



7N90

Power MOSFET

7A, 900V N-CHANNEL POWER MOSFET

DESCRIPTION

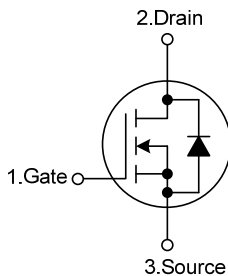
The UTC **7N90** is an N-channel mode power MOSFET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology specializes in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **7N90** is universally applied in active power factor correction, electronic lamp ballast based on half bridge topology and high efficient switched mode power supply.

FEATURES

- * High switching speed
- * $R_{DS(ON)}=1.8\Omega @ V_{GS}=10V$
- * Typically 40nC low gate charge
- * 100% avalanche tested
- * Typically 17pF low C_{RSS}
- * Improved dv/dt capability

SYMBOL

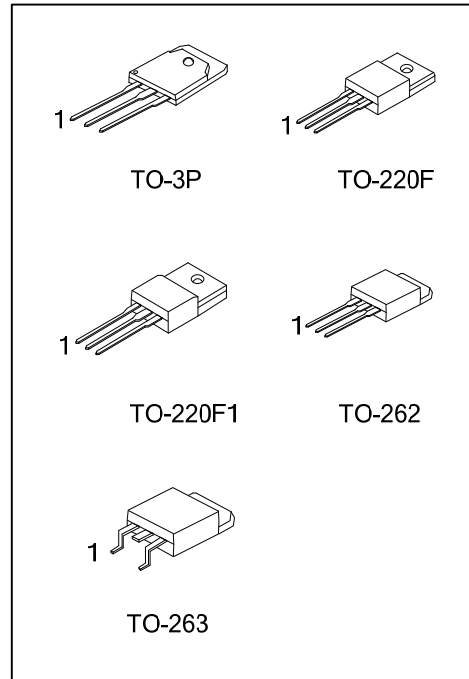


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N90L-T3P-T	7N90G-T3P-T	TO-3P	G	D	S	Tube
7N90L-TF1-T	7N90G-TF1-T	TO-220F1	G	D	S	Tube
7N90L-TF3-T	7N90G-TF3-T	TO-220F	G	D	S	Tube
7N90L-T2Q-T	7N90G-T2Q-T	TO-262	G	D	S	Tube
7N90L-TQ2-T	7N90G-TQ2-T	TO-263	G	D	S	Tube
7N90L-TQ2-R	7N90G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>7N90L-T3P-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Free</p>	<p>(1) T: Tube</p> <p>(2) T3P: TO-3P, TF1: TO-220F1, TF3: TO-220F</p> <p>T2Q: TO-262</p> <p>(3) L: Lead Free, G: Halogen Free</p>
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■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage		V_{DSS}	900	V
Gate to Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current	$T_C=25^\circ\text{C}$	I_D	7.0	A
	$T_C=100^\circ\text{C}$		4.4	A
Pulsed Drain Current (Note 2)		I_{DM}	28	A
Avalanche Current (Note 2)		I_{AR}	6.4	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	500	mJ
Repetitive Avalanche Energy (Note 2)		E_{AR}	21	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns
Power Dissipation	TO-3P	P_D	240	W
	TO-220F/TO-220F1		52	
	TO-262/TO-263		180	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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. $L=20\text{mH}$, $I_{AS}=7.0\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD}\leq 7.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-3P	θ_{JA}	40	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		62.5	
	TO-262/TO-263			
Junction to Case	TO-3P	θ_{JC}	0.52	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		2.4	
	TO-262/TO-263		0.69	

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

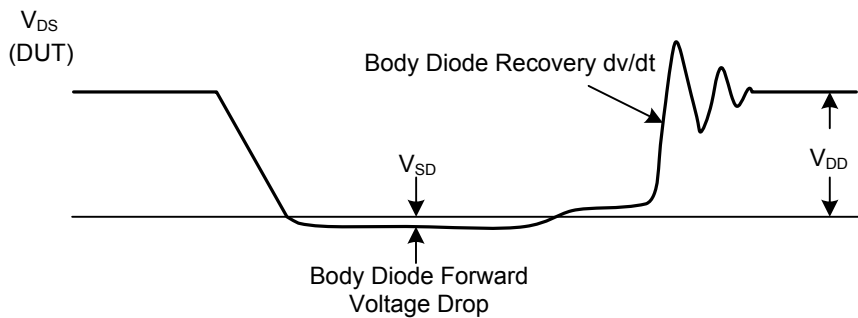
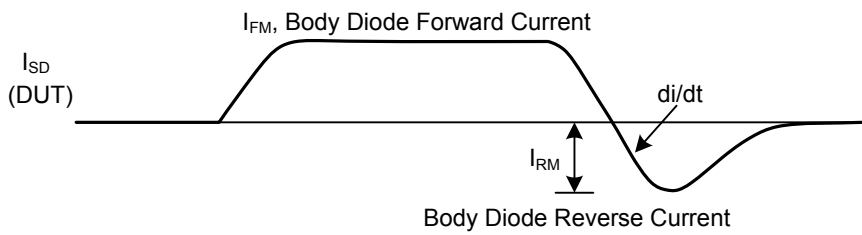
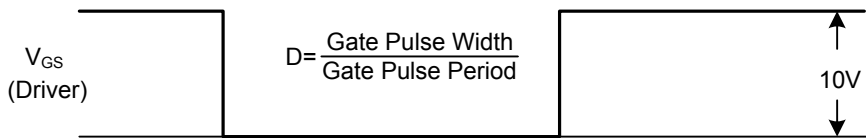
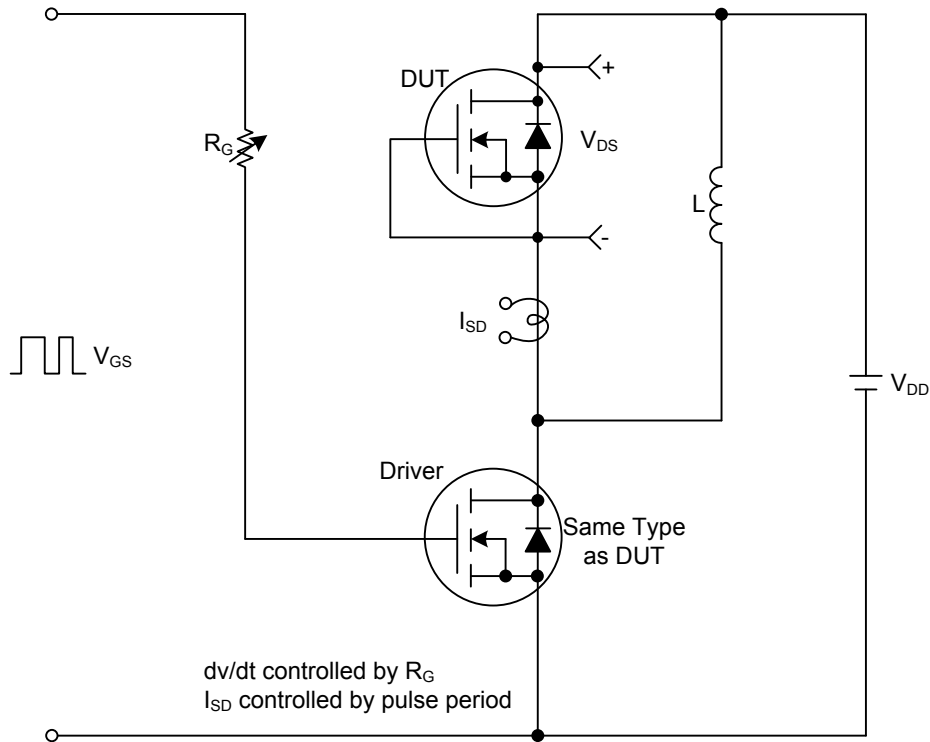
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	900			V	
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		0.96		V/°C	
Drain-Source Leakage Current	I _{DSS}	V _{DS} =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	I _{GSS}	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 =3.5A		1.5	1.8	Ω	
Forward Transconductance	g _{FS}	V _{DS} =50V, I _D =3.5A (Note 4)		5.7		S	
DYNAMIC PARAMETERS							
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		1440	1880	pF	
Output Capacitance	C _{OSS}			140	185	pF	
Reverse Transfer Capacitance	C _{RSS}			17	23	pF	
SWITCHING PARAMETERS							
Total Gate Charge	Q _G	V _{DS} =720V, V _{GS} =10V, I _D =7.0A (Note 4,5)		40	52	nC	
Gate-Source Charge	Q _{GS}			8.5		nC	
Gate-Drain Charge	Q _{GD}			20		nC	
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =450V, I _D =7.0A, R _G =25Ω (Note 4.,5)		35	80	ns	
Turn-ON Rise Time	t _R			80	170	ns	
Turn-OFF Delay Time	t _{D(OFF)}			95	200	ns	
Turn-OFF Fall Time	t _F			55	120	ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current	I _S				6.4	A	
Maximum Body-Diode Pulsed Current	I _{SM}				25.6	A	
Drain-Source Diode Forward Voltage	V _{SD}	I _S =7.0A, V _{GS} =0V			1.4	V	
Body Diode Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _S =7.0A,		400		ns	
Body Diode Reverse Recovery Charge	Q _{RR}	dI _F /dt=100A/μs (Note 4)		4.3		μC	

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

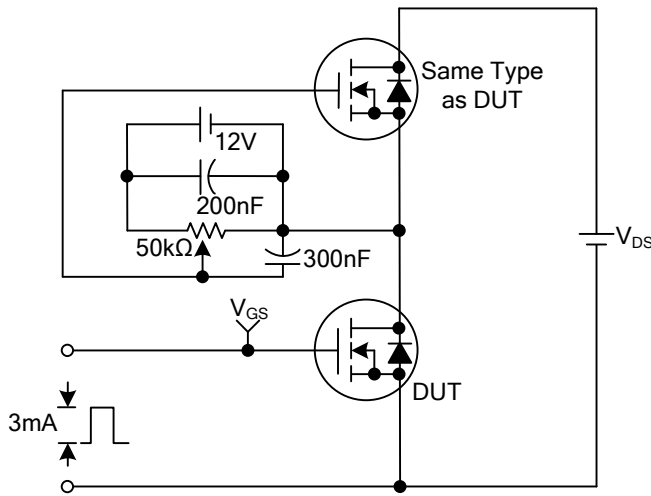
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

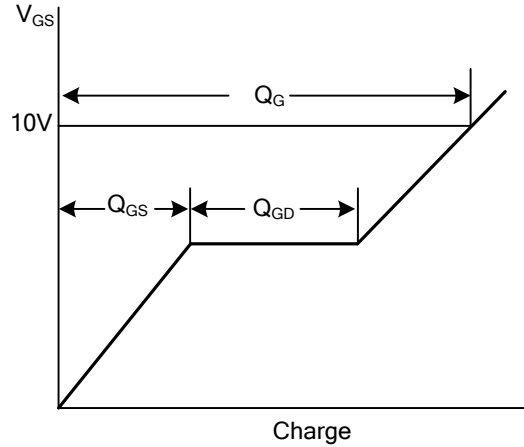
Peak Diode Recovery dv/dt Test Circuit & Waveforms



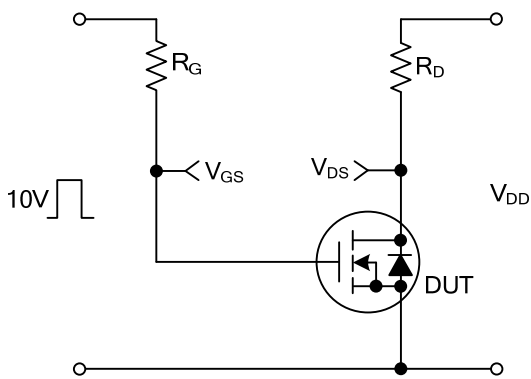
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



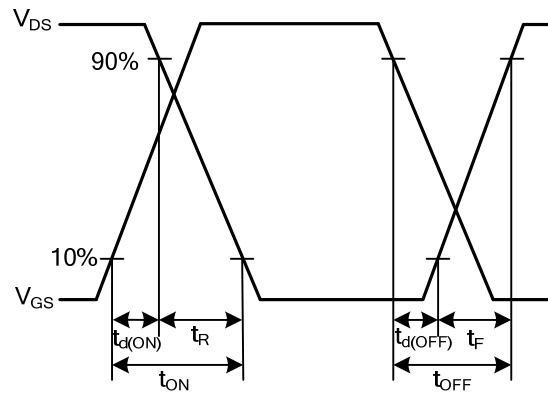
Gate Charge Test Circuit



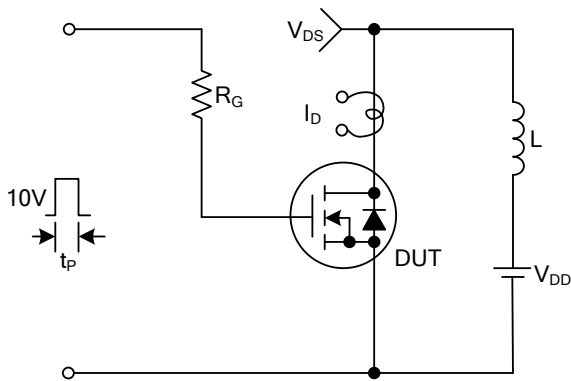
Gate Charge Waveforms



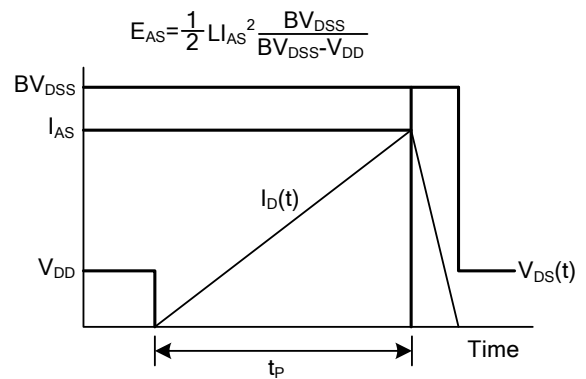
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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