

# UTC UNISONIC TECHNOLOGIES CO., LTD

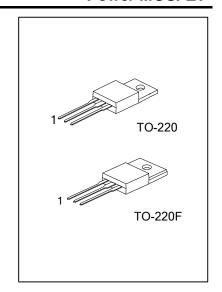
4N40 **Preliminary Power MOSFET** 

# 4A, 400V N-CHANNEL **POWER MOSFET**

#### **DESCRIPTION**

The UTC 4N40 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.

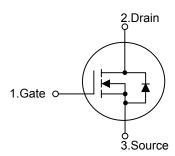
The UTC 4N40 is universally applied in electronic lamp ballast based on half bridge topology and high efficient switched mode power supply.



#### **FEATURES**

- \* High switching speed
- \*  $R_{DS(ON)}$ =1.5 $\Omega$  @  $V_{GS}$ =10V
- \* 100% avalanche tested

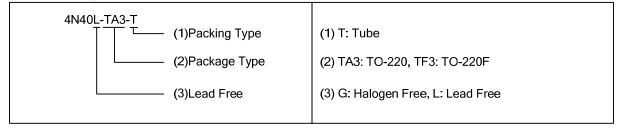
#### **SYMBOL**



#### **ORDERING INFORMATION**

Ordering Number		Dookogo	Pin	Dooking			
Lead Free	Halogen Free	Package	1	2	3	Packing	
4N40L-TA3-T	4N40G-TA3-T	TO-220	G	D	S	Tube	
4N40L-TF3-T	4N40G-TF3-T	TO-220F	G	D	S	Tube	

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



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

PARAM	METER	SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	400	V	
Gate-Source Voltage		$V_{GSS}$	±30	V	
Drain Current	Continuous (T <sub>C</sub> =25°C)	Ι <sub>D</sub>	4	Α	
Drain Current	Pulsed (Note 1)	I <sub>DM</sub>	8	Α	
Peak Diode Recovery dv	/dt (Note 3)	dv/dt	4.5	V/ns	
Dower Dissination	TO-220		60	W	
Power Dissipation	TO-220F	Б	27	W	
TO-220		$P_D$	0.48	W/°C	
Derate above 25°C	TO-220F		0.22	W/°C	
Junction Temperature		TJ	+150	°C	
Storage Temperature		T <sub>STG</sub>	-55~+150	°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		$\theta_{JA}$	62.5	°C/W	
lunction to Coop	TO-220	0	2.08	°C/W	
Junction to Case	TO-220F	$\theta_{ extsf{JC}}$	4.5	J C/VV	

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

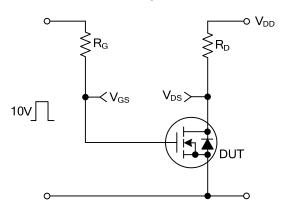
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
OFF CHARACTERISTICS									
Drain-Source Breakdown Voltage	е	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	400			V		
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V			1	μΑ		
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	$V_{GS}$ =+30V, $V_{DS}$ =0V			+100	nA		
Gate- Source Leakage Current	Reverse		$V_{GS}$ =-30V, $V_{DS}$ =0V			-100	nA		
ON CHARACTERISTICS									
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_{D}=250\mu A$ 2.0			4.0	V		
Static Drain-Source On-State Re	sistance	R <sub>DS(ON)</sub>	$V_{GS}$ =10V, $I_D$ =4A		1.2	1.5	Ω		
DYNAMIC PARAMETERS									
Input Capacitance		C <sub>ISS</sub>				750	pF		
Output Capacitance		Coss	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz			150	pF		
Reverse Transfer Capacitance		C <sub>RSS</sub>				100	pF		
SWITCHING PARAMETERS									
Turn-ON Delay Time		t <sub>D(ON)</sub>	$V_{DD}$ =200V, $I_{D}$ =4A, $R_{G}$ =25 $\Omega$ (Note 2, 3)		12	45	ns		
Rise Time		$t_R$			42	60	ns		
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			130	200	ns		
Fall-Time		$t_{F}$			62	100	ns		
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS									
Drain-Source Diode Forward Vol	tage	$V_{SD}$	I <sub>S</sub> =2A, V <sub>GS</sub> =0V			1.4	V		
Body Diode Reverse Recovery T	ime	t <sub>rr</sub>	$I_S$ =4A, $V_{GS}$ =0V, $dI_F/dt$ =100A/ $\mu$ s(Note 2)		800		ns		

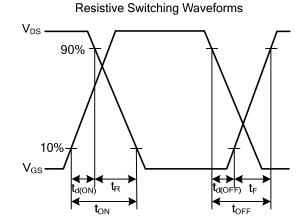
Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

- 2. Pulse Test: Pulse width  $\leq$  300 $\mu$ s, Duty cycle  $\leq$  2%
- 3. Essentially independent of operating temperature

# **■ TEST CIRCUITS AND WAVEFORMS**

Resistive Switching Test Circuit





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