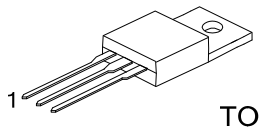
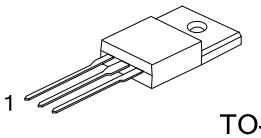
60 Amps, 80 Volts
N-CHANNEL POWER MOSFET



TO-220



TO-220F1

■ DESCRIPTION

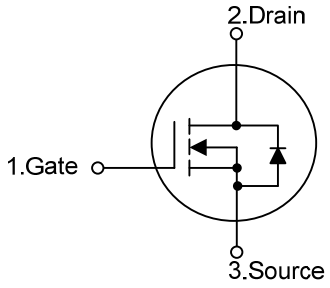
The UTC **60N08** is an N-channel power MOSFET adopting UTC's advanced planar stripe and DMOS technology to provide designers with perfectly high switching speed and minimum on-state resistance. It also can withstand high energy pulse in the avalanche and commutation modes.

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, $R_{DS(ON)}$=0.024Ω @ 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

60N08L - TF1 - T
(1) Packing Type
(2) Package Type
(3) Lead Free

(1) T: Tube
(2) TA3: TO-220, TF1: TO-220F1
(3) G: Halogen Free, L: Lead Free

■ ABSOLUTE MAXIMUM RATINGS (T_C=25°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	°C
Storage Temperature		T_{STG}	-55 ~ +175	°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	°C/W
	TO-220F1		62.5	°C/W
Junction to Case	TO-220	θ_{JC}	1.25	°C/W
	TO-220F1		1.77	°C/W

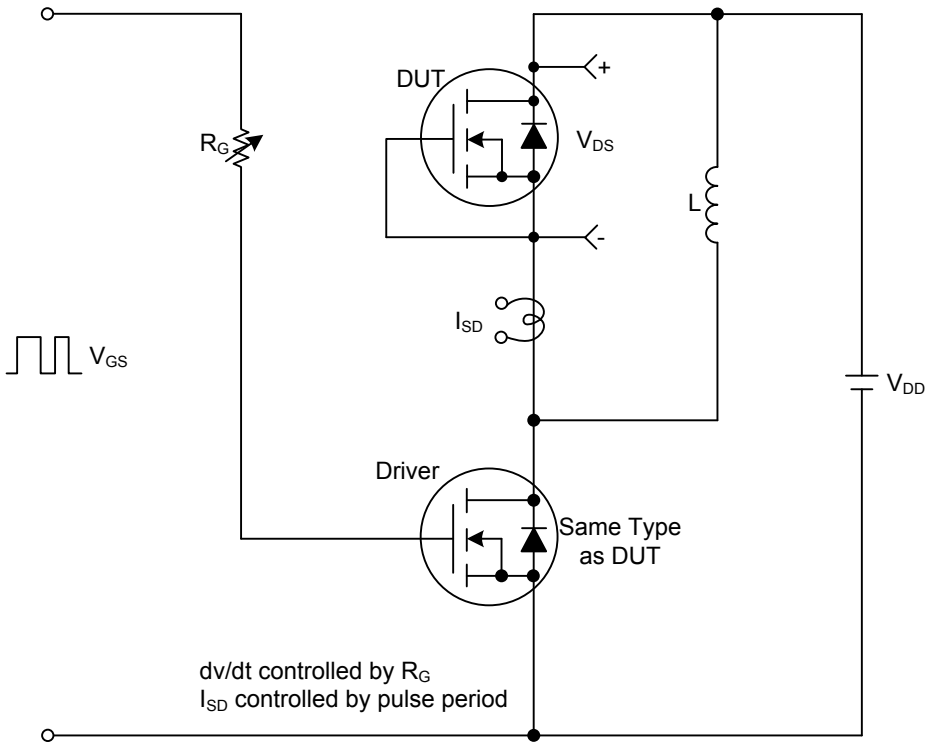
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

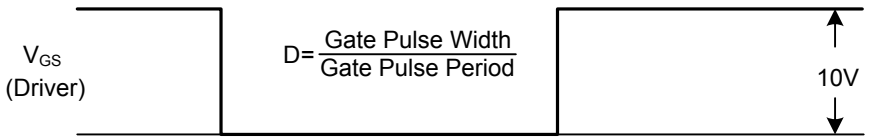
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	80			V
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA,Referenced to 25°C		0.07		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=80V, V_{GS}=0V			1	μA
			V_{DS}=64V, T_C=150°C			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	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=250μA	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=1.0MHz		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=25Ω (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, dI_F/dt=100A/μs (Note 4)		73		ns
Body Diode Reverse Recovery Charge		Q_{RR}			185		μC

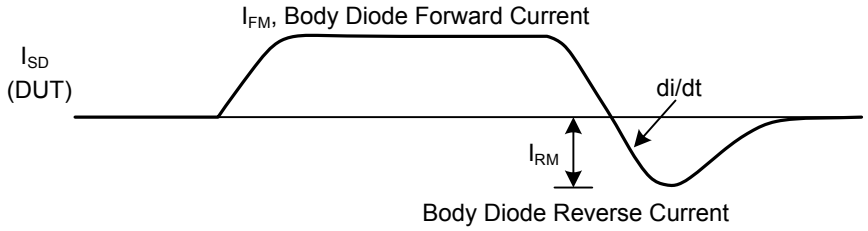
Notes : 1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=0.4mH, I_{AS}=44A, V_{DD}=25V, R_G=25Ω, Starting T_J=25°C
3. I_{SD} ≤60A, di/dt ≤300A/μs, V_{DD} ≤BV_{DSS}, Starting T_J=25°C
4. Pulse Test : Pulse width≤300μs, Duty cycle≤2%
5. Essentially independent of operating temperature

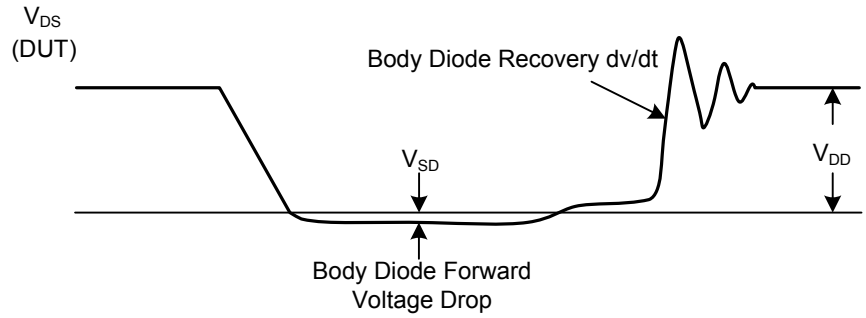
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms



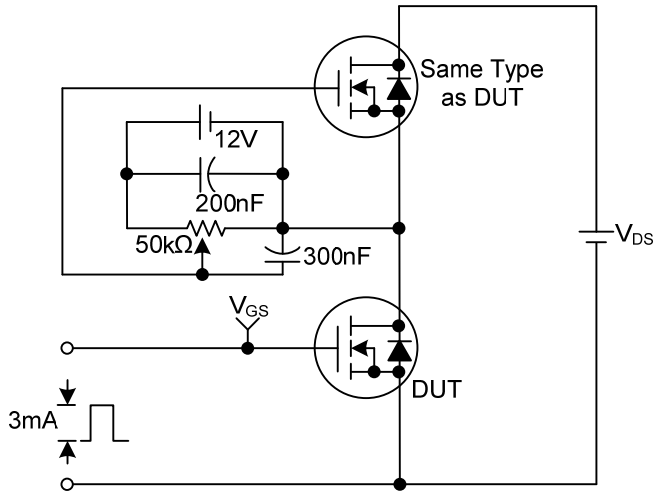




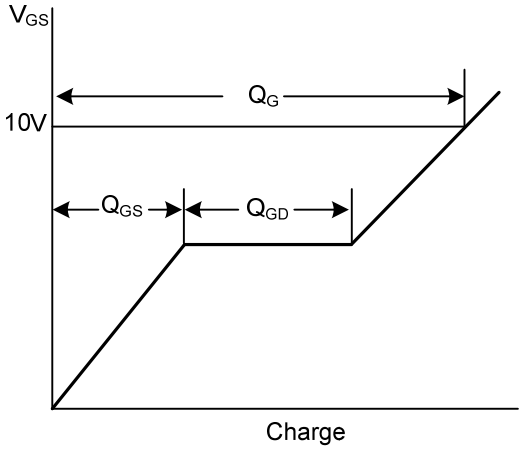


■ TEST CIRCUITS AND WAVEFORMS(Cont.)

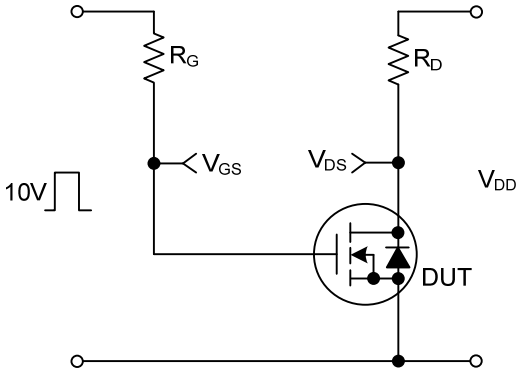
Gate Charge Test Circuit



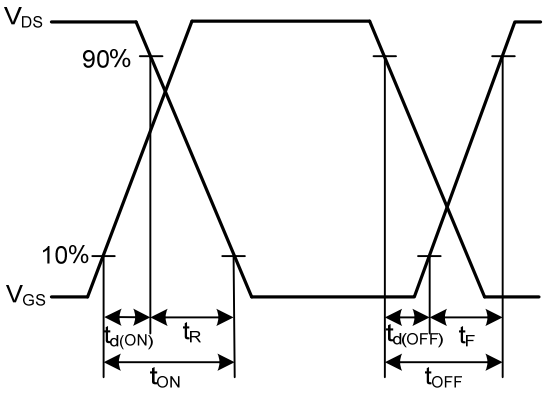
Gate Charge Waveforms



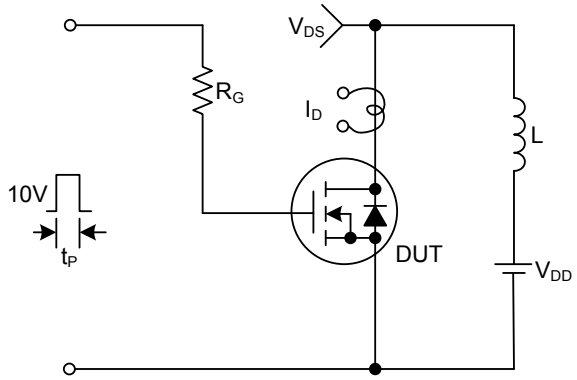
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$