



## 2N7002Z

Preliminary

Power MOSFET

### INTERFACE AND SWITCHING (300mA, 60Volts)

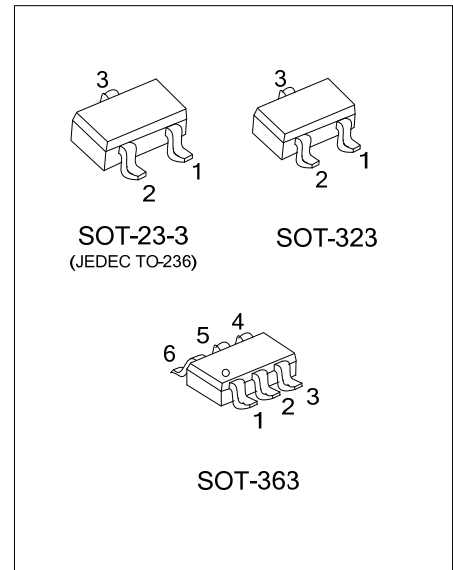
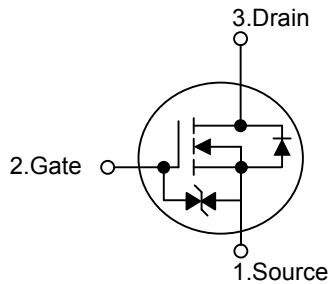
#### DESCRIPTION

The UTC **2N7002Z** uses advanced technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

#### FEATURES

- \*  $R_{DS(ON)} < 7.5\Omega$
- \* Low Reverse Transfer Capacitance ( $C_{RSS} = \text{typical } 3.0 \text{ pF}$ )
- \* ESD Protected
- \* Fast Switching Capability
- \* Avalanche Energy Specified
- \* Improved dv/dt Capability, High Ruggedness

#### SYMBOL

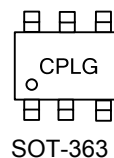
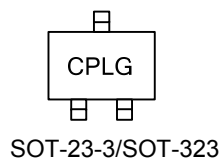


#### ORDERING INFORMATION

| Ordering Number | Package  | Pin Assignment |    |    |    |    |    | Packing   |
|-----------------|----------|----------------|----|----|----|----|----|-----------|
|                 |          | 1              | 2  | 3  | 4  | 5  | 6  |           |
| 2N7002ZG-AE2-R  | SOT-23-3 | S              | G  | D  | -  | -  | -  | Tape Reel |
| 2N7002ZG-AL3-R  | SOT-323  | S              | G  | D  | -  | -  | -  | Tape Reel |
| 2N7002ZG-AL6-R  | SOT-363  | S1             | G1 | D2 | S2 | G2 | D1 | Tape Reel |

|  |  |
|--|--|
| <p>2N7002ZG-AE2-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Halogen Free</li> </ul> | <ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) AE2: SOT-23-3, AL3: SOT-323, AL6: SOT-363</li> <li>(3) G: Halogen Free</li> </ul> |
|--|--|

#### MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

| PARAMETER            | SYMBOL    | RATINGS       | UNIT             |
|----------------------|-----------|---------------|------------------|
| Drain-Source Voltage | $V_{DSS}$ | 60            | V                |
| Gate-Source Voltage  | $V_{GSS}$ | $\pm 20$      | V                |
| Drain Current        | $I_D$     | 300           | mA               |
|                      |           | Pulse(Note 2) |                  |
| Power Dissipation    | $P_D$     | 225           | mW               |
| Junction Temperature | $T_J$     | +150          | $^\circ\text{C}$ |
| Storage Temperature  | $T_{STG}$ | -55 ~ +150    | $^\circ\text{C}$ |

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  $\leq 10\mu\text{s}$ , Duty cycle  $\leq 1\%$

■ ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

| PARAMETER   | SYMBOL       | TEST CONDITIONS  | MIN | TYP  | MAX      | UNIT          |
|---|--------------|--|-----|------|----------|---------------|
| <b>OFF CHARACTERISTICS</b>                                    |              |  |     |      |          |               |
| Drain-Source Breakdown Voltage                                | $BV_{DSS}$   | $V_{GS}=0\text{V}, I_D=10\mu\text{A}$                    | 60  |      |          | V             |
| Drain-Source Leakage Current                                  | $I_{DSS}$    | $V_{DS}=60\text{V}, V_{GS}=0\text{V}$                    |     |      | 1.0      | $\mu\text{A}$ |
| Gate-Source Leakage Current                                   | $I_{GSS}$    | $V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$                |     |      | $\pm 10$ | $\mu\text{A}$ |
| <b>ON CHARACTERISTICS</b>                                     |              |  |     |      |          |               |
| Gate Threshold Voltage  | $V_{GS(TH)}$ | $V_{DS}=10\text{V}, I_D=1\text{mA}$                      | 1.0 | 1.85 | 2.5      | V             |
| Static Drain-Source On-Resistance (Note)                      | $R_{DS(ON)}$ | $V_{GS}=10\text{V}, I_D=0.5\text{A}$                     |     |      | 7.5      | $\Omega$      |
|   |              | $V_{GS}=5\text{V}, I_D=0.05\text{A}$                     |     |      | 7.5      |               |
| Forward Transconductance                                      | $g_{FS}$     | $V_{DS}=10\text{V}, I_D=0.2\text{A}$                     | 80  |      |          | mS            |
| <b>DYNAMIC PARAMETERS</b>                                     |              |  |     |      |          |               |
| Input Capacitance   | $C_{ISS}$    | $V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1.0\text{MHz}$   |     | 25   | 50       | pF            |
| Output Capacitance  | $C_{OSS}$    |  |     | 10   | 25       | pF            |
| Reverse Transfer Capacitance                                  | $C_{RSS}$    |  |     | 3.0  | 5.0      | pF            |
| <b>SWITCHING PARAMETERS</b>                                   |              |  |     |      |          |               |
| Turn-ON Delay Time  | $t_{D(ON)}$  | $I_D=0.2\text{A}, V_{DD}=30\text{V}, V_{GS}=10\text{V},$ |     | 12   | 20       | ns            |
| Turn-OFF Delay Time   | $t_{D(OFF)}$ | $R_L=150\Omega, R_G=10\Omega$                            |     | 20   | 30       | ns            |
| <b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b> |              |  |     |      |          |               |
| Drain-Source Diode Forward Voltage                            | $V_{SD}$     | $V_{GS}=0\text{V}, I_S=115\text{mA}$ (Note )             |     | 0.88 | 1.5      | V             |
| Maximum Pulsed Drain-Source Diode Forward Current             | $I_{SM}$     |  |     |      | 0.8      | A             |
| Maximum Continuous Drain-Source Diode Forward Current         | $I_S$        |  |     |      | 115      | mA            |

Note: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 1\%$

■ TEST CIRCUITS AND WAVEFORMS

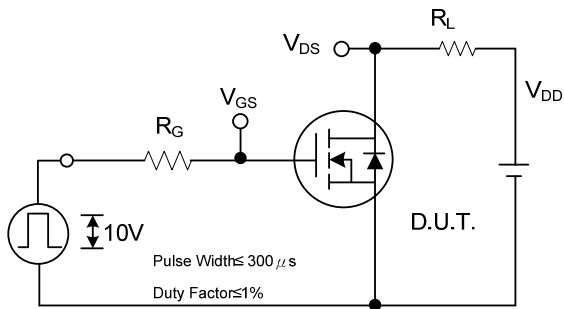


Fig. 2A Switching Test Circuit

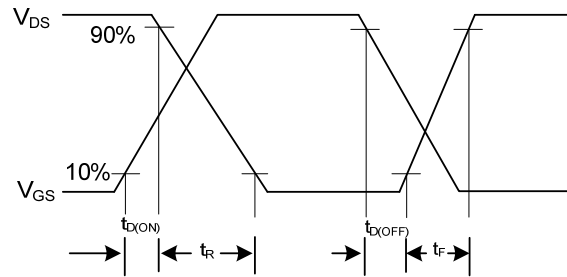


Fig. 2B Switching Waveforms

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.