



5A, 900V N-CHANNEL POWER MOSFET

DESCRIPTION

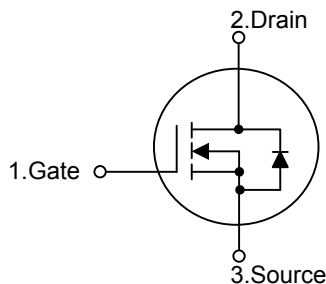
The UTC 5N90 is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC 5N90 is universally applied in high efficiency switch mode power supply.

FEATURES

- * $R_{DS(on)}=2.8\Omega$ @ $V_{GS}=10V$
- * High switching speed
- * Improved dv/dt capability
- * 100% avalanche tested

SYMBOL

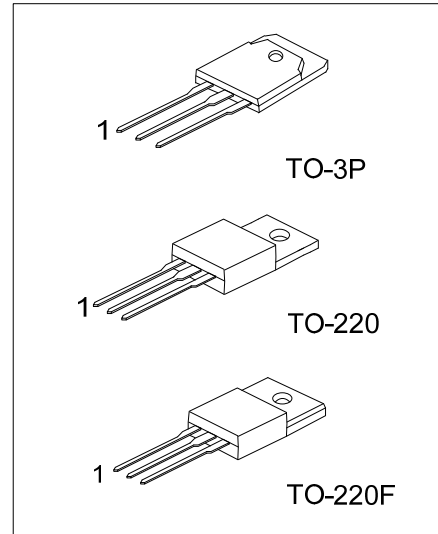


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
5N90L-TA3-T	5N90G-TA3-T	TO-220	G	D	S	Tube
5N90L-TF3-T	5N90G-TF3-T	TO-220F	G	D	S	Tube
5N90L-T3P-T	5N90G-T3P-T	TO-3P	G	D	S	Tube

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

5N90L-TA3-T (1) Packing Type (2) Package Type (3) Lead Free		(1) T: Tube (2) TA3: TO-220, TF3: TO-220F (3) G: Halogen Free, L: Lead Free
---	--	--



■ **ABSOLUTE MAXIMUM RATINGS** ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	900	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	5	A
	Pulsed (Note 2)	I_{DM}	12	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	660	mJ
	Repetitive (Note 2)	E_{AR}	5.1	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns
Power Dissipation	TO-220	P_D	125	W
	TO-220F		38	
	TO-3P		240	
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature		T_{STG}	-55~+150	$^{\circ}\text{C}$

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

3. $L=52.8\text{mH}$, $I_{AS}=5\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$

4. $I_{SD}\leq 5.4\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/ TO-220F	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-3P		40	
Junction to Case	TO-220	θ_{JC}	1	$^{\circ}\text{C}/\text{W}$
	TO-220F		3.25	
	TO-3P		0.52	

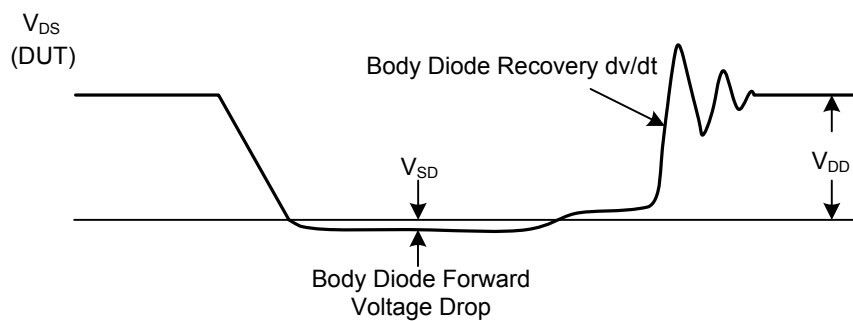
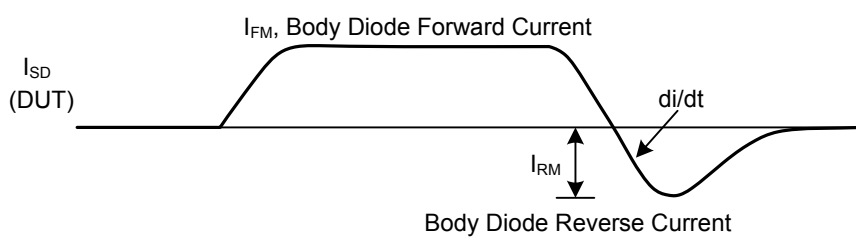
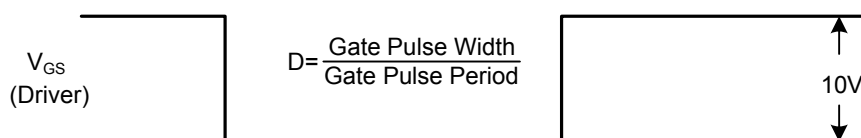
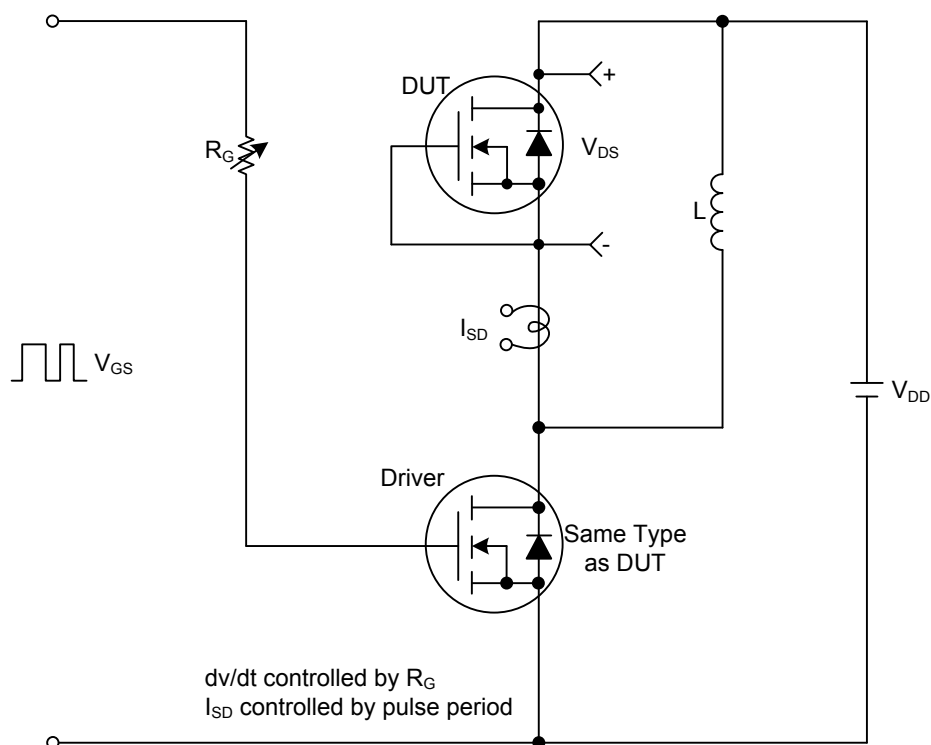
■ **ELECTRICAL CHARACTERISTICS** ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	900			V
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		1.0		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =900V, V _{GS} =0V			10	μA
			V _{DS} =720V, T _C =125°C			100	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{DS} =0V, V _{GS} =30V			100	nA
	Reverse		V _{DS} =0V, V _{GS} =-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =2.5A		2.25	2.8	Ω
Forward Transconductance		g _{FS}	V _{DS} =50V, I _D =2.5A (Note 1)		4.0		S
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		1200	1550	pF
Output Capacitance		C _{OSS}			110	145	pF
Reverse Transfer Capacitance		C _{RSS}			13	17	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =720V, V _{GS} =10V, I _D =5A (Note 1,2)		31	40	nC
Gate-Source Charge		Q _{GS}			7.2		nC
Gate-Drain Charge		Q _{GD}			15		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =450V, I _D =5A, R _G =25Ω (Note 1,2)		28	65	ns
Turn-ON Rise Time		t _R			65	140	ns
Turn-OFF Delay Time		t _{D(OFF)}			65	140	ns
Turn-OFF Fall Time		t _F			50	110	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				5	A
Maximum Body-Diode Pulsed Current		I _{SM}				12	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =5A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	V _{GS} =0V, I _S =5.4A,		610		ns
Body Diode Reverse Recovery Charge		Q _{RR}	dl _F /dt=100A/μs (Note 1)		5.26		μC

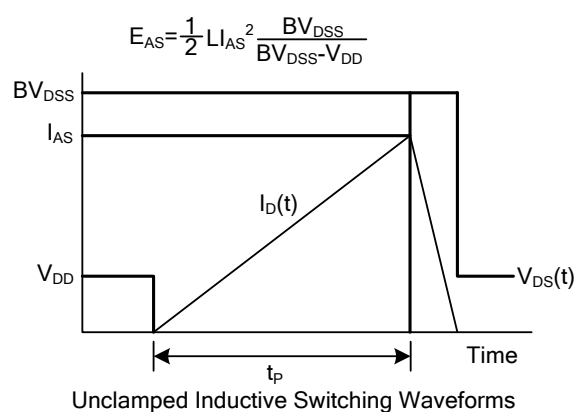
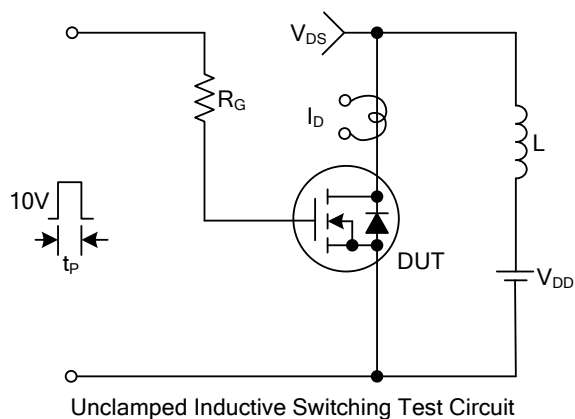
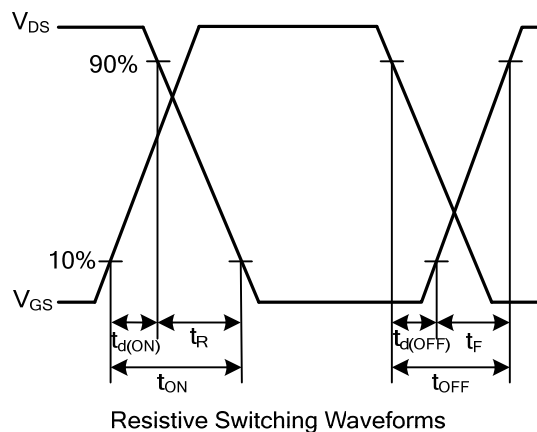
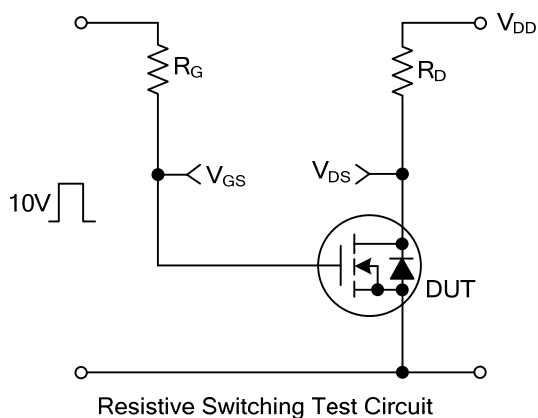
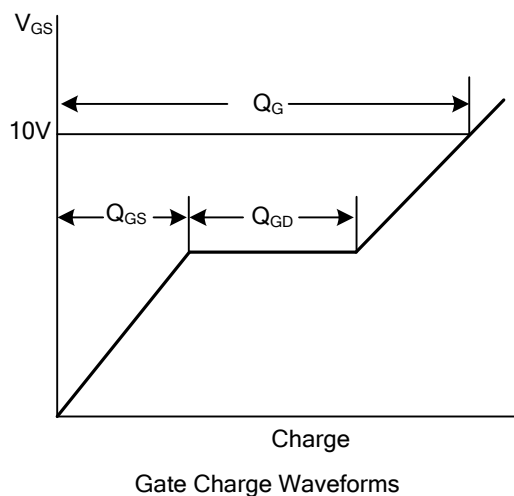
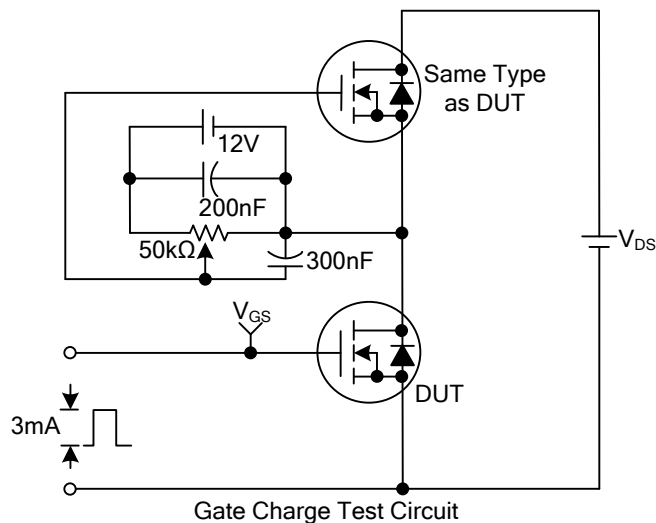
Note: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & 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.