



60N08

Preliminary

Power MOSFET

60 Amps, 80 Volts N-CHANNEL POWER MOSFET

DESCRIPTION

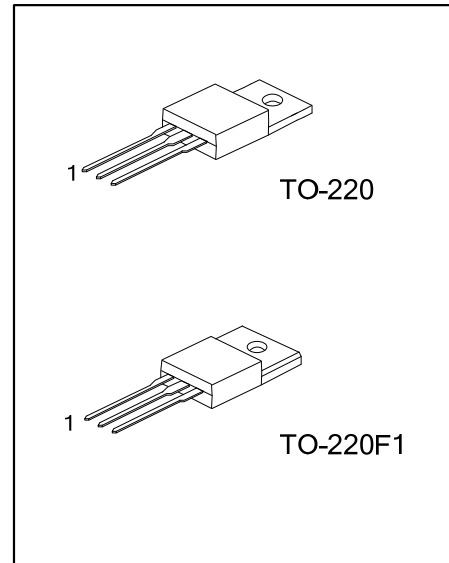
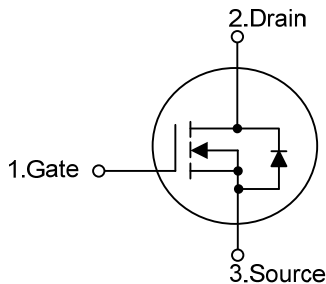
The UTC **60N08** is an N-channel power MOSFET adopting UTC's advanced planar stripe and DMOS technology to provide designers with perfectly high switching speed and minimum on-state resistance. It also can withstand high energy pulse in the avalanche and commutation modes.

The UTC **60N08** is applied in low voltage applications such as DC motor control, automotive, and high efficiency switching for DC/DC converters.

FEATURES

- * 60A, 80V, $R_{DS(ON)}=0.024\Omega @ V_{GS}=10V$
- * High switching speed
- * 100% avalanche tested

SYMBOL



ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|--------------|----------|----------------|---|---|---------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 60N08L-TA3-T | 60N08G-TA3-T | TO-220 | G | D | S | Tube |
| 60N08L-TF1-T | 60N08G-TF1-T | TO-220F1 | G | D | S | Tube |

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

| | |
|--|---|
| <p>60N08L - TF1 - T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p> | <p>(1) T: Tube (2) TA3: TO-220, TF1: TO-220F1 (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 to Source Voltage | | V_{DSS} | 80 | V |
| Gate to Source Voltage | | V_{GSS} | ± 25 | V |
| Continuous Drain Current | Continuous | I_D | 60 | A |
| | Pulsed | I_{DM} | 176 | A |
| Avalanche Energy | Single Pulsed (Note 2) | E_{AS} | 560 | mJ |
| | Repetitive (Note 1) | E_{AR} | 8.5 | mJ |
| Peak Diode Recovery dv/dt (Note 3) | | dv/dt | 6.5 | V/ns |
| Power Dissipation | TO-220 | P_D | 100 | W |
| | TO-220F1 | | 70 | W |
| Junction Temperature | | T_J | +150 | $^\circ\text{C}$ |
| Storage Temperature | | T_{STG} | -55 ~ +175 | $^\circ\text{C}$ |

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.

■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---------------------|----------|---------------|---------|--------------------|
| Junction to Ambient | TO-220 | θ_{JA} | 62.5 | $^\circ\text{C/W}$ |
| | TO-220F1 | | 62.5 | $^\circ\text{C/W}$ |
| Junction to Case | TO-220 | θ_{JC} | 1.25 | $^\circ\text{C/W}$ |
| | TO-220F1 | | 1.77 | $^\circ\text{C/W}$ |

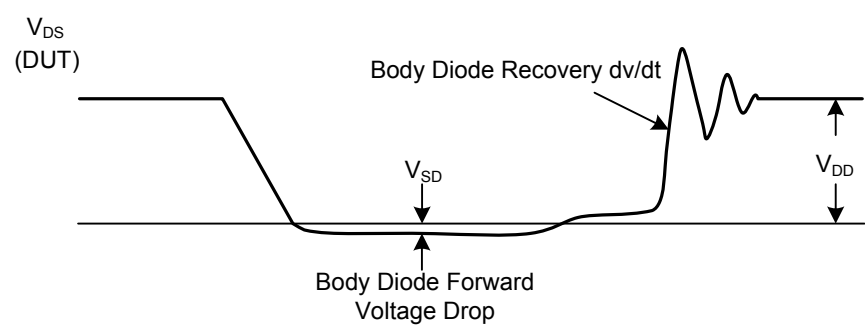
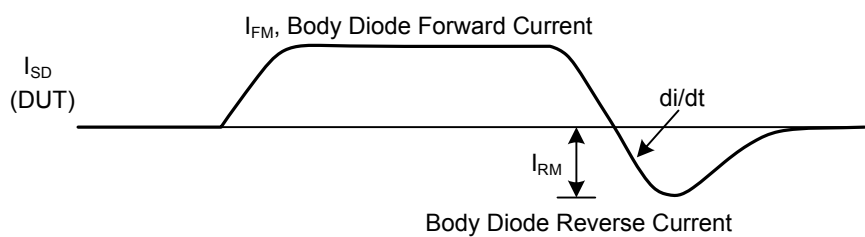
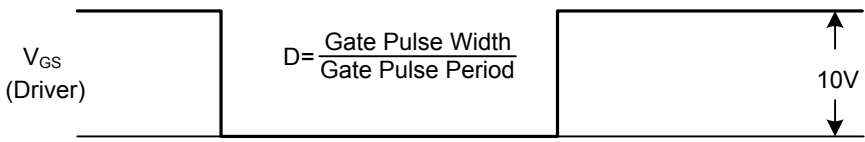
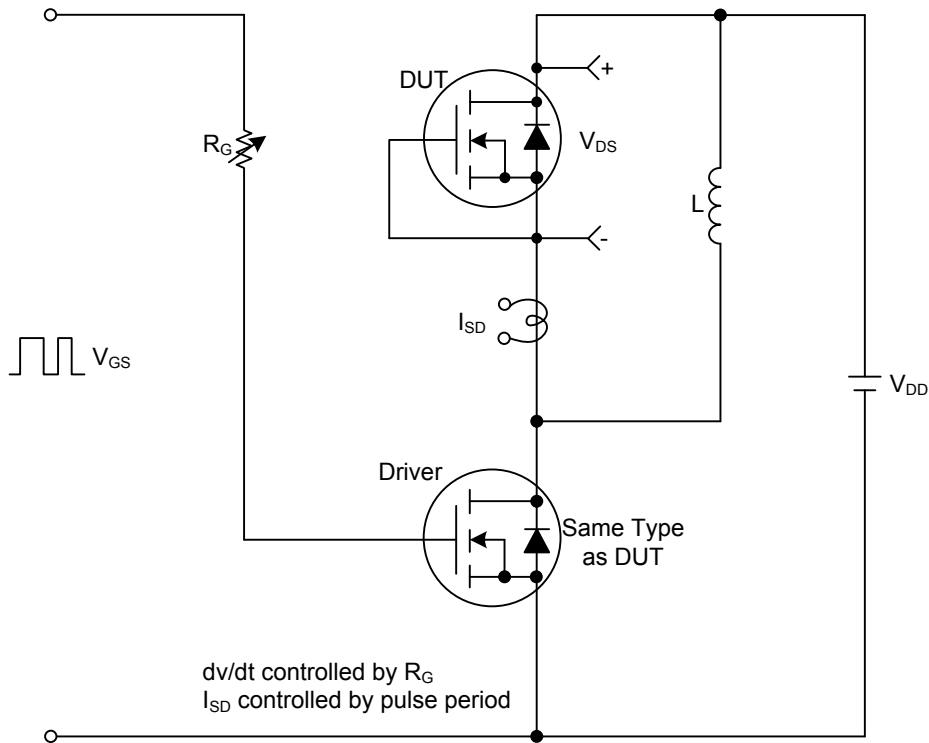
■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|------------------------------|---|-----|-------|-------|--------------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 80 | | | V |
| Breakdown Voltage Temperature Coefficient | $\Delta BV_{DSS}/\Delta T_J$ | $I_D=250\mu A$, Referenced to 25°C | | 0.07 | | $V/^\circ\text{C}$ |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=80V, V_{GS}=0V$ | | | 1 | μA |
| | | $V_{DS}=64V, T_C=150^\circ\text{C}$ | | | 10 | μA |
| Gate-Source Leakage Current | Forward | $V_{DS}=0V, V_{GS}=+25V$ | | | +100 | nA |
| | Reverse | $V_{DS}=0V, V_{GS}=-25V$ | | | -100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2.0 | | 4.0 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=30A$ | | 0.018 | 0.024 | Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=30V, I_D=30A$ (Note 4) | | 31 | | S |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C_{ISS} | $V_{DS}=25V, V_{GS}=0V, f=1.0\text{MHz}$ | | 1450 | 1900 | pF |
| Output Capacitance | C_{OSS} | | | 520 | 680 | pF |
| Reverse Transfer Capacitance | C_{RSS} | | | 120 | 155 | pF |
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge | Q_G | $V_{DS}=64V, V_{GS}=10V, I_D=60A$ (Note 4,5) | | 50 | 65 | nC |
| Gate-Source Charge | Q_{GS} | | | 9.3 | | nC |
| Gate-Drain Charge | Q_{GD} | | | 25 | | nC |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{DD}=40V, I_D=60A,$ $R_G=25\Omega$ (Note 4,5) | | 16.5 | 45 | ns |
| Turn-ON Rise Time | t_R | | | 200 | 410 | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 70 | 150 | ns |
| Turn-OFF Fall Time | t_F | | | 95 | 200 | ns |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Body-Diode Continuous Current | I_S | | | | 60 | A |
| Maximum Body-Diode Pulsed Current | I_{SM} | | | | 176 | A |
| Drain-Source Diode Forward Voltage | V_{SD} | $I_S=60A, V_{GS}=0V$ | | | 1.5 | V |
| Body Diode Reverse Recovery Time | t_{RR} | $V_{GS}=0V, I_S=60A,$ | | 73 | | ns |
| Body Diode Reverse Recovery Charge | Q_{RR} | $di/dt=100A/\mu s$ (Note 4) | | 185 | | μC |

- Notes : 1. Repetitive Rating: Pulse width limited by maximum junction temperature
 2. $L=0.4\text{mH}, I_{AS}=44A, V_{DD}=25V, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
 3. $I_{SD} \leq 60A, di/dt \leq 300A/\mu s, V_{DD} \leq BV_{DSS}$, 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

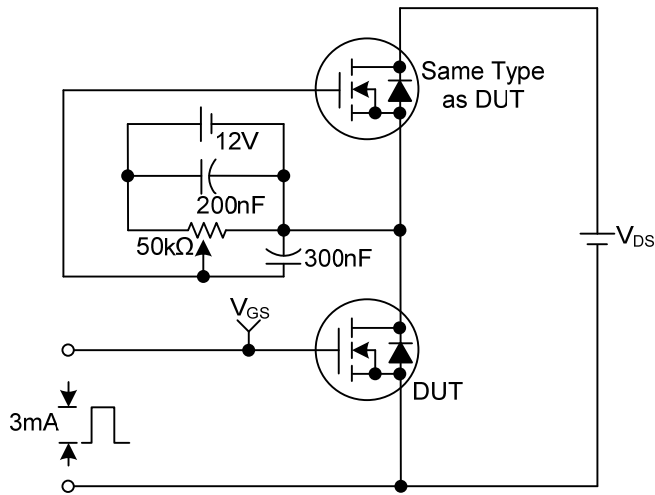
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

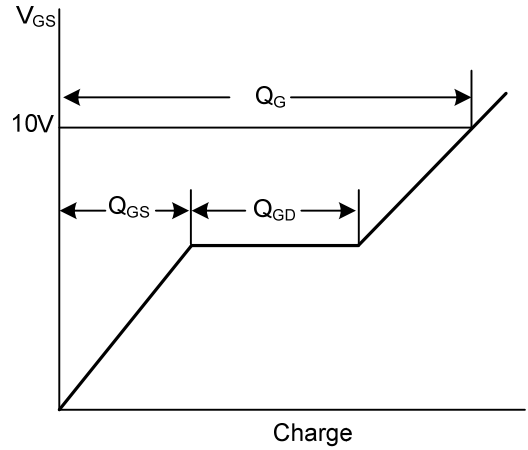


■ TEST CIRCUITS AND WAVEFORMS(Cont.)

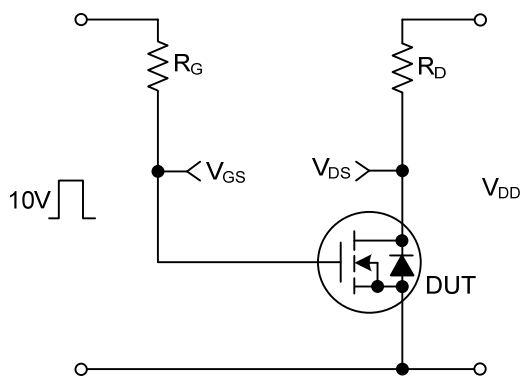
Gate Charge Test Circuit



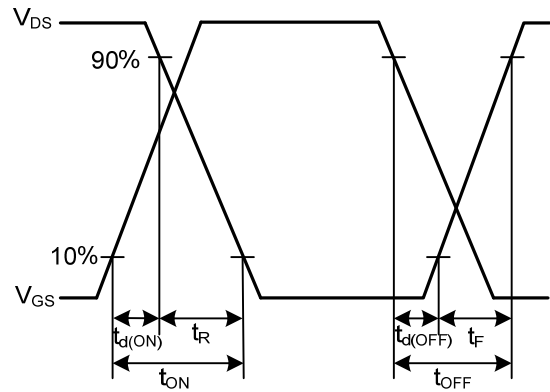
Gate Charge Waveforms



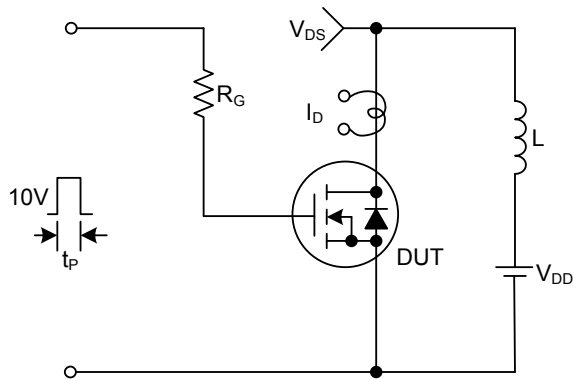
Resistive Switching Test Circuit



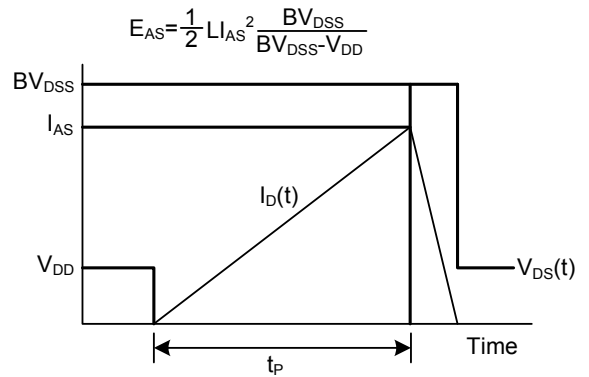
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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