

# UTC UNISONIC TECHNOLOGIES CO., LTD

8N60-E **Preliminary Power MOSFET** 

## 8A, 600V **N-CHANNEL POWER MOSFET**

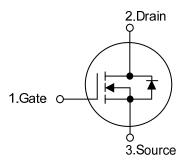
#### **DESCRIPTION**

The UTC 8N60-E is a high voltage and high current power MOSFET, 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 power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

#### **FEATURES**

- \*  $R_{DS(ON)}$  < 1.40@ $V_{GS}$  = 10 V
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

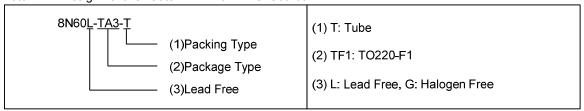




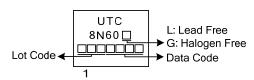
#### **ORDERING INFORMATION**

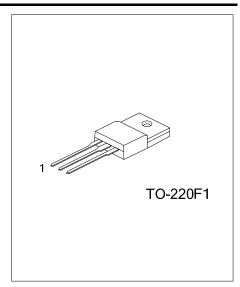
Ordering Number		Dookogo	Pin Assignment			Dooking	
Lead Free	Halogen Free	- Package	1	2	3	Packing	
8N60L-TF1-T	8N60G-TF1-T	TO-220F1	G	D	S	Tube	

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



### **MARKING**





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### ■ ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	600	V	
Gate-Source Voltage		$V_{GSS}$	±30	V	
Avalanche Current (Note 2)		I <sub>AR</sub>	8	Α	
Drain Current	Continuous	$I_{D}$	8	Α	
	Pulsed (Note 2)	I <sub>DM</sub>	32	Α	
Avalanche Energy	Single Pulsed (Note 3)	E <sub>AS</sub>	160	mJ	
	Repetitive (Note 2)	E <sub>AR</sub>	14.7	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns	
Power Dissipation		$P_{D}$	48	W	
Junction Temperature		TJ	+150	°C	
Operating Temperature		T <sub>OPR</sub>	-55 ~ +150	°C	
Storage Temperature		T <sub>STG</sub>	-55 ~ +150	°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  $T_{\text{J}}$
- 3. L = 5mH,  $I_{AS}$  = 8A,  $V_{DD}$  = 50V,  $R_{G}$  = 25  $\Omega$ , Starting  $T_{J}$  = 25°C
- 4.  $I_{SD} \le 7.5 A$ , di/dt  $\le 200 A/\mu s$ ,  $V_{DD} \le BV_{DSS}$ , Starting  $T_J = 25 ^{\circ}C$

#### **■ THERMAL DATA**

PARAMETER	SYMBOL	RATING	UNIT	
Junction to Ambient	$\theta_{JA}$	62.5	°C/W	
Junction to Case	$\theta_{ m JC}$	2.6	°C/W	

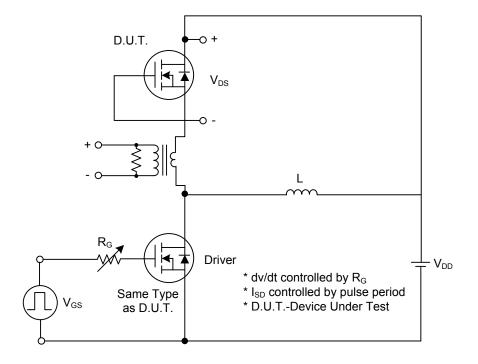
# ■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub> =25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						•	
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	$V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$	600			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> = 600 V, V <sub>GS</sub> = 0V			10	μA
Gate-Source Leakage Current	Forward		V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0V			100	nA
	Reverse	I <sub>GSS</sub>	$V_{GS} = -30 \text{ V}, V_{DS} = 0 \text{ V}$			-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_{J}$	I <sub>D</sub> =250μA, Referenced to 25°C		0.7		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	2.0		4.0	V
Static Drain-Source On-State Res	Static Drain-Source On-State Resistance		$V_{GS} = 10V, I_D = 4A$		1.1	1.4	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		$C_{ISS}$	\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		830	1400	pF
Output Capacitance		Coss	$V_{DS} = 25V, V_{GS} = 0V,$ f = 1MHz		125	180	pF
Reverse Transfer Capacitance		$C_{RSS}$	1 - 11011 12		10	21	pF
SWITCHING CHARACTERISTIC	S						
Turn-On Delay Time		$t_{D(ON)}$			50	80	ns
Turn-On Rise Time		$t_{R}$	$V_{DD} = 30V, I_D = 0.5A,$		80	170	ns
Turn-Off Delay Time		t <sub>D(OFF)</sub>	$R_G = 25\Omega \text{ (Note 1, 2)}$		125	140	ns
Turn-Off Fall Time		t <sub>F</sub>			60	130	ns
Total Gate Charge		$Q_G$	V <sub>DS</sub> = 50V,I <sub>D</sub> =1.3A,		26		nC
Gate-Source Charge		$Q_GS$	V <sub>GS</sub> = 10V (Note 1, 2)		8		nC
Gate-Drain Charge		$Q_GD$	VGS= 10V (Note 1, 2)		6.3		nC
DRAIN-SOURCE DIODE CHARA	CTERISTIC	CS AND MAXII	MUM RATINGS				
Drain-Source Diode Forward Voltage		$V_{SD}$	$V_{GS} = 0V$ , $I_S = 8A$			1.4	V
Maximum Continuous Drain-Source Diode						8	Α
Forward Current		I <sub>S</sub>				0	^
Maximum Pulsed Drain-Source Diode		I <sub>SM</sub>				32	Α
Forward Current						52	_^_
Reverse Recovery Time		t <sub>rr</sub>	$V_{GS} = 0V, I_{S} = 8A,$		365		ns
Reverse Recovery Charge		$Q_{RR}$	dI <sub>F</sub> /dt = 100 A/μs (Note 2)		3.4		μC

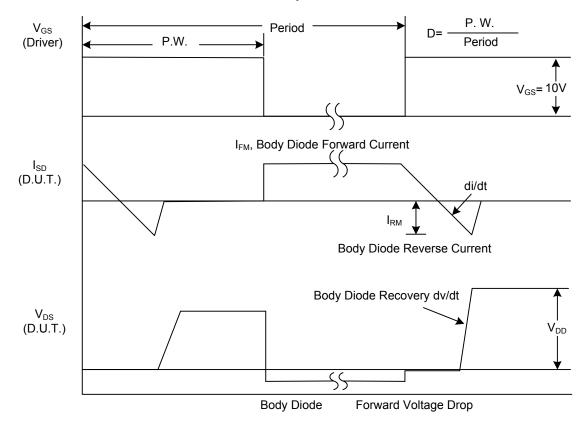
Notes: 1. Pulse Test: Pulse width ≤300µs, Duty cycle≤2%

<sup>2.</sup> Essentially independent of operating temperature

#### **■ TEST CIRCUITS AND WAVEFORMS**

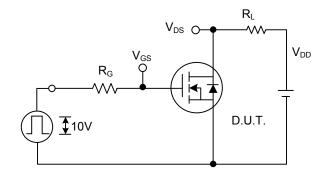


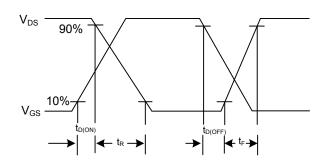
# Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

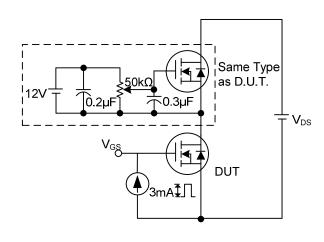
# ■ TEST CIRCUITS AND WAVEFORMS (Cont.)

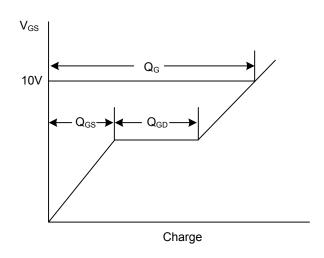




**Switching Test Circuit** 

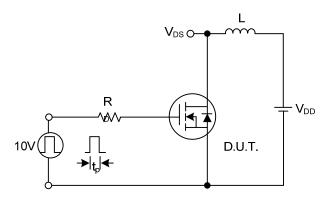
**Switching Waveforms** 

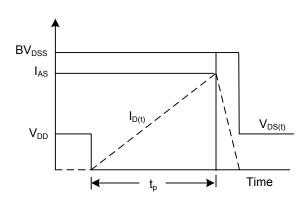




**Gate Charge Test Circuit** 

**Gate Charge Waveform** 





**Unclamped Inductive Switching Test Circuit** 

**Unclamped Inductive Switching Waveforms** 

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