

# **UTC** UNISONIC TECHNOLOGIES CO., LTD

## 9N90-H

# 9A, 900V N-CHANNEL POWER MOSFET

### DESCRIPTION

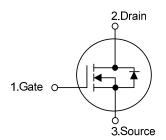
The UTC **9N90-H** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

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<sub>DS(ON)</sub> < 1.3 Ω @ V<sub>GS</sub>=10V, I<sub>D</sub>=4.5A
- \* Fast switching
- \* 100% avalanche tested
- \* Improved dv/dt capability

#### SYMBOL

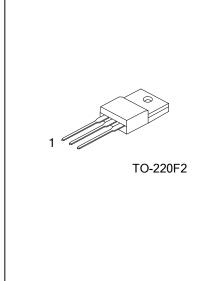


#### ORDERING INFORMATION

Ordering Number		Deekege	Pin Assignment			Decking	
Lead Free	Halogen Free	Package	1	2	3	Packing	
9N90L-TF2-T	9N90G-TF2-T	TO-220F2	G	D	S	Tube	
Note: Pin Assignment: G: Gate D: Drain S: Source							

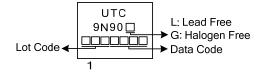
9N90L-TF2-T	(1)Packing Type (2)Package Type (3)Green Package	<ul> <li>(1) T: Tube</li> <li>(2) TF2: TO-220F2</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul>	
www.unisonic.com.tw	Tachnologias Co. Ltr	UTER FLYING LO	000 850

# **Power MOSFET**



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## MARKING





### 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
Drain Current	Continuous	ID	9	А
	Pulsed (Note 2)	I <sub>DM</sub>	36	А
Avalanche Energy	Single Pulsed (Note 3)	E <sub>AS</sub>	1597	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.6	V/ns
Power Dissipation		PD	58	W
Junction Temperature		TJ	+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 maximum junction temperature.

3. L = 79mH, I<sub>AS</sub> = 6.36A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25  $\Omega$  Starting T<sub>J</sub> = 25°C

4.  $I_{SD} \le 9.0A$ , di/dt  $\le 200A/\mu s$ ,  $V_{DD} \le BV_{DSS}$ , Starting  $T_J = 25^{\circ}C$ 

#### THERMAL DATA

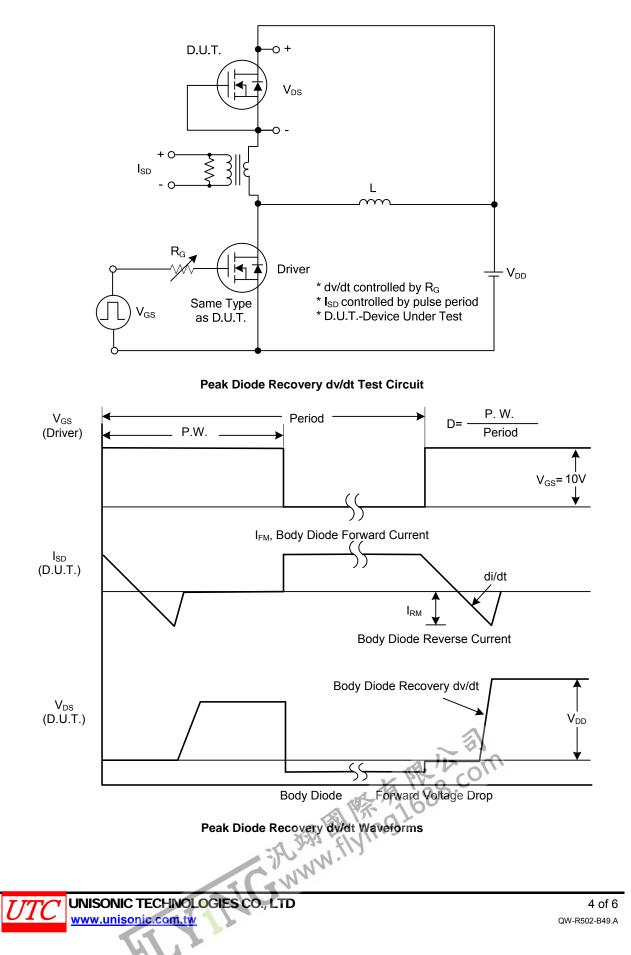
PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	°C/W
Junction to Case	θ <sub>JC</sub>	2.15	°C/W

#### ELECTRICAL CHARACTERISTICS(TJ = 25°C, unless otherwise specified)

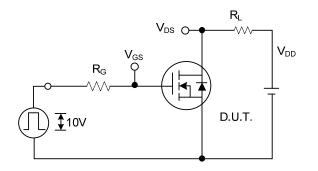
			1				
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> = 250µA	900			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =900V, V <sub>GS</sub> =0V			1	μA
Gate-Source Leakage Current	Forward		$V_{GS}$ =30V, $V_{DS}$ =0V			100	nA
	Reverse	I <sub>GSS</sub>	V <sub>GS</sub> =-30V, V <sub>DS</sub> =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			4.0	V
Static Drain-Source On-State Res	stance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =4.5A			1.3	Ω
DYNAMIC CHARACTERISTICS				_		_	
Input Capacitance	ut Capacitance				1912		рF
Output Capacitance		Coss	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0 MHz		257		рF
Reverse Transfer Capacitance		C <sub>RSS</sub>			50		рF
SWITCHING CHARACTERISTICS	5			_		_	
Total Gate Charge (Note 1)		$Q_{G}$	V <sub>DS</sub> =180V, V <sub>GS</sub> =10V, I <sub>D</sub> =9.0A,		67.5		nC
Gate to Source Charge		Q <sub>GS</sub>			19		nC
Gate to Drain Charge		$Q_{GD}$	-I <sub>G</sub> =1mA (Note 1, 2)		29		nC
Turn-ON Delay Time (Note 1)		t <sub>D(ON)</sub>			37		ns
Rise Time		t <sub>R</sub>	V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =9.0A, R <sub>G</sub> =25Ω (Note 1, 2)		97		ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			203		ns
Fall-Time		t⊨	0		62		ns
SOURCE- DRAIN DIODE RATING	GS AND CH	ARACTERIS	TICS				
Maximum Body-Diode Continuous Current		Is	A 112 C	2		9	Α
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>	AR CON	*		36	Α
Drain-Source Diode Forward Voltage (Note 1)		$V_{SD}$	I <sub>S</sub> =9.0A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t <sub>rr</sub>	I <sub>8</sub> =9.0A, V <sub>GS</sub> =0V,		685		ns
Body Diode Reverse Recovery Charge		Q <sub>rr</sub>	dl <sub>F</sub> /dt =100A/µs		9.36		μC
Notes: 1 Pulse Test · Pulse width		ty cycle $< 2\%$	1/1/1				

Notes: 1. Pulse Test : Pulse width  $\leq$  300µs, Duty cycle  $\leq$  2%. Essentially independent of operating temperature.

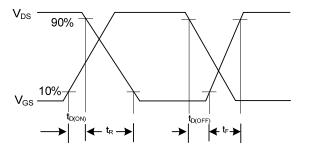
## TEST CIRCUITS AND WAVEFORMS



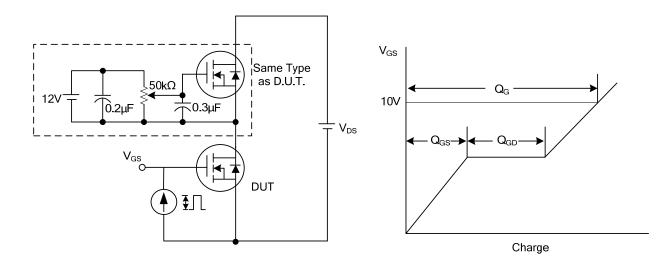
## ■ TEST CIRCUITS AND WAVEFORMS (Cont.)



**Switching Test Circuit** 

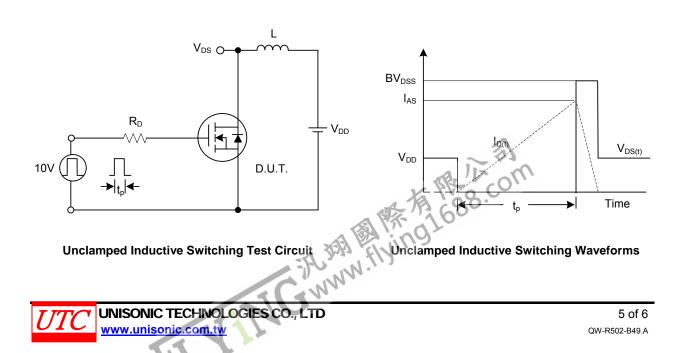


Switching Waveforms

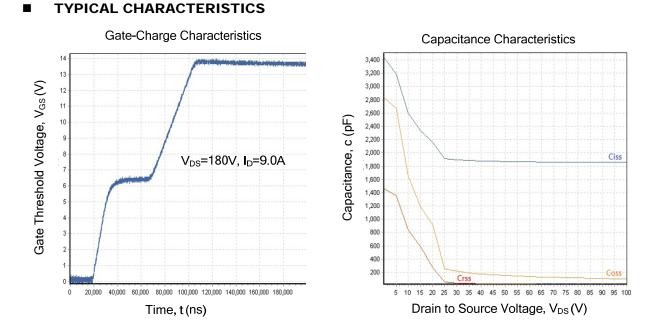


**Gate Charge Test Circuit** 

**Gate Charge Waveform** 



## **Power MOSFET**



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