} = -24V, V_{GS} = -4.5V, I_D = -3A$                                 |     | 7     |      | ns            |
| Total Gate Charge (Note 2)                             | $Q_G$                        |  |     | 5     | 8    | nC            |
| Gate-Source Charge                                     | $Q_{GS}$                     |  |     | 1     |      | nC            |
| Gate-Drain Charge                                      | $Q_{GD}$                     |  | 3   |       | nC   |               |
| <b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b> |                              |  |     |       |      |               |
| Forward On Voltage                                     | $V_{SD}$                     | $I_S = -1A, V_{GS} = 0V$   |     | -0.76 | -1.2 | V             |
| Reverse Recovery Time                                  | $t_{RR}$                     | $I_S = -3A, V_{GS} = 0V,$  |     | 20    |      | ns            |
| Reverse Recovery Charge                                | $Q_{RR}$                     | $di/dt = -100A/\mu s$  |     | 15    |      | nC            |

Notes: 1. Pulse width limited by  $T_{J(MAX)}$

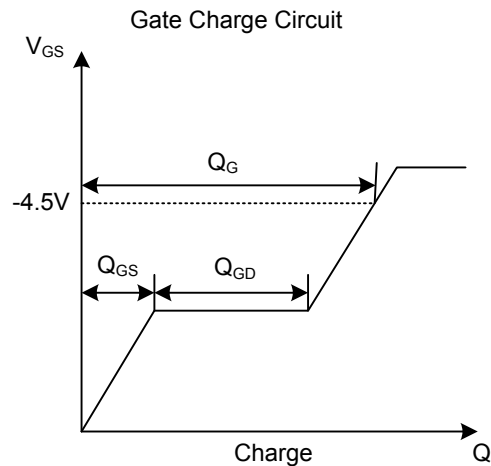
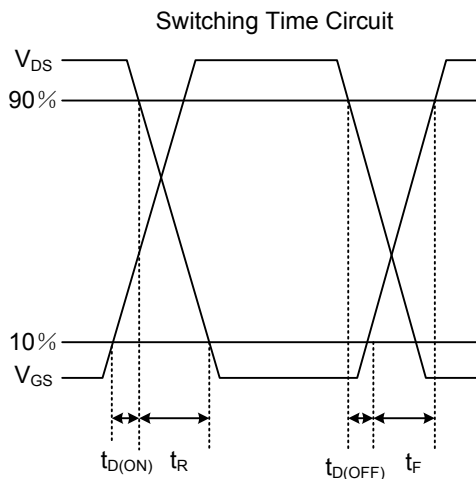
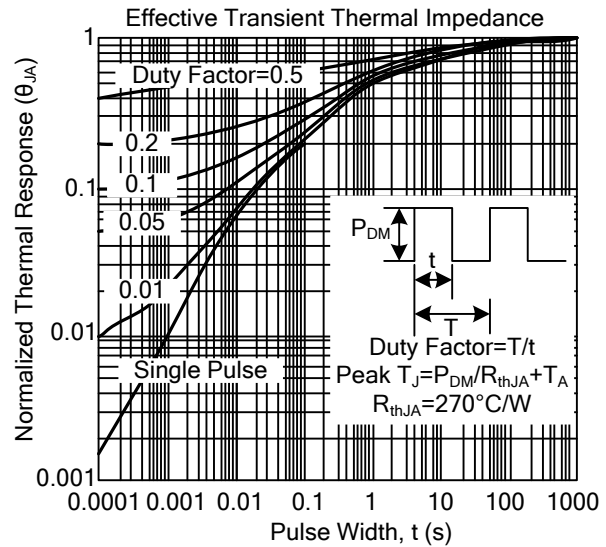
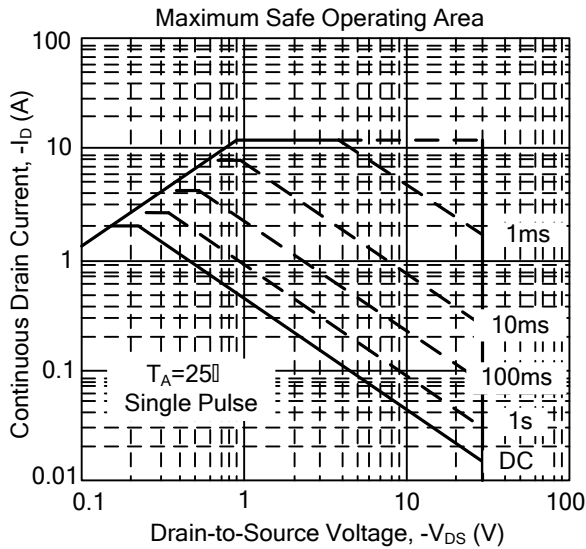
2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board.

## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS(Cont.)



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