



## UT3N10

Power MOSFET

### N-CHANNEL ENHANCEMENT MODE POWER MOSFET

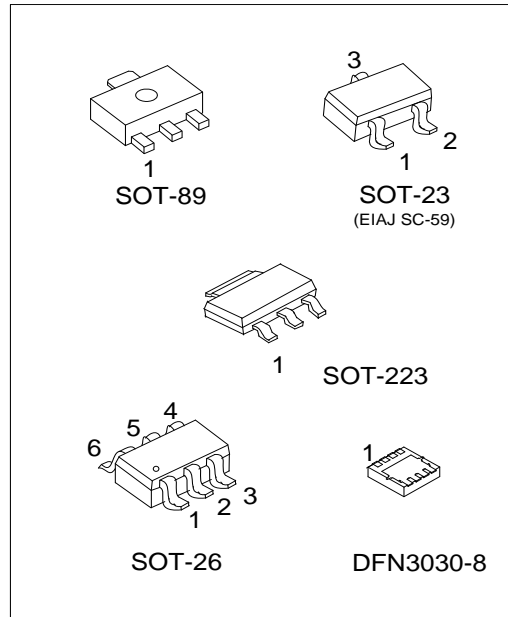
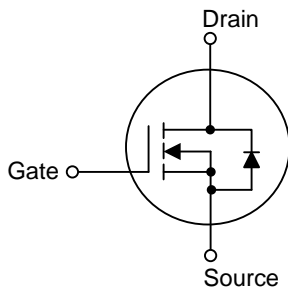
#### DESCRIPTION

The UTC **UT3N10** is an N-channel power MOSFET providing very low on-resistance. It has high efficiency and perfect cost-effectiveness. It can be generally applied in the commercial and industrial fields.

#### FEATURES

- \*  $R_{DS(ON)} \leq 0.165\Omega$  @  $V_{GS}=10V, I_D=3.0A$
- $R_{DS(ON)} \leq 0.180\Omega$  @  $V_{GS}=4.5V, I_D=2.0A$
- \* Simple drive requirement

#### SYMBOL



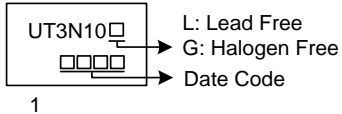
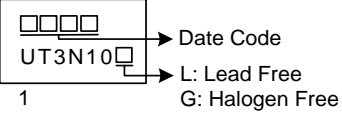
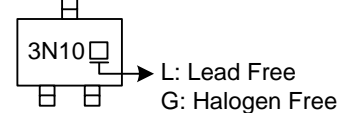
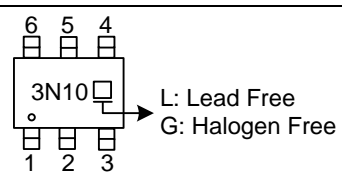
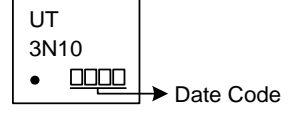
#### ORDERING INFORMATION

| Ordering Number    |                    | Package   | Pin Assignment |   |   |   |   |   |   |   | Packing   |
|--------------------|--------------------|-----------|----------------|---|---|---|---|---|---|---|-----------|
| Lead Free          | Halogen Free       |           | 1              | 2 | 3 | 4 | 5 | 6 | 7 | 8 |           |
| UT3N10L-AA3-R      | UT3N10G-AA3-R      | SOT-223   | G              | D | S | - | - | - | - | - | Tape Reel |
| UT3N10L-AB3-R      | UT3N10G-AB3-R      | SOT-89    | G              | D | S | - | - | - | - | - | Tape Reel |
| UT3N10L-AE3-R      | UT3N10G-AE3-R      | SOT-23    | G              | S | D | - | - | - | - | - | Tape Reel |
| UT3N10L-AG6-R      | UT3N10G-AG6-R      | SOT-26    | D              | D | G | S | D | D | - | - | Tape Reel |
| UT3N10L-K08-3030-R | UT3N10G-K08-3030-R | DFN3030-8 | S              | S | S | G | D | D | D | D | Tape Reel |

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

|   |   |
|---|---|
| <p>UT3N10G-AA3-R</p> <p>(1) Packing Type<br/>(2) Package Type<br/>(3) Green Package</p> | <p>(1) R: Tape Reel<br/>(2) AA3: SOT-223, AB3: SOT-89, AE3: SOT-23<br/>AG6: SOT-26, K08-3030: DFN3030-8<br/>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|---|

■ MARKING

| PACKAGE   | MARKING  |
|-----------|--|
| SOT-223   |  <p>L: Lead Free<br/>G: Halogen Free<br/>Date Code</p> |
| SOT-89    |  <p>Date Code<br/>L: Lead Free<br/>G: Halogen Free</p> |
| SOT-23    |  <p>L: Lead Free<br/>G: Halogen Free</p>               |
| SOT-26    |  <p>L: Lead Free<br/>G: Halogen Free</p>               |
| DFN3030-8 |  <p>Date Code</p>                                     |


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■ **ABSOLUTE MAXIMUM RATINGS** ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER  | SYMBOL           | RATINGS    | UNIT             |
|--|------------------|------------|------------------|
| Drain-Source Voltage   | $V_{DSS}$        | 100        | V                |
| Gate-Source Voltage  | $V_{GSS}$        | $\pm 20$   | V                |
| Continuous Drain Current<br>( $V_{GS}=4.5\text{V}$ , $T_A=25^\circ\text{C}$ ) (Note 2) | $I_D$            | 3.0        | A                |
| Pulsed Drain Current (Note 3, 4)   | $I_{DM}$         | 10         | A                |
| Power Dissipation ( $T_A=25^\circ\text{C}$ )   | SOT-223          | 0.89       | W                |
|  | SOT-89           | 0.55       | W                |
|  | SOT-23<br>SOT-26 | 0.35       | W                |
|  | DFN3030-8        | 0.96       | W                |
| Junction Temperature   | $T_J$            | +150       | $^\circ\text{C}$ |
| Storage Temperature  | $T_{STG}$        | -55 ~ +150 | $^\circ\text{C}$ |

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. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board; 270 $^\circ\text{C}/\text{W}$  when mounted on min. copper pad.

3. Repetitive Rating: Pulse width limited by maximum junction temperature.

4. Pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .

■ **THERMAL CHARACTERISTICS**

| PARAMETER                  | SYMBOL           | RATING | UNIT                      |
|----------------------------|------------------|--------|---------------------------|
| Junction to Ambient (Note) | SOT-223          | 140    | $^\circ\text{C}/\text{W}$ |
|                            | SOT-89           | 180    | $^\circ\text{C}/\text{W}$ |
|                            | SOT-23<br>SOT-26 | 350    | $^\circ\text{C}/\text{W}$ |
|                            | DFN3030-8        | 130    | $^\circ\text{C}/\text{W}$ |

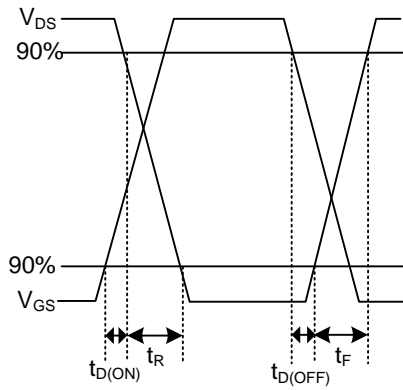
Note: The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

### ■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C, unless otherwise specified)

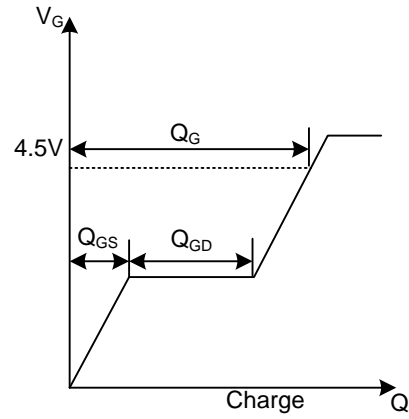
| PARAMETER  | SYMBOL                              | TEST CONDITIONS  | MIN | TYP  | MAX   | UNIT |
|--|-------------------------------------|--|-----|------|-------|------|
| <b>OFF CHARACTERISTICS</b>                             |                                     |  |     |      |       |      |
| Drain-Source Breakdown Voltage                         | V <sub>DSS</sub>                    | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA   | 100 |      |       | V    |
| Breakdown Voltage Temperature Coefficient              | $\frac{\Delta V_{DSS}}{\Delta T_J}$ | Reference to 25°C, I <sub>D</sub> =1mA   |     | 0.05 |       | V/°C |
| Drain-Source Leakage Current                           | I <sub>DSS</sub>                    | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V   |     |      | 10    | μA   |
| Gate-Source Leakage Current                            | I <sub>GSS</sub>                    | V <sub>GS</sub> =±20V  |     |      | ±100  | nA   |
| <b>ON CHARACTERISTICS</b>                              |                                     |  |     |      |       |      |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub>                 | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA   | 1.0 |      | 3.0   | V    |
| Drain to Source On-state Resistance                    | R <sub>DS(ON)</sub>                 | V <sub>GS</sub> =10V, I <sub>D</sub> =3.0A   |     |      | 0.165 | Ω    |
|  |                                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =2.0A  |     |      | 0.180 | Ω    |
| <b>DYNAMIC PARAMETERS</b>                              |                                     |  |     |      |       |      |
| Input Capacitance                                      | C <sub>ISS</sub>                    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz  |     | 490  | 780   | pF   |
| Output Capacitance                                     | C <sub>OSS</sub>                    |  |     | 41   |       | pF   |
| Reverse Transfer Capacitance                           | C <sub>RSS</sub>                    |  |     | 33   |       | pF   |
| <b>SWITCHING PARAMETERS</b>                            |                                     |  |     |      |       |      |
| Total Gate Charge (Note)                               | Q <sub>G</sub>                      | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =48V, I <sub>D</sub> =3A  |     | 18   |       | nC   |
| Gate Source Charge                                     | Q <sub>GS</sub>                     |  |     | 3.76 |       | nC   |
| Gate Drain Charge                                      | Q <sub>GD</sub>                     |  |     | 8.5  |       | nC   |
| Turn-ON Delay Time (Note)                              | t <sub>D(ON)</sub>                  | V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>D</sub> =1A,<br>R <sub>D</sub> =30Ω, R <sub>G</sub> =3.3Ω |     | 22   |       | ns   |
| Turn-ON Rise Time                                      | t <sub>R</sub>                      |  |     | 18   |       | ns   |
| Turn-OFF Delay Time                                    | t <sub>D(OFF)</sub>                 |  |     | 190  |       | ns   |
| Turn-OFF Fall-Time                                     | t <sub>F</sub>                      |  |     | 65   |       | ns   |
| <b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b> |                                     |  |     |      |       |      |
| Drain-Source Diode Forward Voltage (Note)              | V <sub>SD</sub>                     | I <sub>S</sub> =1.2A, V <sub>GS</sub> =0V  |     |      | 1.2   | V    |
| Reverse Recovery Time                                  | t <sub>rr</sub>                     | I <sub>S</sub> =3A, V <sub>GS</sub> =0V, di/dt=100A/μs   |     | 25   |       | ns   |
| Reverse Recovery Charge                                | Q <sub>rr</sub>                     |  |     |      | 26    |      |

Note: Pulse width ≤300μs, duty cycle ≤2%.

## ■ TEST WAVEFORMS



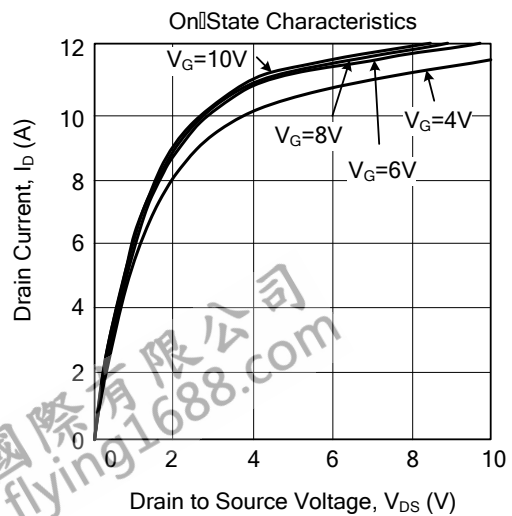
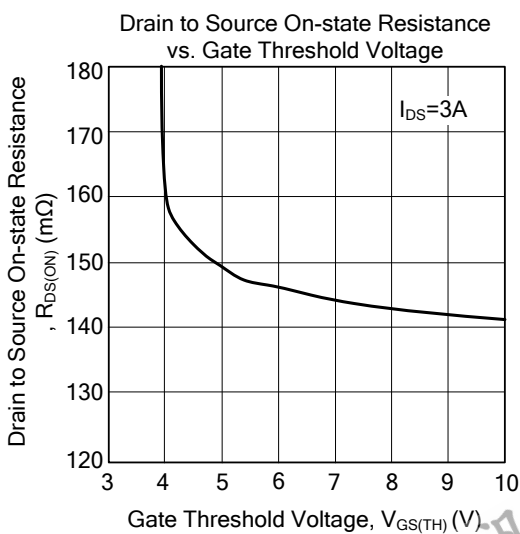
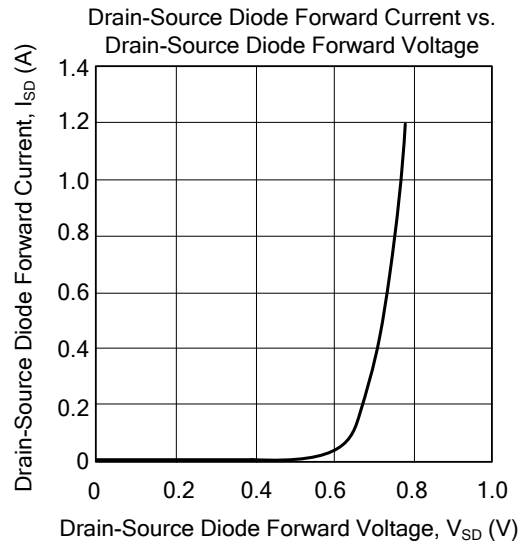
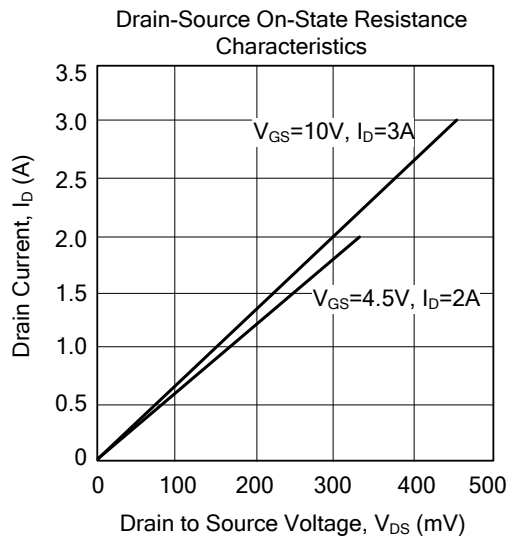
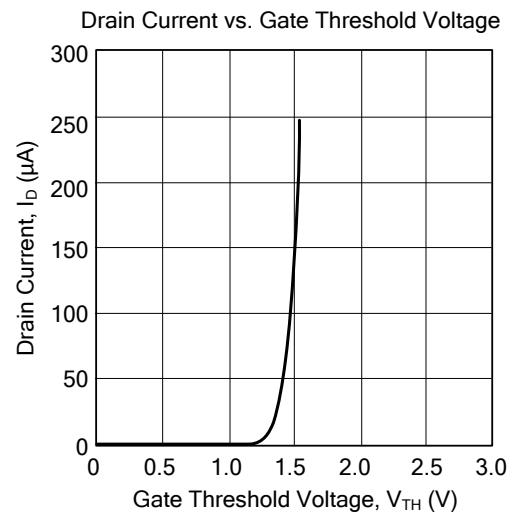
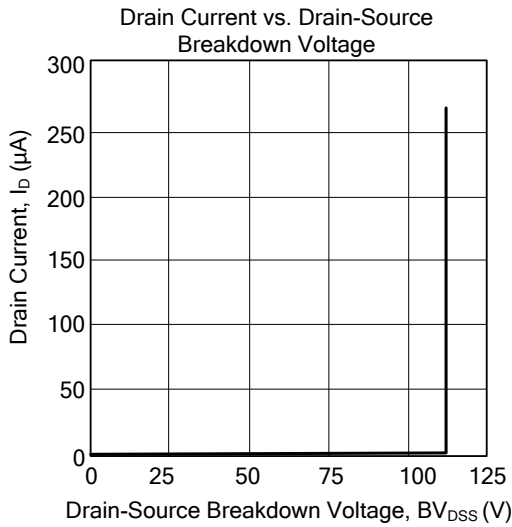
Switching Time Waveform



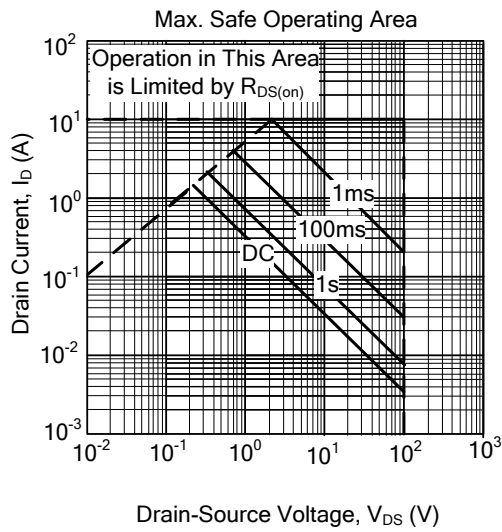
Gate Charge Waveform

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## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS



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