



# 11N90

*Power MOSFET*

## 11A, 900V N-CHANNEL POWER MOSFET

### DESCRIPTION

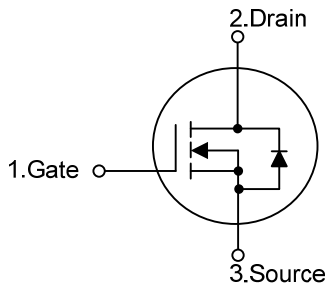
The UTC **11N90** is a N-channel enhancement mode Power FET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology specializes in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **11N90** is universally applied in high efficiency switch mode power supply,

### FEATURES

- \*  $R_{DS(on)} \leq 1.1 \Omega @ V_{GS}=10V, I_D=5.5A$
- \* High switching speed
- \* Improved dv/dt capability
- \* 100% avalanche tested

### SYMBOL

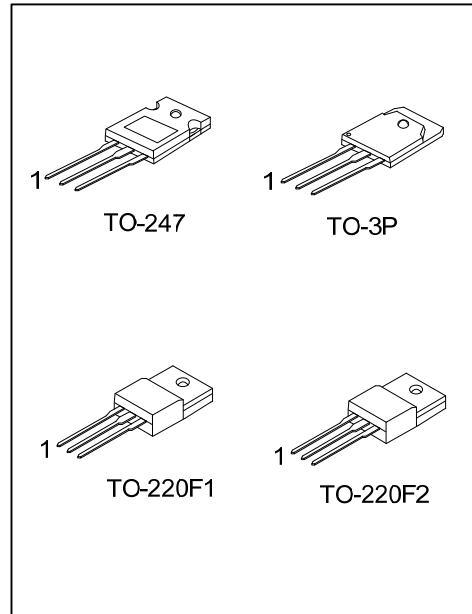


### ORDERING INFORMATION

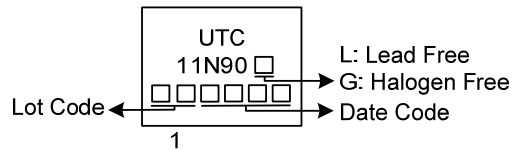
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
11N90L-TF1-T	11N90G-TF1-T	TO-220F1	G	D	S	Tube
11N90L-TF2-T	11N90G-TF2-T	TO-220F2	G	D	S	Tube
11N90L-T47-T	11N90G-T47-T	TO-247	G	D	S	Tube
11N90L-T3P-T	11N90G-T3P-T	TO-3P	G	D	S	Tube

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

<p>11N90G-TF1-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube (2) TF1: TO-220F1, TF2: TO-220F2, T47: TO-247 T3P: TO-3P (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



■ 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		$V_{GSS}$	$\pm 30$	V
Drain Current	Continuous	$I_D$	11	A
	Pulsed (Note 1)	$I_{DM}$	44	A
Avalanche Energy	Single Pulsed (Note 2)	$E_{AS}$	1000	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.0	V/ns
Power Dissipation	TO-220F1/TO-220F2	$P_D$	50	W
	TO-3P		215	W
	TO-247		190	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Note: 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.

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1/TO-220F2	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
	TO-3P		40	$^\circ\text{C/W}$
	TO-247		50	$^\circ\text{C/W}$
Junction to Case	TO-220F1/TO-220F2	$\theta_{JC}$	2.48	$^\circ\text{C/W}$
	TO-3P		0.58	$^\circ\text{C/W}$
	TO-247		0.65	$^\circ\text{C/W}$

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
<b>OFF CHARACTERISTICS</b>								
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	900			V		
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$ , Referenced to $25^\circ\text{C}$		1.0		$\text{V}/^\circ\text{C}$		
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=900\text{V}$ , $V_{GS}=0\text{V}$			10	$\mu\text{A}$		
		$V_{DS}=720\text{V}$ , $T_C=125^\circ\text{C}$			100			
Gate- Source Leakage Current	Forward	$I_{GSS}$				nA		
	Reverse						$V_{GS}=+30\text{V}$ , $V_{DS}=0\text{V}$	100
						$V_{GS}=-30\text{V}$ , $V_{DS}=0\text{V}$	-100	nA
<b>ON CHARACTERISTICS</b>								
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	3.0		5.0	V		
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=5.5\text{A}$		0.91	1.1	$\Omega$		
<b>DYNAMIC PARAMETERS</b>								
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		980	1380	pF		
Output Capacitance	$C_{OSS}$			170	280	pF		
Reverse Transfer Capacitance	$C_{RSS}$			18	25	pF		
<b>SWITCHING PARAMETERS</b>								
Total Gate Charge	$Q_G$	$V_{GS}=10\text{V}$ , $V_{DS}=50\text{V}$ , $I_D=1.3\text{A}$ (Note 4, 5)		60	80	nC		
Gate to Source Charge	$Q_{GS}$			14		nC		
Gate to Drain Charge	$Q_{GD}$			22		nC		
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30\text{V}$ , $I_D=0.5\text{A}$ , $R_G=25\Omega$ (Note 4, 5)		125	140	ns		
Rise Time	$t_R$			260	320	ns		
Turn-OFF Delay Time	$t_{D(OFF)}$			340	380	ns		
Fall-Time	$t_F$			220	270	ns		
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>								
Maximum Body-Diode Continuous Current	$I_S$				11	A		
Maximum Body-Diode Pulsed Current (Note1)	$I_{SM}$				44	A		
Drain-Source Diode Forward Voltage (Note 4)	$V_{SD}$	$I_S=11\text{A}$ , $V_{GS}=0\text{V}$			1.4	V		

Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2.  $L = 15\text{mH}$ ,  $I_{AS} = 11\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

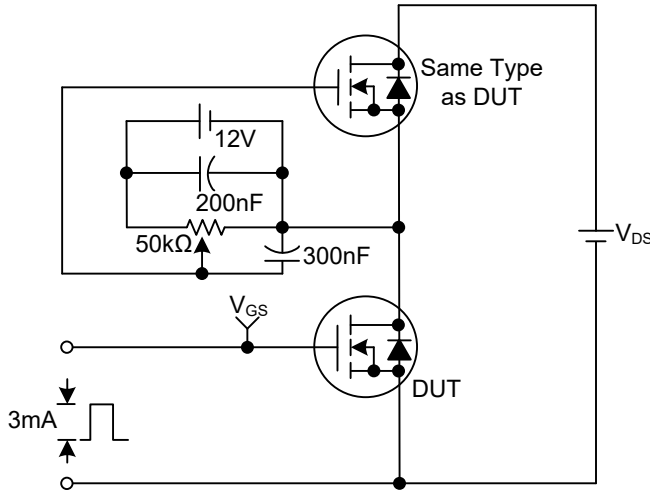
3.  $I_{SD} \leq 11.0\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

4. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

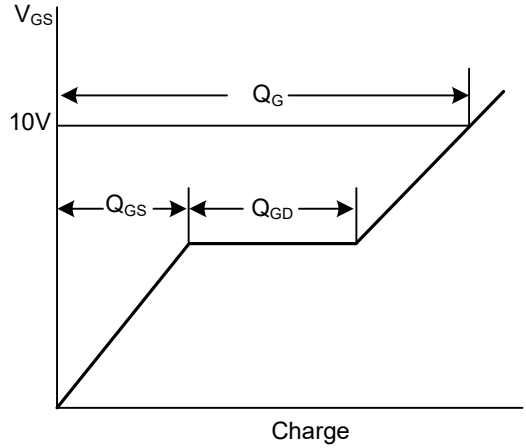
5. Essentially independent of operating temperature

## TEST CIRCUITS AND WAVEFORMS

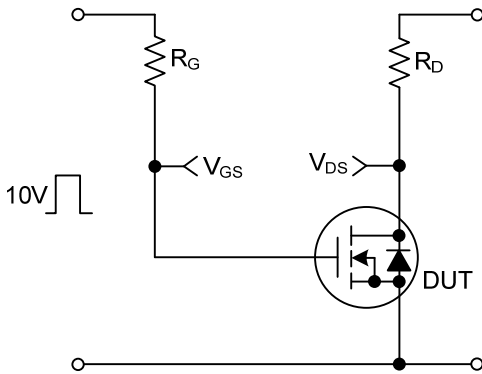
Gate Charge Test Circuit



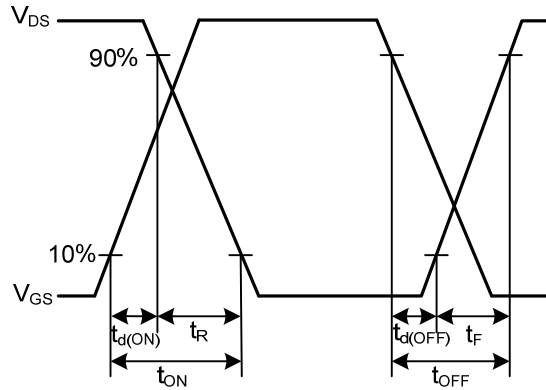
Gate Charge Waveforms



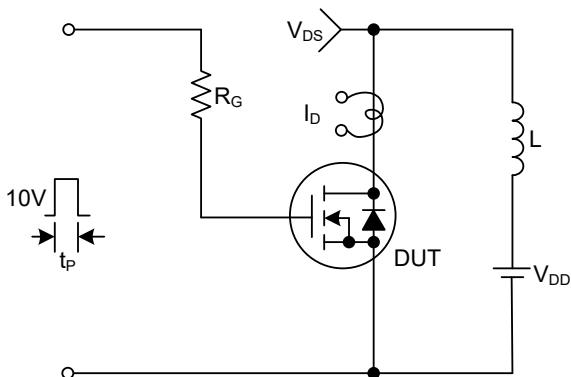
Resistive Switching Test Circuit



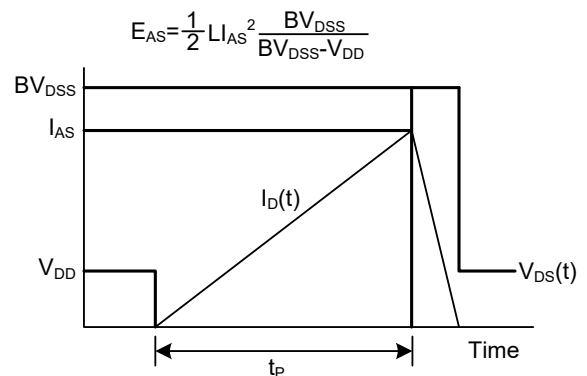
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

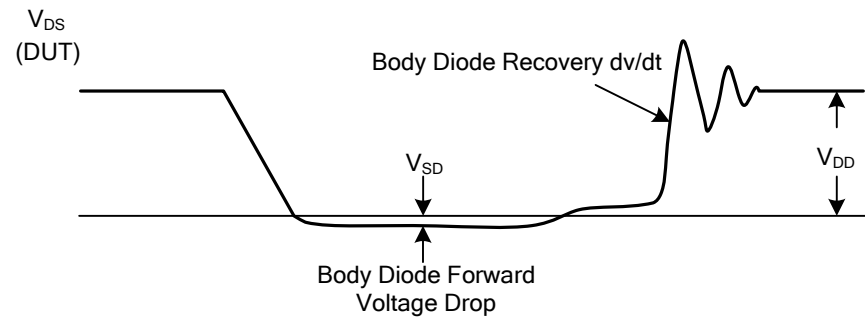
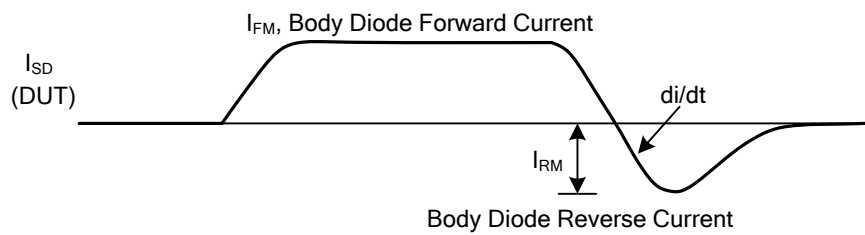
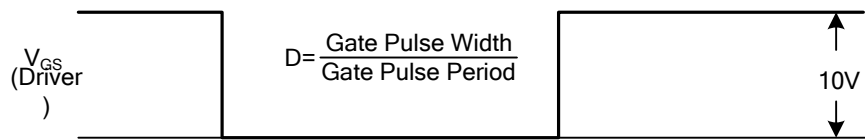
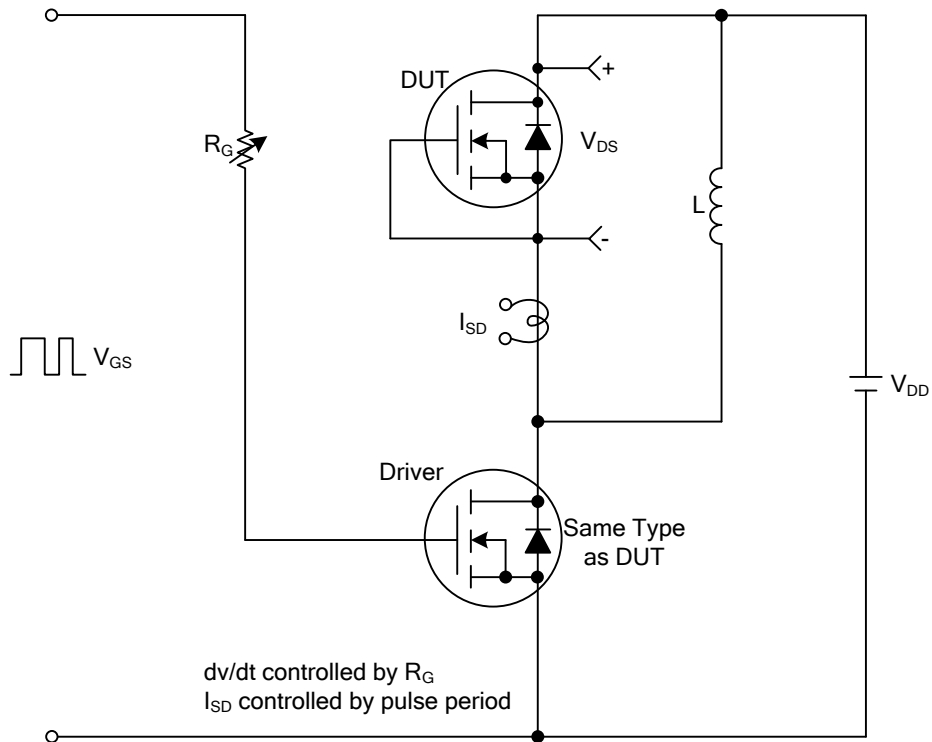


Unclamped Inductive Switching Waveforms

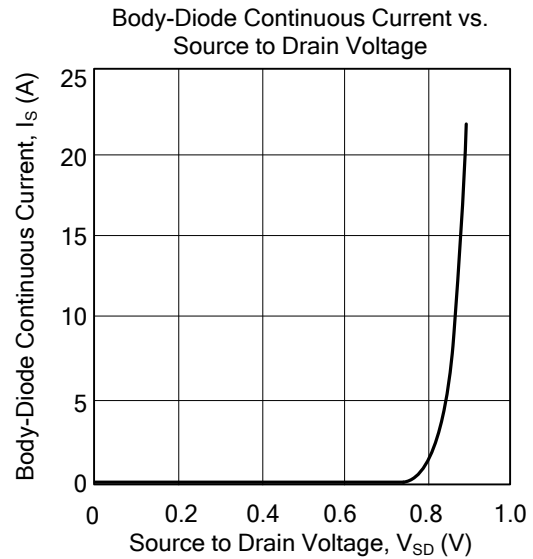
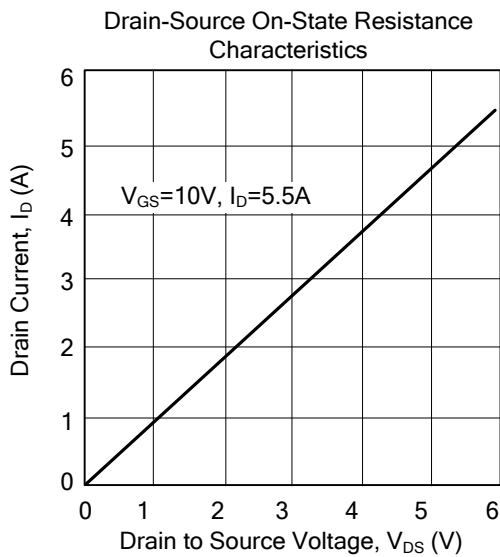
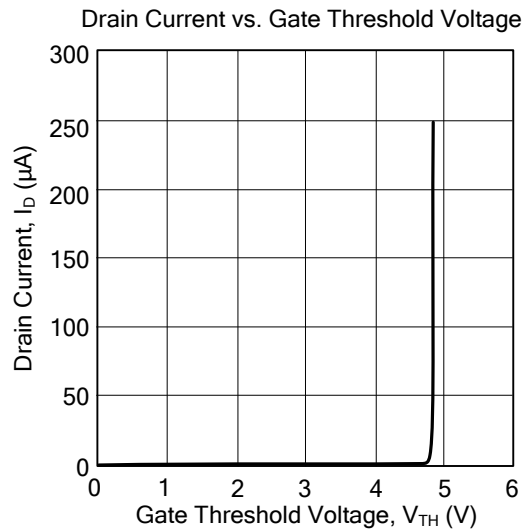
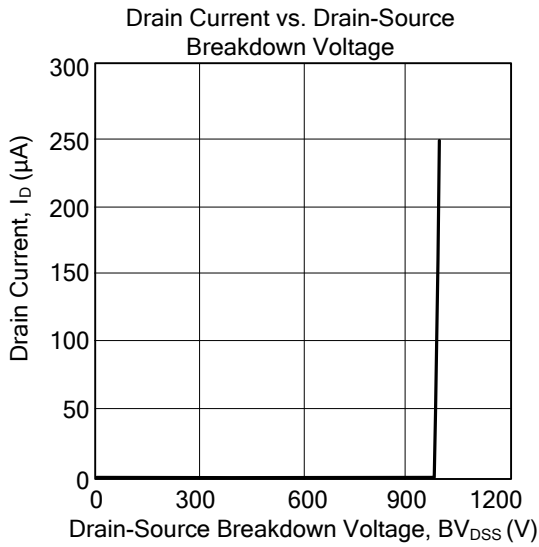


■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms



## TYPICAL CHARACTERISTICS



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