

# UNISONIC TECHNOLOGIES CO., LTD

### 12N90

Preliminary

## 12A, 900V N-CHANNEL POWER MOSFET

#### DESCRIPTION

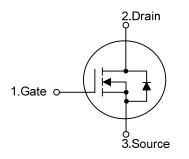
The UTC **12N90** is an N-channel enhancement mode power MOSFET useing UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **12N90** is universally applied in high efficiency switch mode power supply.

#### FEATURES

- \*  $R_{DS(on)} = 0.95\Omega @V_{GS} = 10 V$
- \* High switching speed
- \* 100% avalanche tested

#### SYMBOL

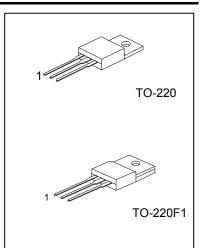


#### ORDERING INFORMATION

Ordering Number		Deekere	Pin Assignment			Decking	
Lead Free	Halogen Free	Package	1	2	3	Packing	
12N90L-TA3-T	12N90G-TA3-T	TO-220	G	D	S	Tube	
12N90L-TF1-T	12N90G-TF1-T	TO-220F1	G	D	S	Tube	

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

12N90L - <u>TA3</u> - T		
	(1) Packing Type	(1) T: Tube
	(2) Package Type	(2) TA3: TO-220, TF1: TO-220F1
	(3) Lead Free	(3) G: Halogen Free, L: Lead Free



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V <sub>DSS</sub>	900	V
Gate-Source Voltage		V <sub>GSS</sub>	±30	V
	Continuous (T <sub>C</sub> =25°C)	Ι <sub>D</sub>	12	А
Drain Current	Pulsed (Note 2) I <sub>DM</sub> 48	А		
Avalanche Current (Note 2)		I <sub>AR</sub>	12	А
Dewer Dissinction	TO-220	TO-220 PD 225   TO-220F1 51	225	W
Power Dissipation	TO-220F1		W	
Junction Temperature		TJ	+150	°C
Storage Temperature		T <sub>STG</sub>	-55~+150	°C

Note: 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

#### ■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ <sub>JA</sub> 62.5		°C/W
Junction to Case	TO-220	0	0.56	°C/W
	TO-220F1	θ <sub>JC</sub>	2.43	°C/W

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

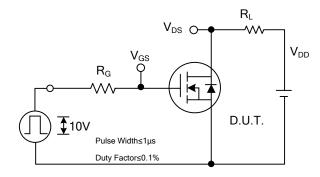
					r		
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						-	-
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	900			V
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS} / \triangle T_J$	I <sub>D</sub> =250μA, Referenced to 25°C		1.0		V/°C
Drain Source Leekage Current			V <sub>DS</sub> =900V, V <sub>GS</sub> =0V			10	μA
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =720V, T <sub>C</sub> =125°C			100	μΑ
Gate- Source Leakage Current	Forward		V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V			100	nA
	Reverse		$V_{GS}$ =-30V, $V_{DS}$ =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250µA	3.0		5.0	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =6A		0.8	0.95	Ω
DYNAMIC PARAMETERS					-		
Input Capacitance	nput Capacitance				4200		pF
Output Capacitance		C <sub>oss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		315		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			90		pF
SWITCHING PARAMETERS							
Total Gate Charge		$Q_{G}$			123	155	nC
Gate to Source Charge		$Q_{GS}$	V <sub>GS</sub> =10V, V <sub>DS</sub> =720V, I <sub>D</sub> =12A (Note 1, 2)		27	45	nC
Gate to Drain Charge		$Q_{GD}$			49	80	nC
Turn-ON Delay Time		t <sub>D(ON)</sub>			18	50	ns
Rise Time		t <sub>R</sub>	V <sub>DD</sub> =450V, I <sub>D</sub> =12A,		12	50	ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>	R <sub>G</sub> =25Ω (Note 1, 2)		51	100	ns
Fall-Time		t⊦			18	50	ns
SOURCE- DRAIN DIODE RATI	NGS AND CI	HARACTERIS	TICS				
Maximum Body-Diode Continuous Current		ls				12	Α
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>				48	А
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	I <sub>S</sub> =12A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time		t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =12A,		1000		ns
Body Diode Reverse Recovery Charge		Q <sub>RR</sub>	dl <sub>F</sub> /dt=100A/µs (Note 1)		17.0		μC
Note: 1 Pulse Test: Pulse width							

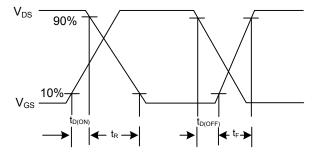
Note: 1. Pulse Test: Pulse width  $\leq$  300µs, Duty cycle  $\leq$  2%

2. Essentially independent of operating temperature



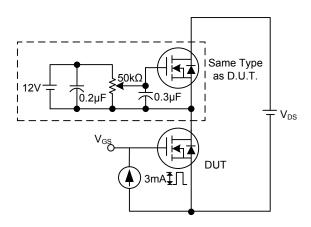
#### TEST CIRCUITS AND WAVEFORMS

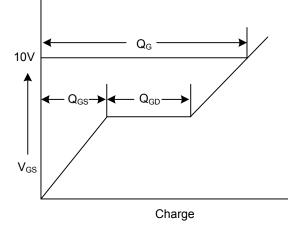




**Switching Test Circuit** 

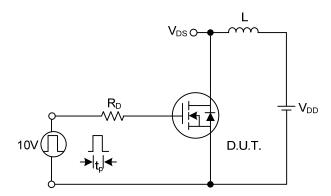






**Gate Charge Test Circuit** 

**Gate Charge Waveform** 



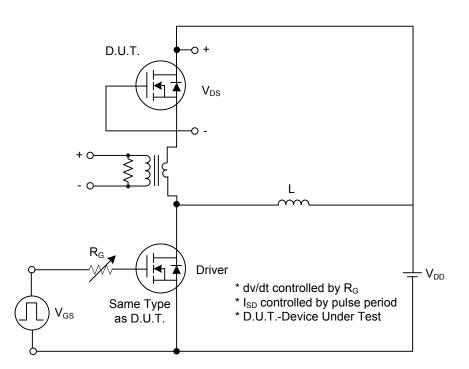
Unclamped Inductive Switching Test Circuit

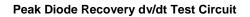
 $BV_{DSS}$   $I_{AS}$   $V_{DD}$   $I_{D(t)}$   $V_{DS(t)}$   $V_{DS(t)}$   $V_{DS(t)}$   $V_{DS(t)}$   $V_{DS(t)}$ 

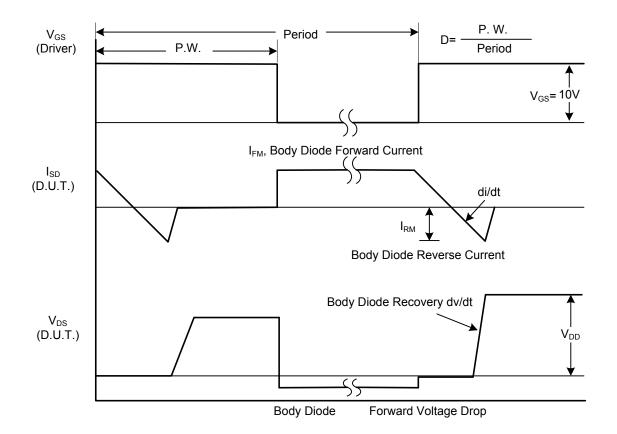
**Unclamped Inductive Switching Waveforms** 

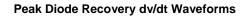


#### ■ TEST CIRCUITS AND WAVEFORMS(Cont.)











UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.

