



7N80

Preliminary

Power MOSFET

7.0 Amps, 800 Volts N-CHANNEL POWER MOSFET

DESCRIPTION

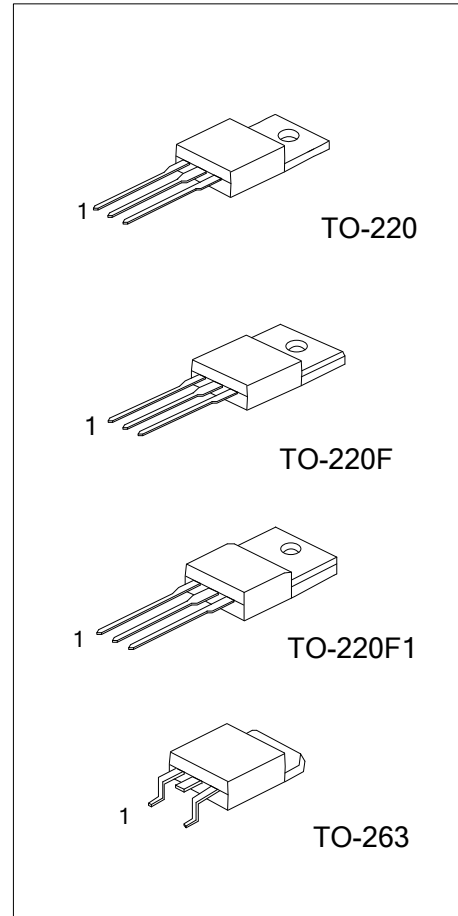
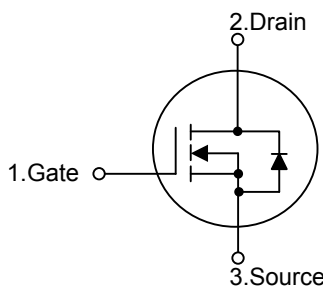
The UTC **7N80** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology specializes in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **7N80** is universally applied in high efficiency switch mode power supply.

FEATURES

- * 7A, 800V, $R_{DS(on)}=1.9\Omega@V_{GS}=10V$
- * High switching speed
- * 100% avalanche tested

SYMBOL



ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|--------------|----------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 7N80L-TA3-T | 7N80G-TA3-T | TO-220 | G | D | S | Tube |
| 7N80L-TF3-T | 7N80G-TF3-T | TO-220F | G | D | S | Tube |
| 7N80L-TF1-T | 7N80G-TF1-T | TO-220F1 | G | D | S | Tube |
| 7N80L-TQ2-R | 7N80G-TQ2-R | TO-263 | G | D | S | Tape Reel |
| 7N80L-TQ2-T | 7N80G-TQ2-T | TO-263 | G | D | S | Tube |

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

| | |
|---|--|
| <p>7N80L - TA3 - T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p> | <p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F, TQ2: TO-263 (3) G: Halogen Free, L: Lead Free</p> |
|---|--|

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

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|--------------------------------------|------------------------|-----------|----------|------------------|
| Drain-Source Voltage | | V_{DSS} | 800 | V |
| Gate-Source Voltage | | V_{GSS} | ± 30 | V |
| Drain Current | Continuous | I_D | 7 | A |
| | Pulsed (Note 1) | I_{DM} | 26.4 | A |
| Avalanche Energy | Single Pulsed (Note 2) | E_{AS} | 580 | mJ |
| | Repetitive (Note 1) | E_{AR} | 16.7 | mJ |
| Peak Diode Recovery dv/dt (Note 3) | | dv/dt | 4.5 | V/ns |
| Power Dissipation | TO-220 /TO-263 | P_D | 142 | W |
| | TO-220F/ TO-220F1 | | 48 | W |
| Junction Temperature | | T_J | +150 | $^\circ\text{C}$ |
| Storage Temperature | | T_{STG} | -55~+150 | $^\circ\text{C}$ |

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.

* Drain current limited by maximum junction temperature.

■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---------------------|--------------------|---------------|---------|---------------------------|
| Junction to Ambient | TO-220/TO-263 | θ_{JA} | 62.5 | $^\circ\text{C}/\text{W}$ |
| | TO-220F /TO-220F1 | | 62.5 | $^\circ\text{C}/\text{W}$ |
| Junction to Case | TO-220/TO-263 | θ_{JC} | 0.88 | $^\circ\text{C}/\text{W}$ |
| | TO-220F / TO-220F1 | | 2.6 | $^\circ\text{C}/\text{W}$ |

■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, 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 |
| Breakdown Voltage Temperature Coefficient | $\Delta BV_{DSS}/\Delta T_J$ | $I_D=250\mu A$, Referenced to 25°C | | 0.93 | | $V/^\circ\text{C}$ |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=800V, V_{GS}=0V$ | | | 10 | μA |
| | | $V_{DS}=640V, T_C=125^\circ\text{C}$ | | | 100 | μA |
| Gate-Source Leakage Current | Forward | $V_{DS}=0V, V_{GS}=30V$ | | | 100 | nA |
| | Reverse | $V_{DS}=0V, V_{GS}=-30V$ | | | -100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 3.0 | | 5.0 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=3.3A$ | | 1.4 | 1.9 | Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=50V, I_D=3.3A$ (Note 4) | | 5.5 | | S |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C_{ISS} | $V_{DS}=25V, V_{GS}=0V, f=1.0\text{MHz}$ | | 1290 | 1680 | pF |
| Output Capacitance | C_{OSS} | | | 120 | 155 | pF |
| Reverse Transfer Capacitance | C_{RSS} | | | 10 | 13 | pF |
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge | Q_G | $V_{DS}=640V, V_{GS}=10V, I_D=6.6A$ (Note 4,5) | | 27 | 35 | nC |
| Gate-Source Charge | Q_{GS} | | | 8.2 | | nC |
| Gate-Drain Charge | Q_{GD} | | | 11 | | nC |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{DD}=400V, I_D=6.6A, R_G=25\Omega$ (Note 4,5) | | 35 | 80 | ns |
| Turn-ON Rise Time | t_R | | | 100 | 210 | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 50 | 110 | ns |
| Turn-OFF Fall Time | t_F | | | 60 | 130 | ns |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Body-Diode Continuous Current | I_S | | | | 6.6 | A |
| Maximum Body-Diode Pulsed Current | I_{SM} | | | | 26.4 | A |
| Drain-Source Diode Forward Voltage | V_{SD} | $I_S=6.6A, V_{GS}=0V$ | | | 1.4 | V |
| Body Diode Reverse Recovery Time | t_{RR} | $V_{GS}=0V, I_S=6.6A$, | | 650 | | ns |
| Body Diode Reverse Recovery Charge | Q_{RR} | $di_F/dt=100A/\mu s$ (Note 4) | | 7.0 | | μC |

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. $L=25\text{mH}, I_{AS}=6.6A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

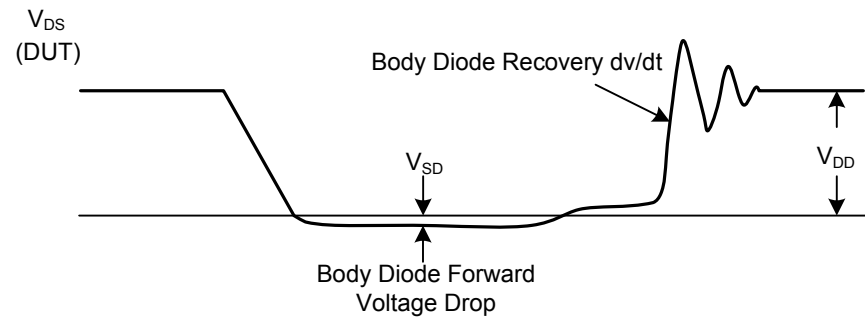
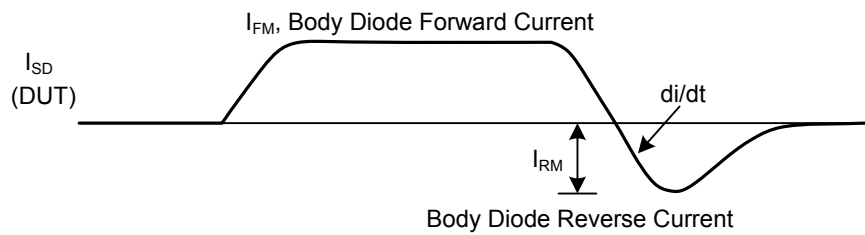
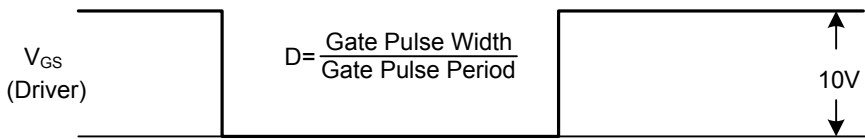
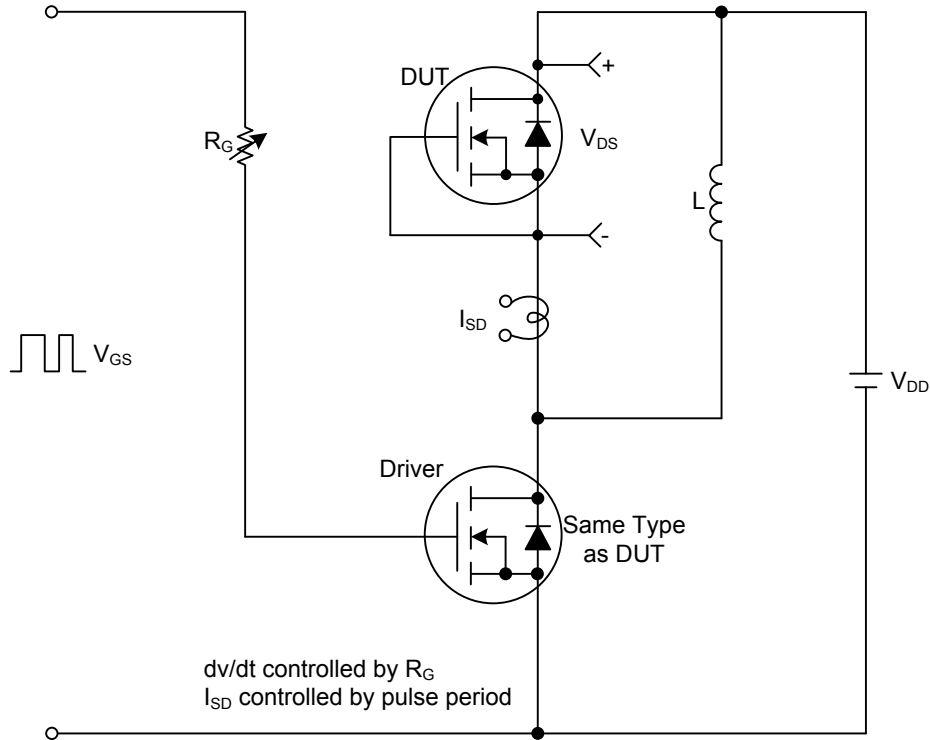
3. $I_{SD}\leq 8A, di/dt\leq 200A/\mu s, V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

4. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

5. Essentially independent of operating temperature

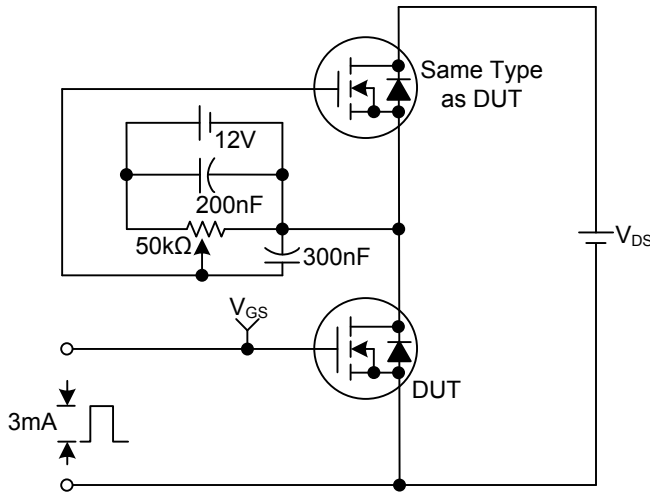
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

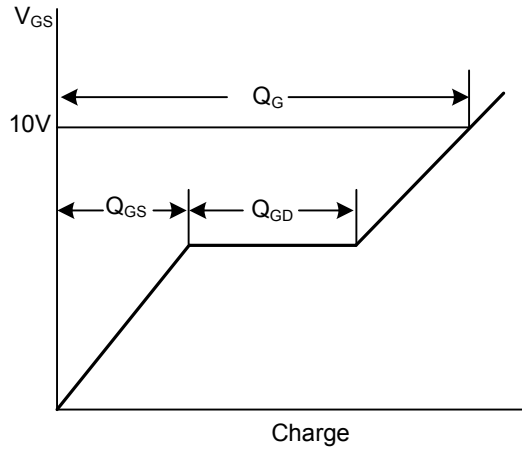


■ TEST CIRCUITS AND WAVEFORMS(Cont.)

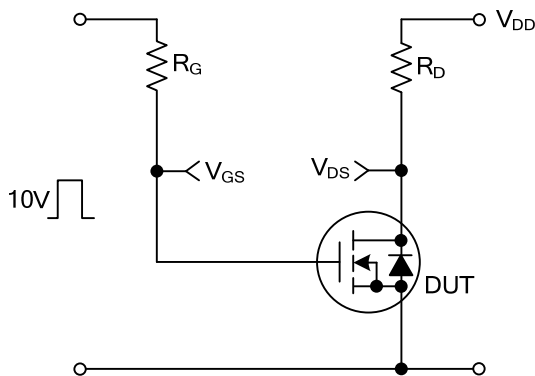
Gate Charge Test Circuit



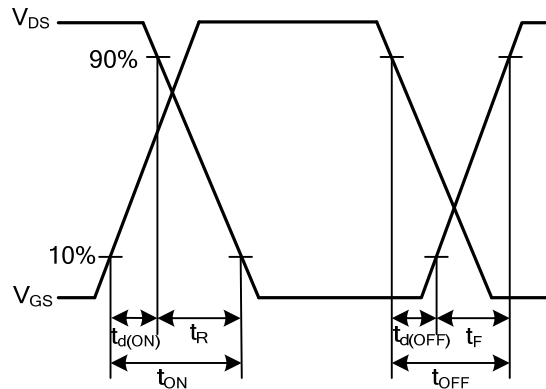
Gate Charge Waveforms



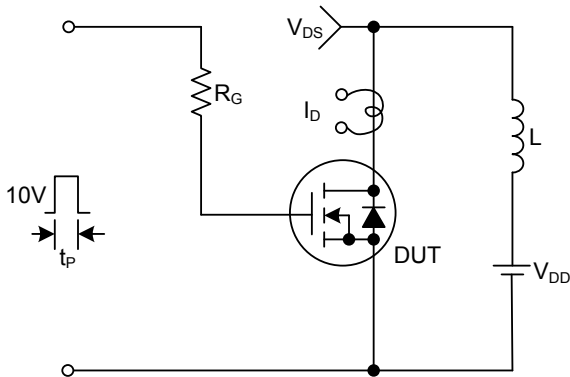
Resistive Switching Test Circuit



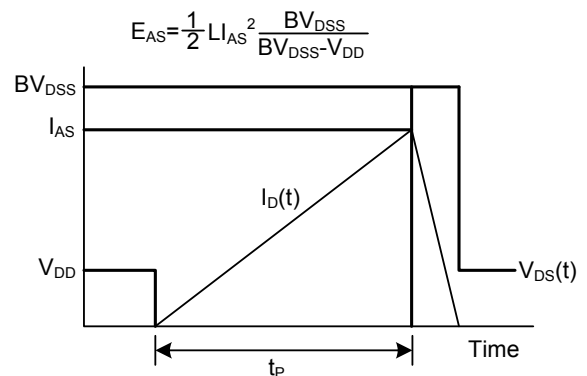
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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