UNISONIC TECHNOLOGIES CO., LTD

13N50 **Preliminary** Power MOSFET

500V N-CHANNEL MOSFET

DESCRIPTION

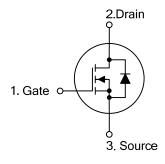
The UTC 13N50 is an N-Channel enhancement mode power MOSFET. The device adopts planar stripe and uses DMOS technology to minimize and provide lower on-state resistance and faster switching speed. It can also withstand high energy pulse under the avalanche and commutation mode conditions.

The UTC 13N50 is ideally suitable for high efficiency switch mode power supply, power factor correction, electronic lamp ballast based on half bridge topology.

FEATURES

- * $R_{DS(ON)} = 0.48\Omega @V_{GS} = 10 V$
- * Ultra low gate charge (typical 43 nC)
- * Low reverse transfer Capacitance (C_{RSS} = typical 20pF)
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

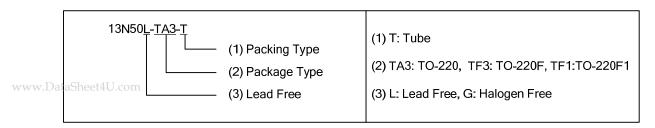
SYMBOL



TO-220 TO-220F TO-220F1

ORDERING INFORMATION

Ordering Number		Dookogo	Pin Assignment			Dooking	
Lead Free	Halogen Free	Package	1	2	3	Packing	
13N50L-TA3-T	13N50G-TA3-T	TO-220	G	D	S	Tube	
13N50L-TF3-T	13N50G-TF3-T	TO-220F	G	D	S	Tube	
13N50L- TF1-T	13N50G-TF1-T	TO-220F1	G	D	S	Tube	



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■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current		I_{D}	13	Α
Pulsed Drain Current (Note 2)		I_{DM}	52	Α
Avalanche Current (Note 2)		I _{AR}	13	Α
Single Pulsed Avalanche Energy (Note 3)		E _{AS}	810	mJ
Repetitive Avalanche Energy (Note 2)		E_{AR}	17	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation (T _C =25°C)	TO-220	Б	168	W
	TO-220F	P _D	48	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T _{STG}	-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 maximum junction temperature
 - 3. L = 9.3mA, I_{AS} = 13A, V_{DD} = 50V, R_{G} = 25 Ω , Starting T_J = 25 $^{\circ}$ C
 - 4. $I_{SD} \le 13.A$, di/dt $\le 200A/\mu s$, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25^{\circ}C$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	0	62.5	°C/W
	TO-220F	θ_{JA}	62.5	°C/W
Junction to Case	TO-220	0	0.74	°C/W
	TO-220F	θις	2.58	°C/W

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

2.2	0) (1.17.0)					
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	$V_{GS} = 0V, I_{D} = 250\mu A$	500			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 500V, V_{GS} = 0V$			1	μΑ
Gate-Source Leakage Current	I _{GSS}	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
Gate-Source Leakage Current		$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
Breakdown Voltage Temperature	$\triangle BV_{DSS}/\triangle T_{J}$	$I_D = 250 \mu A$		0.5		V/°C
Coefficient	ZDVDSS/ZIJ	Referenced to 25°C				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 Resistance	R _{DS(ON)}	$V_{GS} = 10V, I_D = 6.5A$		0.33	0.43	Ω
Forward Transconductance	g fs	V _{DS} =50V, I _D =6.25A (Note 1)		10		S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}			1800	2300	pF
Output Capacitance	Coss	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		245	320	pF
Reverse Transfer Capacitance	C_{RSS}			25	35	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$			40	90	nS
Turn-On Rise Time	t_R	$V_{DD} = 250V, I_D = 13A$		140	290	nS
w.Da Turn-Off Delay Time	$t_{D(OFF)}$	$R_G = 25\Omega$ (Note 1,2)		100	210	nS
Turn-Off Fall Time	t_{F}			85	180	nS
Total Gate Charge	Q_G	V =400V I =12A V =10 V		45	60	nC
Gate-Source Charge	Q_GS	V_{DS} =400V, I_D =13A, V_{GS} =10 V		11		nC
Gate-Drain Charge	Q_{GD}	(Note 1, 2)		22		nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS								
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_{S} = 13 A$			1.4	V		
Maximum Continuous Drain-Source	I _S				13	Α		
Diode Forward Current								
Maximum Pulsed Drain-Source Diode	I _{SM}				52	Α		
Forward Current	ISM				52			
Reverse Recovery Time	t _{RR}	V _{GS} = 0V, I _S = 13A,		290		nS		
Reverse Recovery Charge	Q_{RR}	dI _F / dt = 100A/µs (Note 1)		2.6		μC		

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

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^{2.} Essentially independent of operating ambient temperature

TEST CIRCUITS AND WAVEFORMS

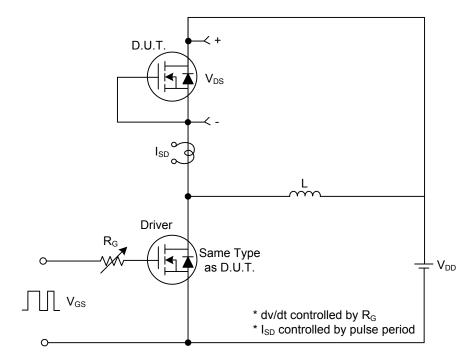


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

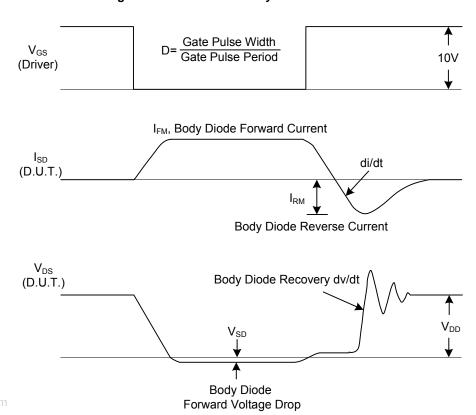
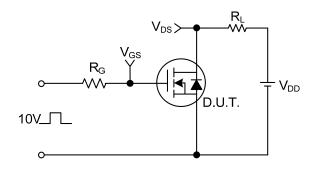


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)



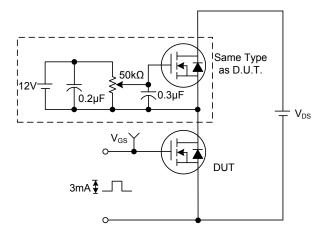
V_{DS} 90%

V_{GS} 10%

t_{D(ON)} t_R t_F t_F t_F t_F t_F t_{OFF)}

Fig. 2A Switching Test Circuit

Fig.2B Switching Waveforms



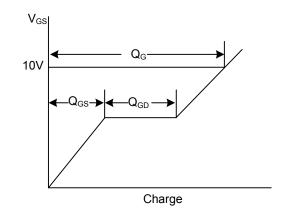
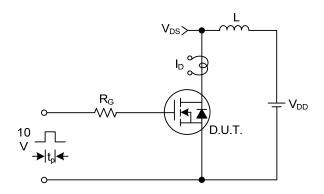
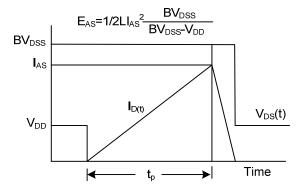


Fig. 3A Gate Charge Test Circuit

Fig. 3B Gate Charge Waveform





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Fig. 4B Unclamped Inductive Switching Waveforms

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