



4N90

Power MOSFET

4 Amps, 900 Volts N-CHANNEL POWER MOSFET

DESCRIPTION

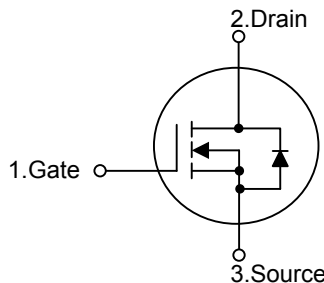
The UTC **4N90** is a N-channel enhancement MOSFET adopting UTC's advanced technology to provide customers with DMOS, planar stripe technology. This technology is designed to meet the requirements of the minimum on-state resistance and perfect switching performance. It also can withstand high energy pulse in the avalanche and communication mode.

The UTC **4N90** is particularly applied in high efficiency switch mode power supplies.

FEATURES

- * $V_{DS}=900V$
- * $I_D=4A$
- * $R_{DS(ON)}=4.2\Omega @ V_{GS}=10V$
- * Typically 17nC low gate charge
- * High switching speed
- * Typically 5.6pF low C_{RSS}
- * 100% avalanche tested
- * Improved dv/dt capability

SYMBOL

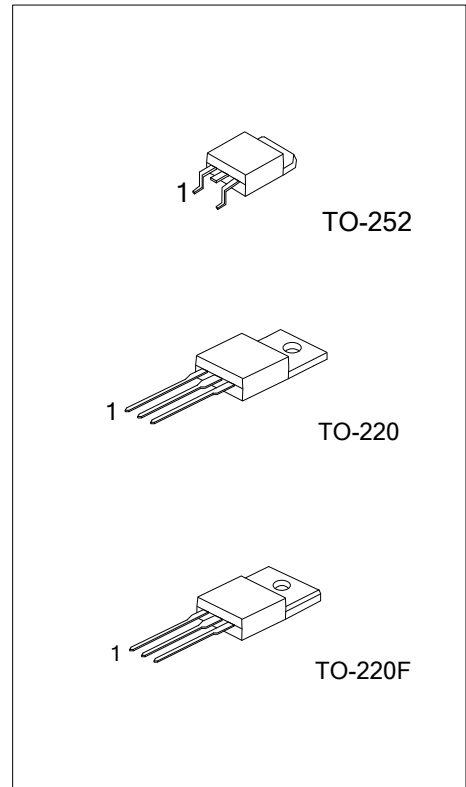


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N90L-TA3-T	4N90G-TA3-T	TO-220	G	D	S	Tube
4N90L-TF3-T	4N90G-TF3-T	TO-220F	G	D	S	Tube
4N90L-TN3-R	4N90G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>4N90L - TA3 - T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TN3: TO-252 (3) G: Halogen Free, L: Lead Free</p>
------------------------	---



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage		V_{DSS}	900	V
Gate to Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	4	A
Continuous Drain Current	Continuous	I_D	4	A
	Pulsed (Note 2)	I_{DM}	16	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	570	mJ
	Repetitive (Note 2)	E_{AR}	14	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation ($T_C=25^\circ\text{C}$)	TO-220	P_D	140	W
	TO-220F		38	
	TO-252		54	
Derate above 25°C	TO-220		1.12	$\text{W}/^\circ\text{C}$
	TO-220F		0.304	
	TO-252		0.43	
Operating 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. $L=67\text{mH}$, $I_{AS}=4\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

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

■ THERMAL DATA

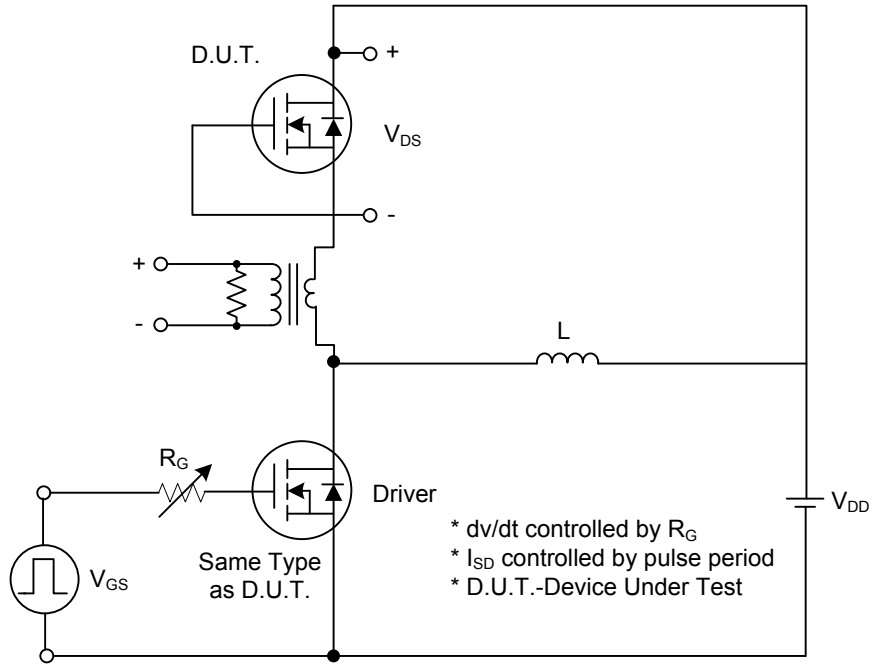
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-252		110	
Junction to Case	TO-220	θ_{JC}	0.89	$^\circ\text{C}/\text{W}$
	TO-220F		3.25	
	TO-252		2.3	

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

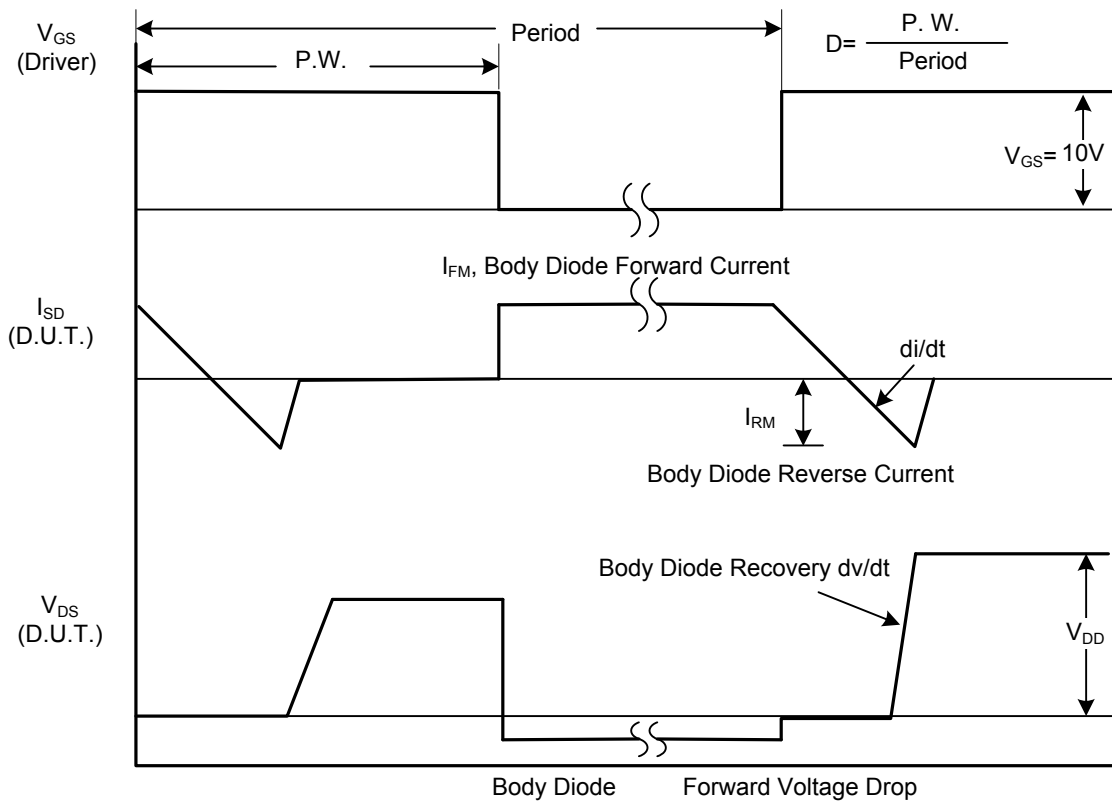
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	900			V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		1.05		V/°C
Drain-Source Leakage Current	I _{DSS}	V _{DS} =900V, V _{GS} =0V			10	μA
		V _{DS} =720V, T _C =125°C			100	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V, V _{DS} =0V		+100	nA
	Reverse	I _{GSS}	V _{GS} =-30V, V _{DS} =0V		-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 =2A		3.5	4.2	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		740	960	pF
Output Capacitance	C _{OSS}			65	85	pF
Reverse Transfer Capacitance	C _{RSS}			5.6	7.3	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =720V, V _{GS} =10V, I _D =4A (Note 1,2)		17	22	nC
Gate-Source Charge	Q _{GS}			4.5		nC
Gate-Drain Charge	Q _{GD}			7.5		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =450V, I _D =4A, R _G =25Ω (Note 1,2)		25	60	ns
Turn-ON Rise Time	t _R			50	110	ns
Turn-OFF Delay Time	t _{D(OFF)}			40	90	ns
Turn-OFF Fall Time	t _F			35	80	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				4	A
Maximum Body-Diode Pulsed Current	I _{SM}				16	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =4A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{RR}	V _{GS} =0V, I _S =4A,		450		ns
Body Diode Reverse Recovery Charge	Q _{RR}	di _F /dt=100A/μs (Note 1)		3.5		μC

Note : 1. Pulse Test : Pulse width≤300μs, Duty cycle≤2%
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

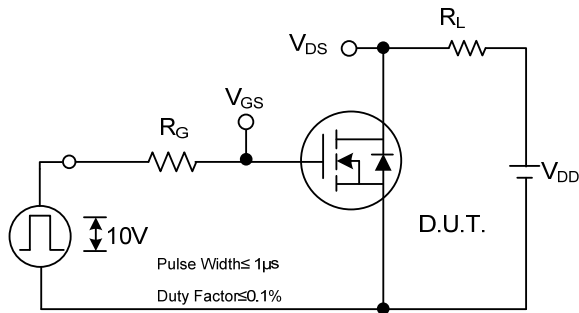


Peak Diode Recovery dv/dt Test Circuit

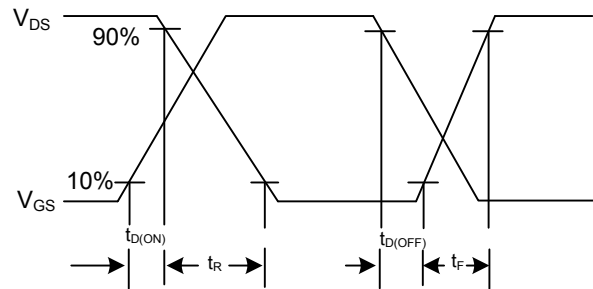


Peak Diode Recovery dv/dt Waveforms

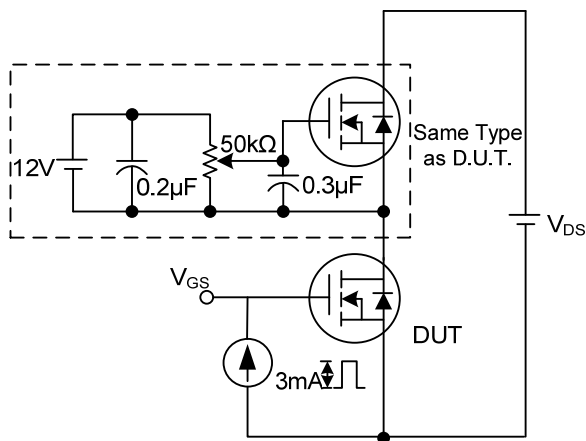
TEST CIRCUITS AND WAVEFORMS (Cont.)



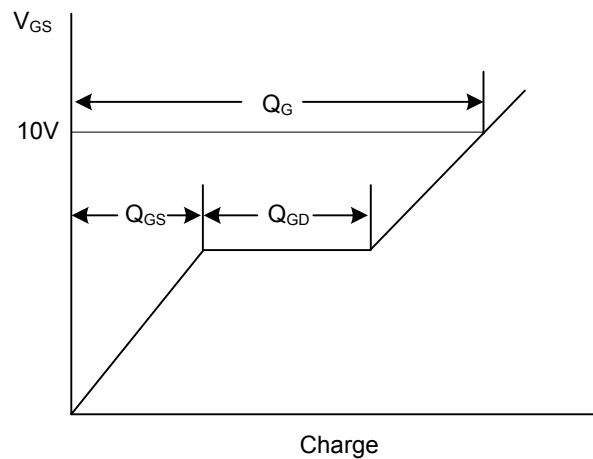
Switching Test Circuit



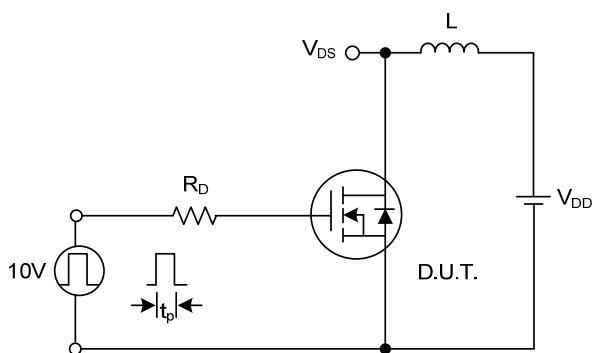
Switching Waveforms



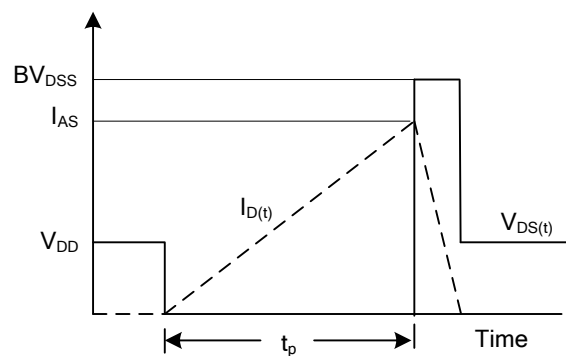
Gate Charge Test Circuit



Gate Charge Waveform

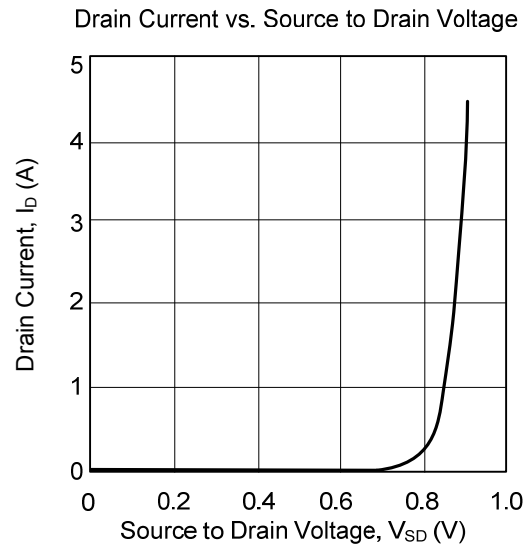
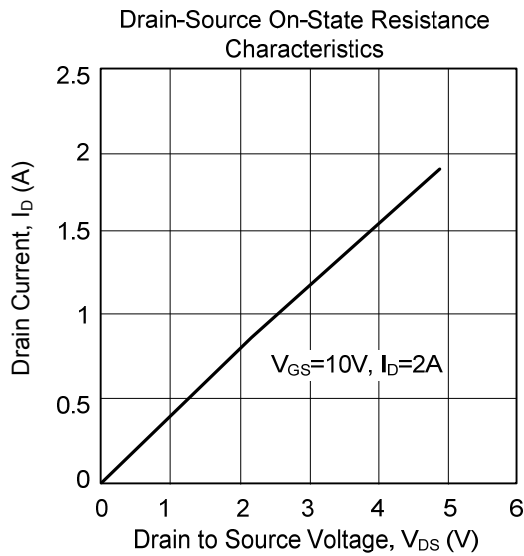
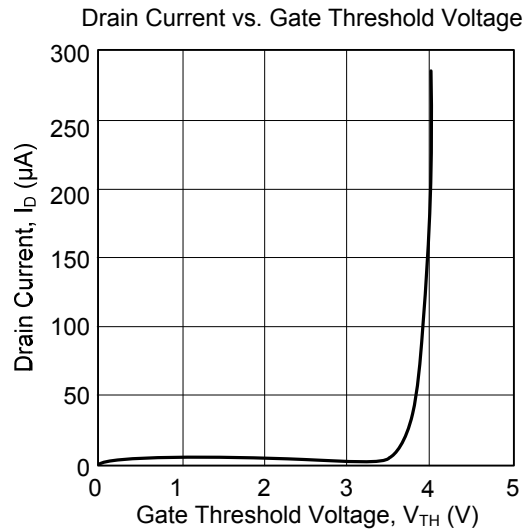
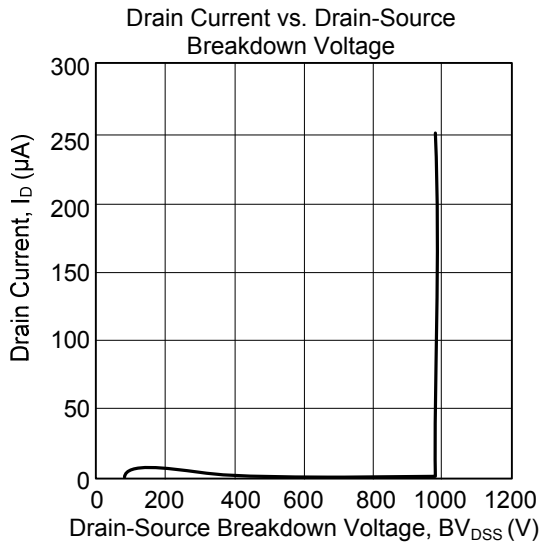


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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.