



2N7002Z

Power MOSFET

300mA, 60V N-CHANNEL ENHANCEMENT MODE POWER MOSFET

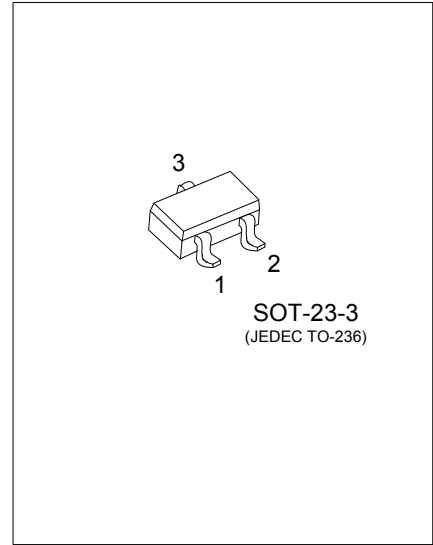
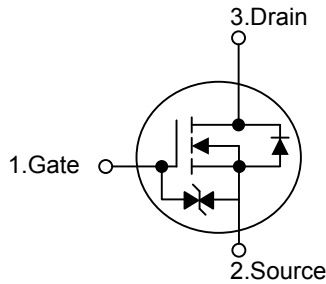
DESCRIPTION

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

- * Low Reverse Transfer Capacitance
- * ESD Protected
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

SYMBOL



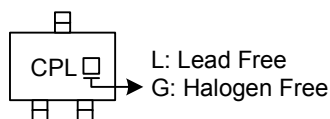
ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|----------------|----------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 2N7002ZL-AE2-R | 2N7002ZG-AE2-R | SOT-23-3 | G | S | D | Tape Reel |

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

| | |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| <p>2N7002ZG-AE2-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p> | <p>(1) R: Tape Reel</p> <p>(2) AE2: SOT-23-3</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|

MARKING



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

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------------------------|-----------|---------------|----------------------|
| Drain-Source Voltage | V_{DSS} | 60 | V |
| Gate-Source Voltage | V_{GSS} | ± 20 | V |
| Drain Current | I_D | Continuous | 300 |
| | | Pulse(Note 2) | 800 |
| Power Dissipation | P_D | 225 | mW |
| Derating above $T_A=25^\circ\text{C}$ | | 1.6 | mW/ $^\circ\text{C}$ |
| 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.

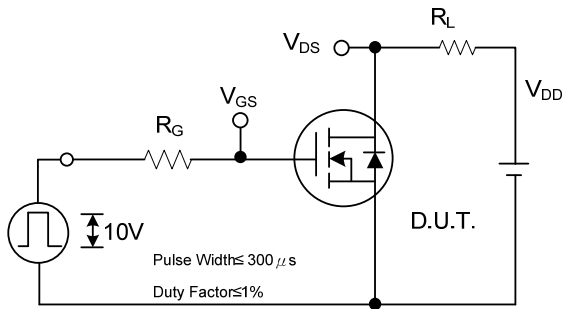
2. Pulse width $\leq 10\mu\text{s}$, Duty cycle $\leq 1\%$.

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified.)

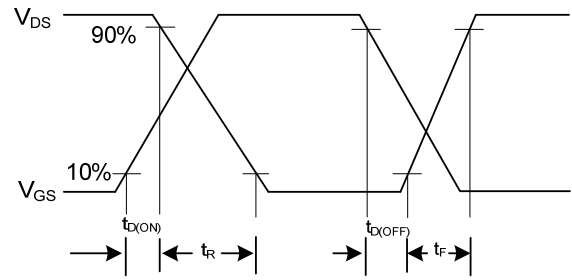
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------------------------------------------|--------------|----------------------------------------------------------|-----|------|----------|---------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown 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 | μA |
| Gate-Source Leakage Current | I_{GSS} | $V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$ | | | ± 10 | μA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu\text{A}$ | 1.0 | | 2.5 | V |
| Static Drain-Source On-Resistance (Note) | $R_{DS(ON)}$ | $V_{GS}=10\text{V}, I_D=300\text{mA}$ | | | 4.0 | Ω |
| | | $V_{GS}=4.5\text{V}, I_D=50\text{mA}$ | | | 6.0 | Ω |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C_{ISS} | $V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1.0\text{MHz}$ | | 22 | 50 | pF |
| Output Capacitance | C_{OSS} | | 9 | 25 | pF | |
| Reverse Transfer Capacitance | C_{RSS} | | 4 | 5.0 | pF | |
| SWITCHING PARAMETERS | | | | | | |
| Turn-ON Delay Time | $t_{D(ON)}$ | $I_D=0.2\text{A}, V_{DD}=30\text{V}, V_{GS}=10\text{V},$ | | 1.3 | 20 | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | $R_L=150\Omega, R_G=10\Omega$ | | 4.2 | 30 | ns |
| DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | I_S | | | | 300 | mA |
| Maximum Pulsed Drain-Source Diode Forward Current | I_{SM} | | | | 0.8 | A |
| Drain-Source Diode Forward Voltage | V_{SD} | $V_{GS}=0\text{V}, I_S=300\text{mA}$ (Note) | | 0.88 | 1.5 | V |

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

■ TEST CIRCUITS AND WAVEFORMS

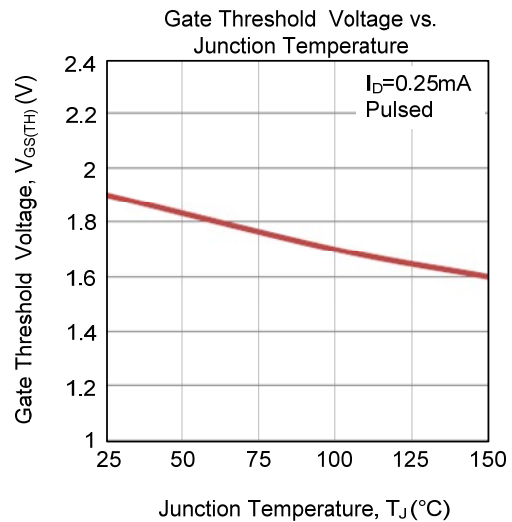
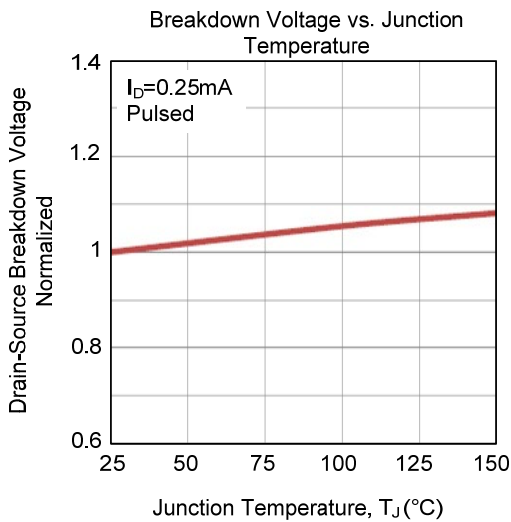
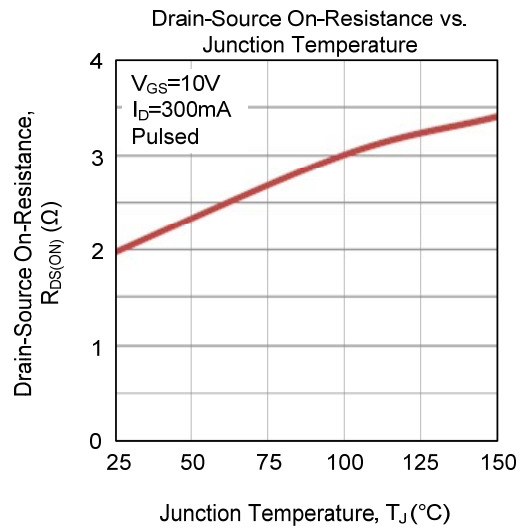
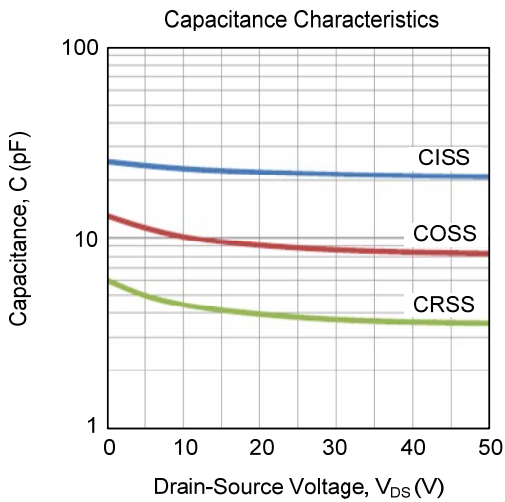
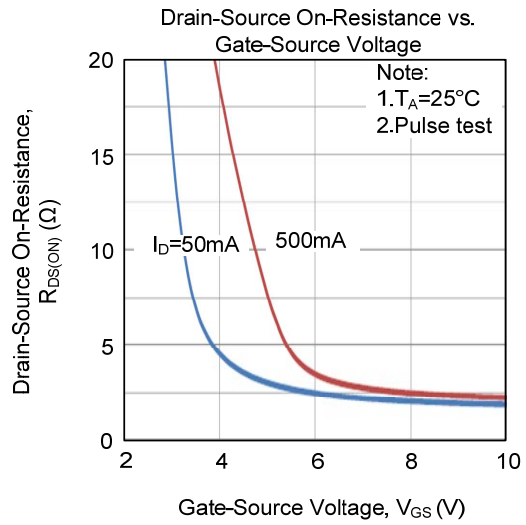
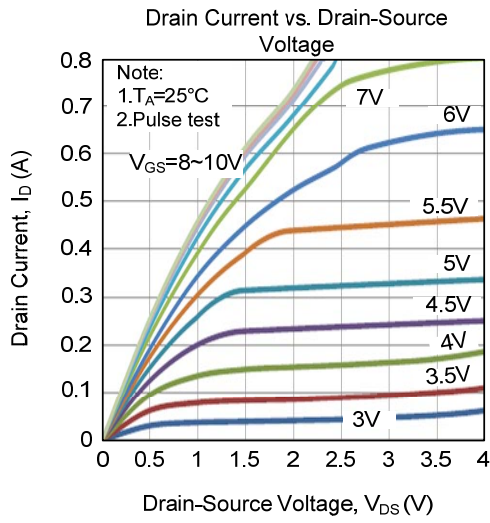


Switching Test Circuit

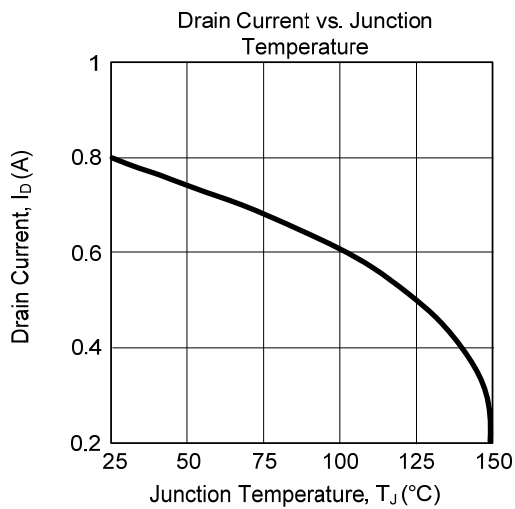
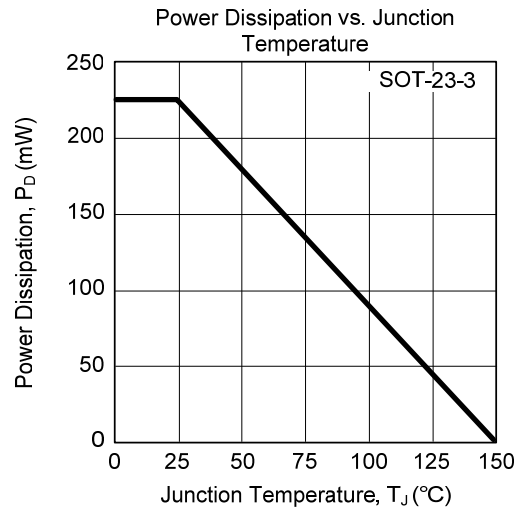
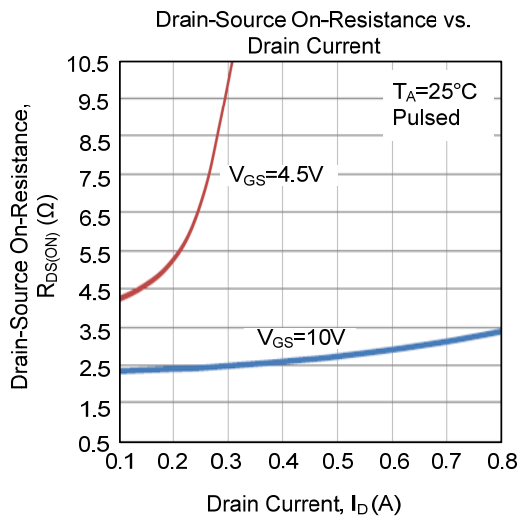
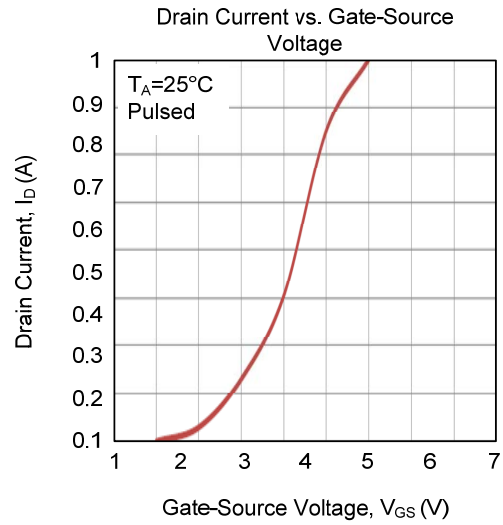
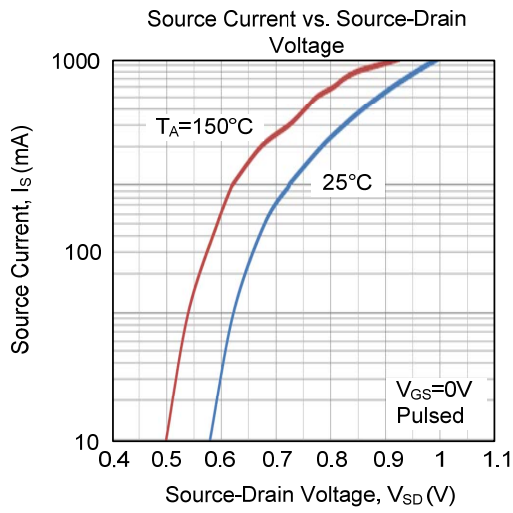


Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



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