



3N80Z

Power MOSFET

3.0A, 800V N-CHANNEL POWER MOSFET

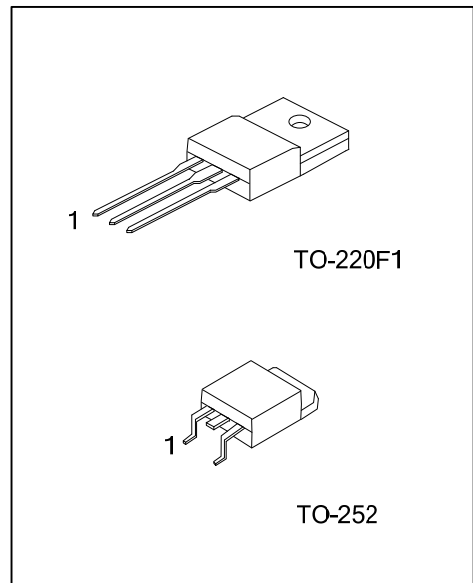
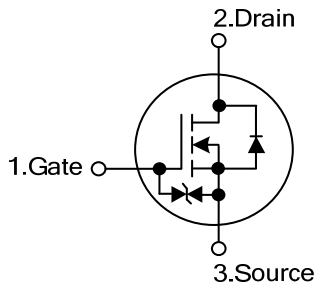
■ DESCRIPTION

The UTC **3N80Z** 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

- * $R_{DS(ON)} < 4.2\Omega$ @ $V_{GS}=10V, I_D=1.5A$
- * Ultra Low Gate Charge (typical 19 nC)
- * Low Reverse Transfer Capacitance (C_{RSS} = Typical 11 pF)
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

■ SYMBOL



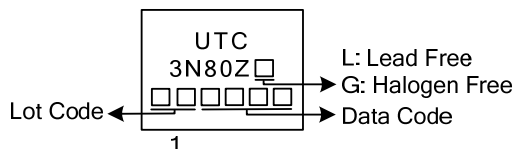
■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|--------------|----------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 3N80ZL-TF1-T | 3N80ZG-TF1-T | TO-220F1 | G | D | S | Tube |
| 3N80ZL-TN3-R | 3N80ZG-TN3-R | TO-252 | G | D | S | Tape Reel |

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

| | |
|---|---|
| <p>3N80ZL-TF1-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p> | <p>(1) T: Tube, R: Tape Reel</p> <p>(2) TF1: TO-220F1, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|---|

■ MARKING



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

| PARAMETER | SYMBOL | RATINGS | UNIT |
|--|------------|------------|------------------|
| Drain-Source Voltage ($V_{GS}=0V$) | V_{DSS} | 800 | V |
| Drain-Gate Voltage ($R_G=20k\Omega$) | V_{DGR} | 800 | V |
| Gate-Source Voltage | V_{GSS} | ± 20 | V |
| Gate-Source Breakdown Voltage ($I_{GS}=\pm 1mA$) | BV_{GSO} | 30 (MIN) | V |
| Insulation Withstand Voltage (DC) | V_{ISO} | 2500 | V |
| Continuous Drain Current | I_D | 3.0 | A |
| Pulsed Drain Current | I_{DM} | 12 | A |
| Avalanche Current (Note 2) | I_{AR} | 4.0 | A |
| Single Pulse Avalanche Energy (Note 3) | E_{AS} | 80 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | dv/dt | 3.5 | V/ns |
| Power Dissipation | TO-220F1 | P_D | 25 |
| | TO-252 | | 50 |
| 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. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. $L=10mH$, $I_{AS}=4.0A$, $V_{DD}=50V$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$.
4. $I_{SD}\leq 3.0A$, $di/dt\leq 200A/\mu s$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

| PARAMETER | SYMBOL | RATING | UNIT |
|---------------------|----------|---------------|------|
| Junction to Ambient | TO-220F1 | θ_{JA} | 62.5 |
| | TO-252 | | 110 |
| Junction to Case | TO-220F1 | θ_{JC} | 5.0 |
| | TO-252 | | 2.5 |

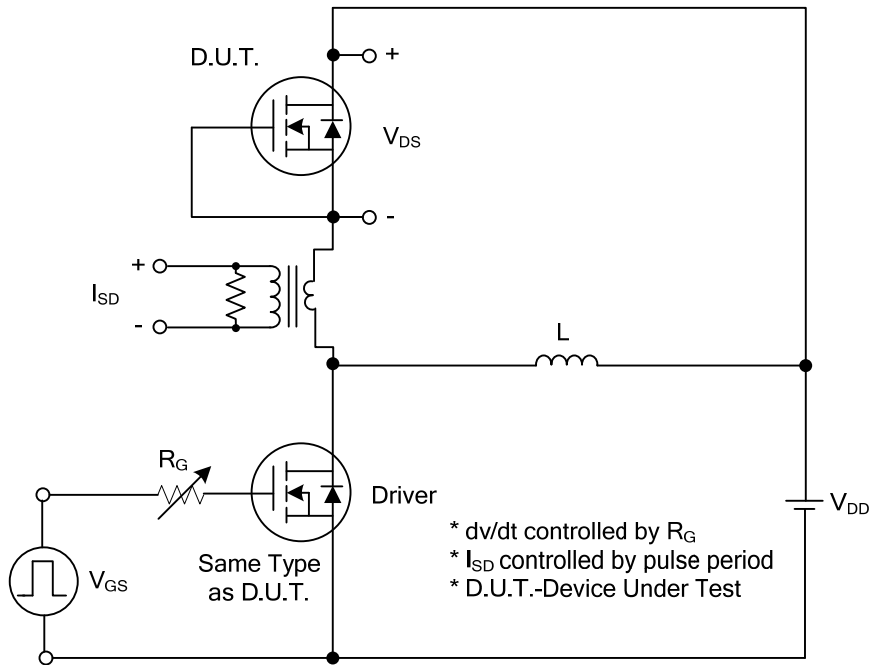
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|--------------|---|-----|-----|----------|----------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 800 | | | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=800V, V_{GS}=0V$ | | | 1 | μA |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 10 | μA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 3.0 | | 4.5 | V |
| Static Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=1.5A$ | | | 4.2 | Ω |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS}=0V, V_{DS}=25V, f=1MHz$ | | 485 | | pF |
| Output Capacitance | C_{OSS} | | | 57 | | pF |
| Reverse Transfer Capacitance | C_{RSS} | | | 11 | | pF |
| SWITCHING CHARACTERISTICS | | | | | | |
| Total Gate Charge | Q_G | $V_{DS}=50V, V_{GS}=10V, I_D=1.3A,$ $I_G=250\mu A$ (Note 1, 2) | | 68 | | nC |
| Gate to Source Charge | Q_{GS} | | | 6.0 | | nC |
| Gate to Drain Charge | Q_{GD} | | | 9.5 | | nC |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{DD}=30V, V_{GS}=10V, I_D=0.5A,$ $R_G=25\Omega$ (Note 1, 2) | | 55 | | ns |
| Rise Time | t_R | | | 52 | | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 170 | | ns |
| Fall-Time | t_F | | | 42 | | ns |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Body-Diode Continuous Current | I_{SD} | | | | 3.0 | A |
| Maximum Body-Diode Pulsed Current | I_{SDM} | | | | 12 | A |
| Drain-Source Diode Forward Voltage | V_{SD} | $I_S=3.0A, V_{GS}=0V$ | | | 1.6 | V |
| Reverse Recovery Time | t_{rr} | $I_S=3.0A, V_{GS}=0V,$ | | 480 | | ns |
| Reverse Recovery Charge | Q_{rr} | $di_F/dt=100A/\mu s$ | | 2.7 | | μC |

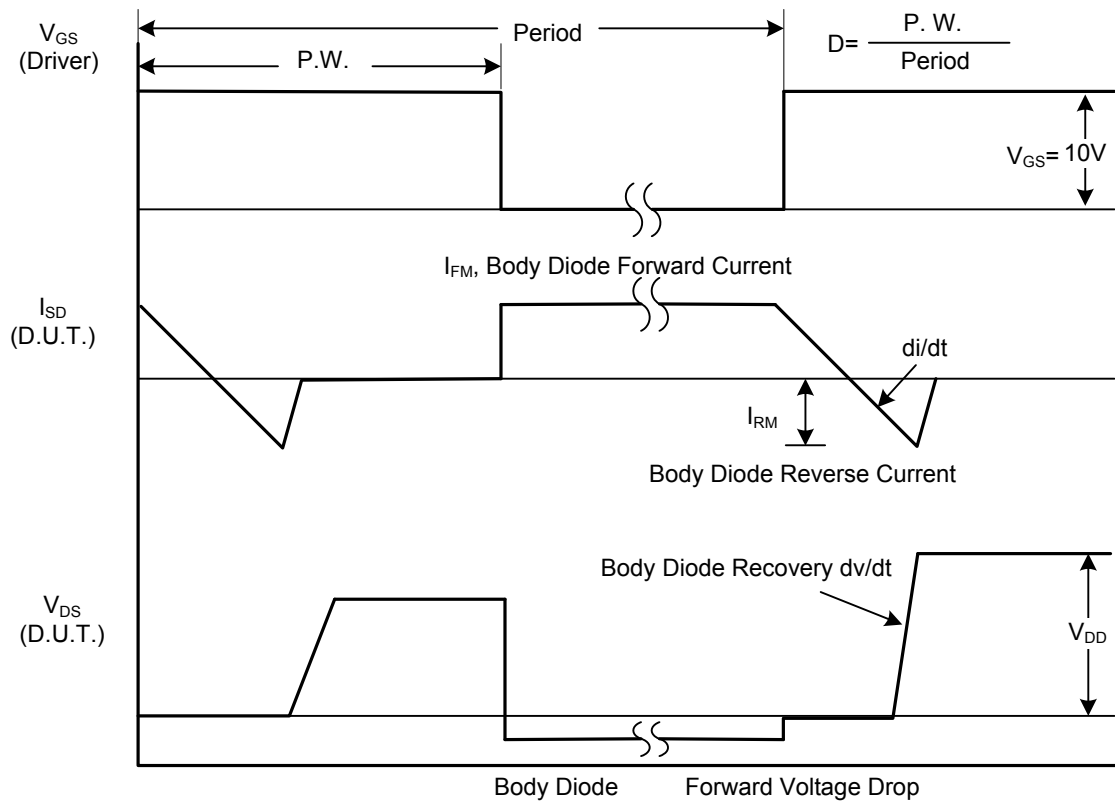
Notes: 1. Pulse width=300 μs , Duty cycle $\leq 1.5\%$

2. $C_{OSS(EQ)}$ is defined as constant equivalent capacitance giving the same charging time as C_{OSS} when V_{DS} increases from 0 to 80% V_{DSS} .

■ TEST CIRCUITS AND WAVEFORMS

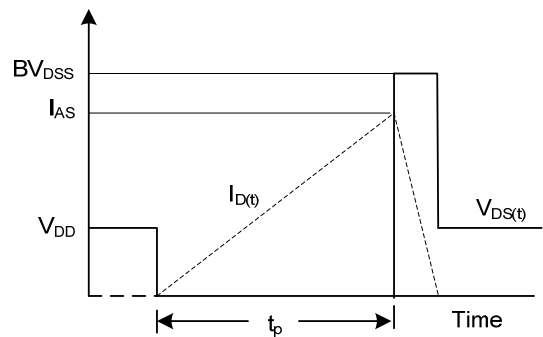
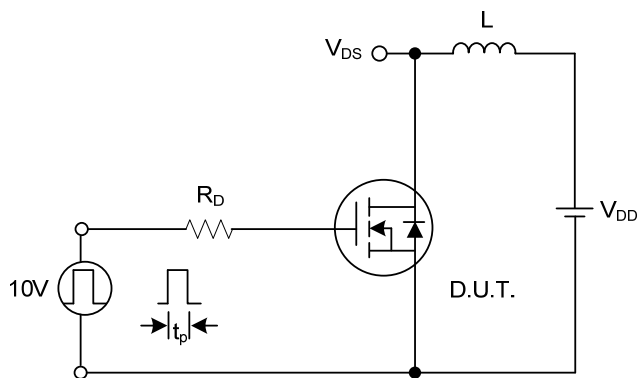
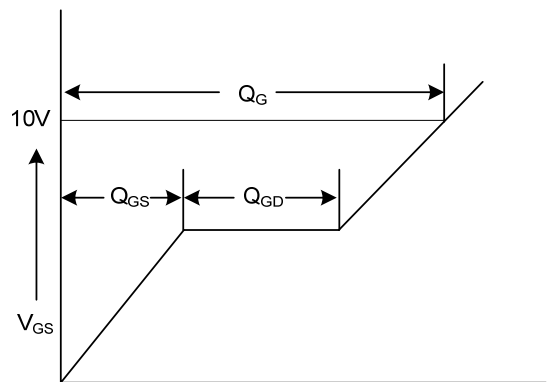
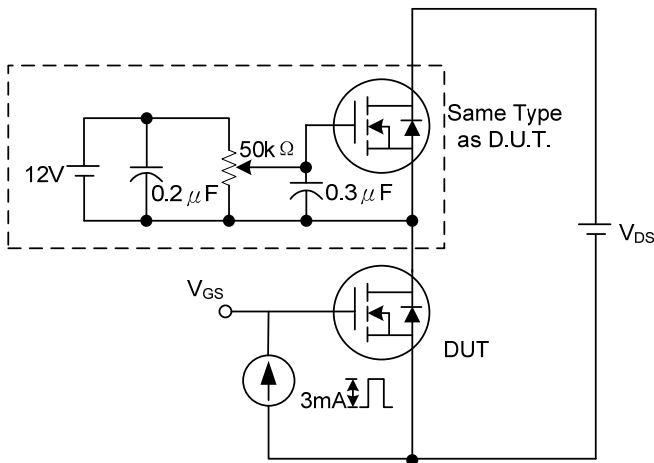
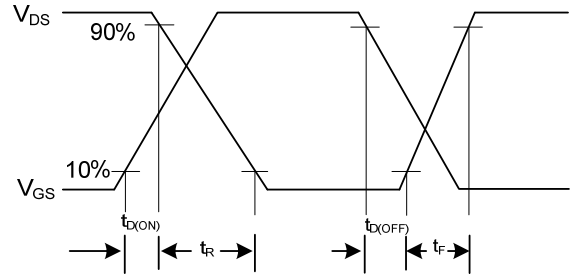
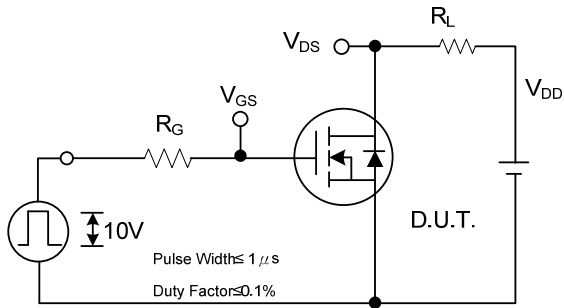


Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)



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