



8NM60

Power MOSFET

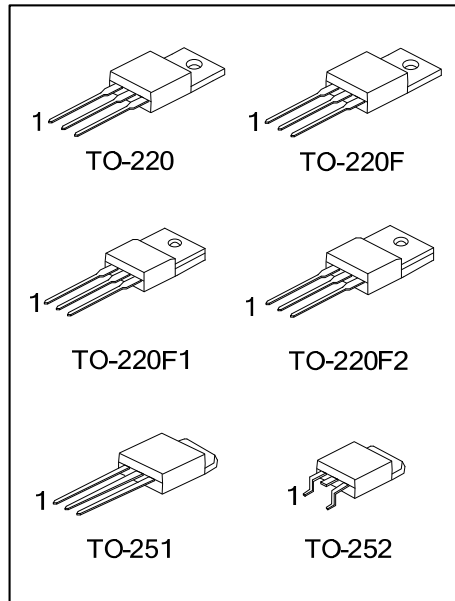
8.0A, 600V N-CHANNEL POWER MOSFET

DESCRIPTION

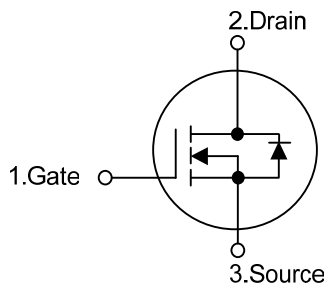
The UTC **8NM60** is a high voltage super junction MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

FEATURES

- * $R_{DS(ON)} \leq 0.75 \Omega$ @ $V_{GS}=10V, I_D=4.0A$
- * Fast Switching Capability
- * Avalanche Energy Tested
- * Improved dv/dt Capability, High Ruggedness



SYMBOL



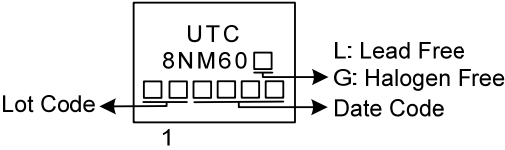
ORDERING INFORMATION

Order Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8NM60L-TA3-T	8NM60G-TA3-T	TO-220	G	D	S	Tube
8NM60L-TF1-T	8NM60G-TF1-T	TO-220F1	G	D	S	Tube
8NM60L-TF2-T	8NM60G-TF2-T	TO-220F2	G	D	S	Tube
8NM60L-TF3-T	8NM60G-TF3-T	TO-220F	G	D	S	Tube
8NM60L-TM3-T	8NM60G-TM3-T	TO-251	G	D	S	Tube
8NM60L-TN3-R	8NM60G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>8NM60G-TA3-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) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F, TM3: TO-251, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	8.0	A
	Pulsed (Note 2)	I_{DM}	32	A
Avalanche Current (Note 2)		I_{AR}	1.9	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	233	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.2	V/ns
Power Dissipation	TO-220	P_D	75	W
	TO-220F/TO-220F1		27	W
	TO-220F2			
	TO-251/TO-252		56	W
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. $L=144\text{mH}$, $I_{AS}=1.8\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD}\leq 8.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-251/TO-252			
Junction to Case	TO-220	θ_{JC}	1.66	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		4.6	$^\circ\text{C}/\text{W}$
	TO-220F2			
	TO-251/TO-252		2.23 (Note)	$^\circ\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

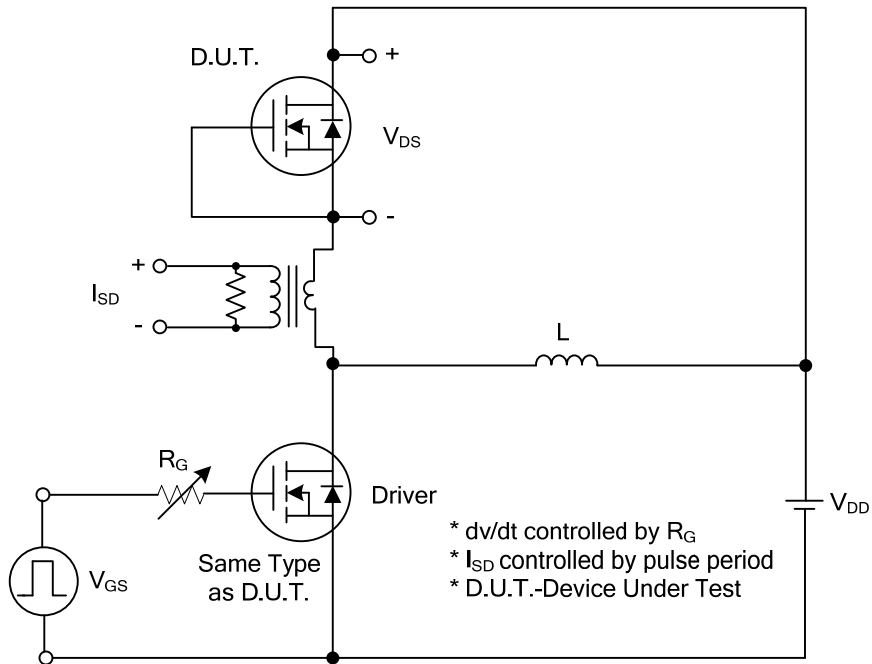
■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	600			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
	Reverse		$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 4.0A$			0.75	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{ MHz}$		462		pF
Output Capacitance		C_{OSS}			351		pF
Reverse Transfer Capacitance		C_{RSS}			33		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	$V_{DS}=480V, V_{GS}=10V, I_D=8.0A, I_G=1mA$ (Note 1, 2)		22		nC
Gate to Source Charge		Q_{GS}			6		nC
Gate to Drain Charge		Q_{GD}			7		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	$V_{DD}=100V, V_{GS}=10V, I_D=8.0A, R_G=25\Omega$ (Note 1, 2)		13		ns
Rise Time		t_R			21		ns
Turn-off Delay Time		$t_{D(OFF)}$			61		ns
Fall-Time		t_F			33		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Pulsed Current		I_S				8	A
Drain-Source Diode Forward Voltage (Note 1)		I_{SM}				32	A
Maximum Body-Diode Continuous Current		V_{SD}	$I_S=8.0A, V_{GS}=0V$			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	$I_S=8.0A, V_{GS}=0V$		285		ns
Reverse Recovery Charge		Q_{rr}	$di_f/dt=100A/\mu s$		6.6		μC

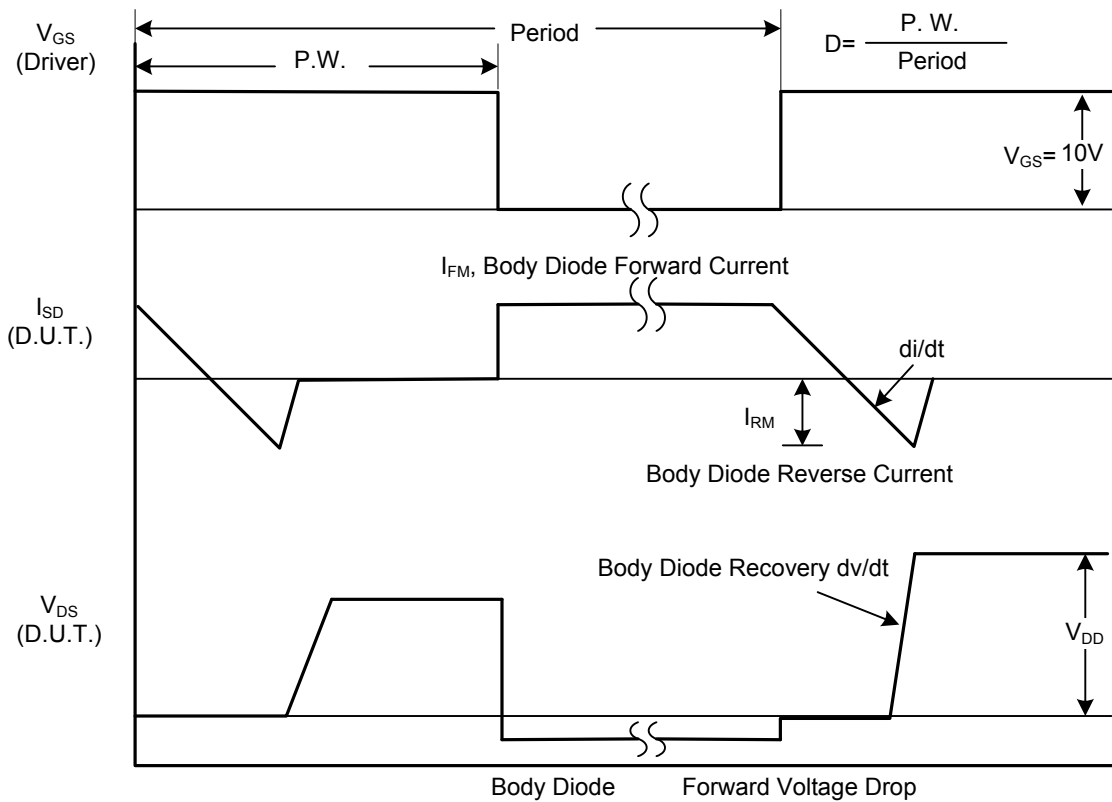
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

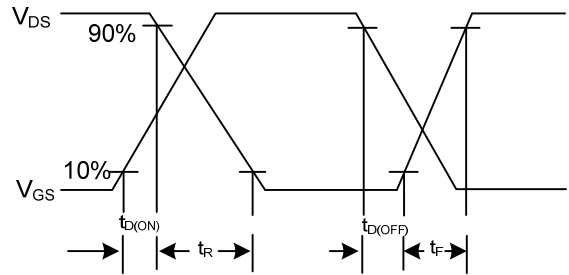
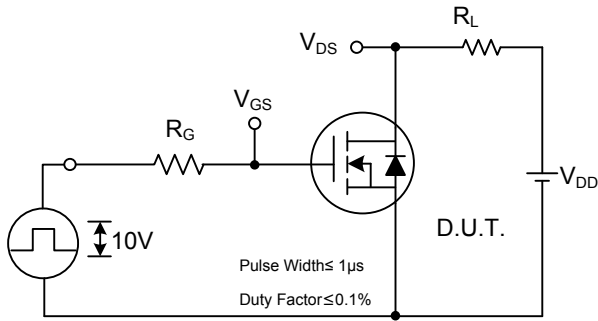


Peak Diode Recovery dv/dt Test Circuit



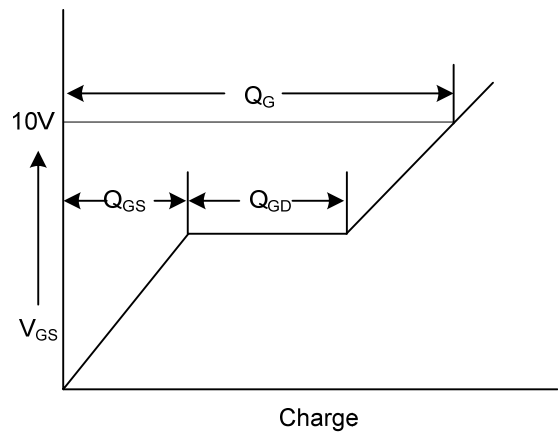
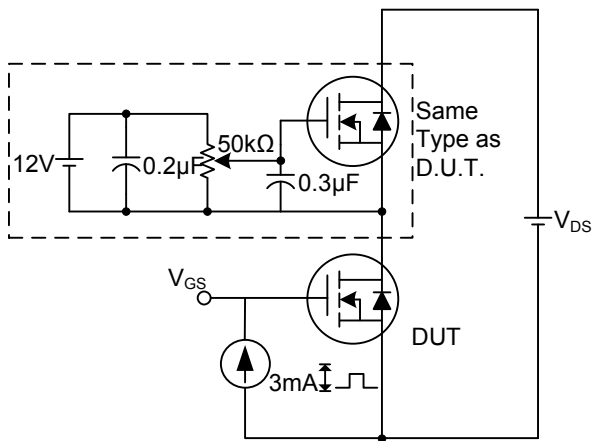
Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)



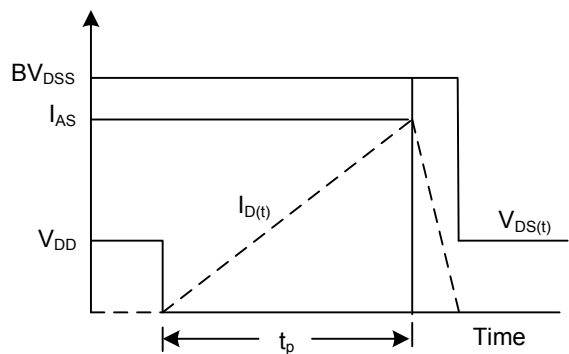
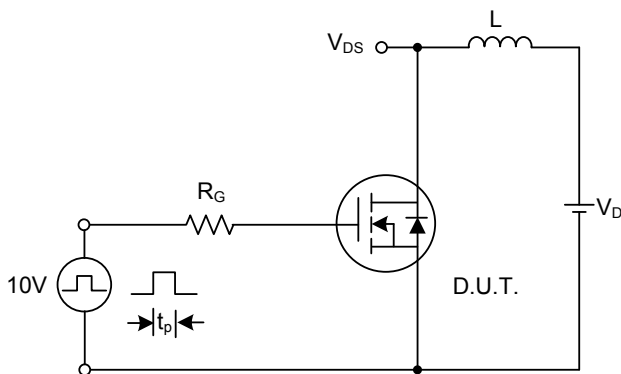
Switching Test Circuit

Switching Waveforms



Gate Charge Test Circuit

Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

Unclamped Inductive Switching Waveforms

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