

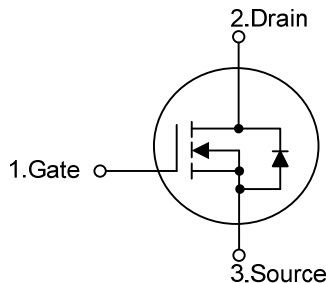
**11N90****Power MOSFET****11A, 900V N-CHANNEL
POWER MOSFET****DESCRIPTION**

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,

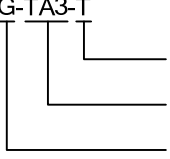
FEATURES

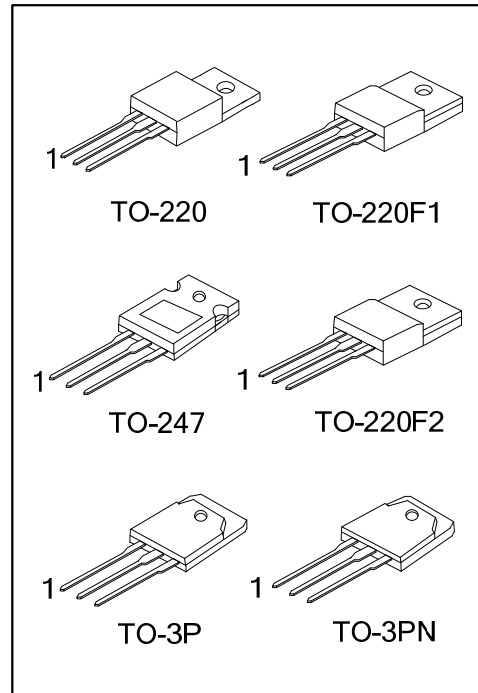
- * $R_{DS(on)} < 1.1\Omega$ @ $V_{GS} = 10V$, $I_D = 5.5A$
- * High switching speed
- * Improved dv/dt capability
- * 100% avalanche tested

SYMBOL**ORDERING INFORMATION**

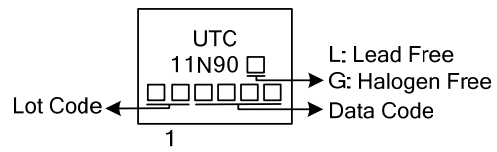
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
11N90L-TA3-T	11N90G-TA3-T	TO-220	G	D	S	Tube
11N90L-TF1-T	11N90G-TF1-T	TO-220F1	G	D	S	Tube
11N90L-TF2-T	11N90G-TF2-T	TO-220F2	G	D	S	Tube
11N90L-T3P-T	11N90G-T3P-T	TO-3P	G	D	S	Tube
11N90L-T3N-T	11N90G-T3N-T	TO-3PN	G	D	S	Tube
11N90L-T47-T	11N90G-T47-T	TO-247	G	D	S	Tube

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

11N90G-TA3-T 		(1) T: Tube (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 T3P: TO-3P, T3N: TO-3PN, T47: TO-247 (3) G: Halogen Free and Lead Free, L: Lead Free
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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}	± 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-220	P_D	160	W
	TO-220F1/TO-220F2		50	W
	TO-3P/TO-3PN		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-220/TO-220F1	θ_{JA}	62.5	$^{\circ}\text{C/W}$
	TO-220F2			$^{\circ}\text{C/W}$
	TO-3P/TO-3PN		40	$^{\circ}\text{C/W}$
	TO-247		50	$^{\circ}\text{C/W}$
Junction to Case	TO-220	θ_{JC}	0.78	$^{\circ}\text{C/W}$
	TO-220F1/TO-220F2		2.48	$^{\circ}\text{C/W}$
	TO-3P/TO-3PN		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
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	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	
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V, V _{DS} =0V			100	nA
	Reverse		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
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =5.5A		0.91	1.1	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		980	1380	pF
Output Capacitance		C _{OSS}			170	280	pF
Reverse Transfer Capacitance		C _{RSS}			18	25	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{GS} =10V, V _{DS} =50V, I _D =1.3A (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} =30V, I _D =0.5A, R _G =25Ω (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
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
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 =11A, V _{GS} =0V			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 $T_J = 25^\circ\text{C}$

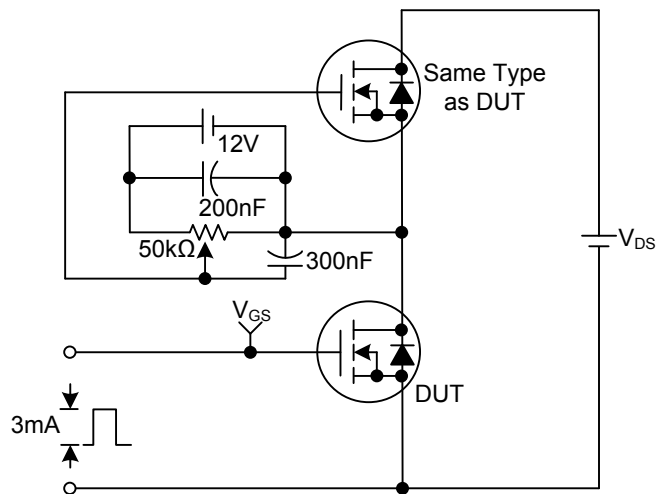
3. $I_{SD} \leq 11.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

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

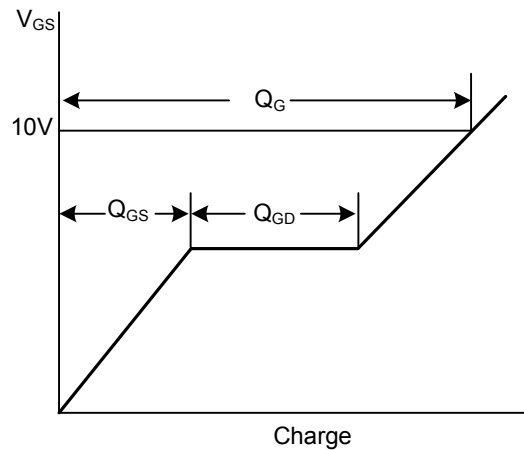
5. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

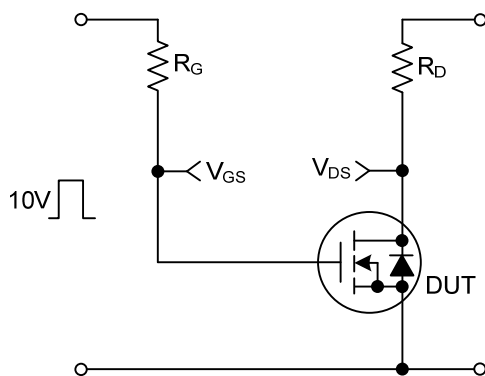
Gate Charge Test Circuit



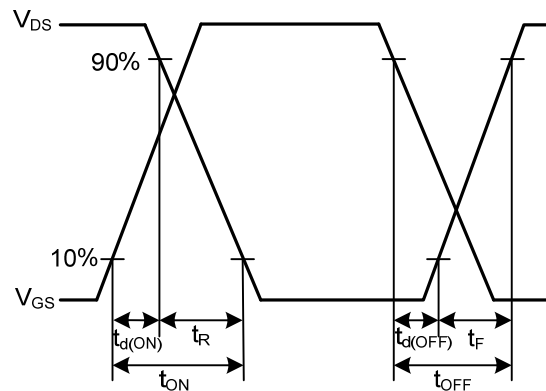
Gate Charge Waveforms



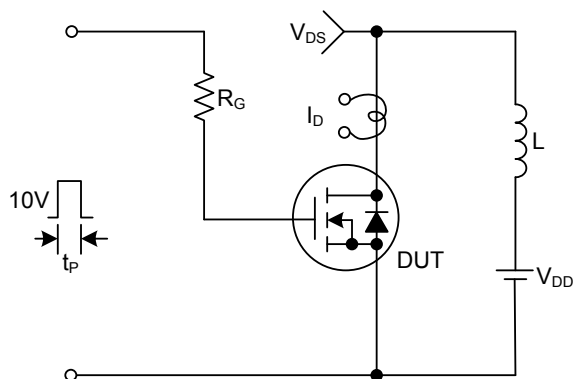
Resistive Switching Test Circuit



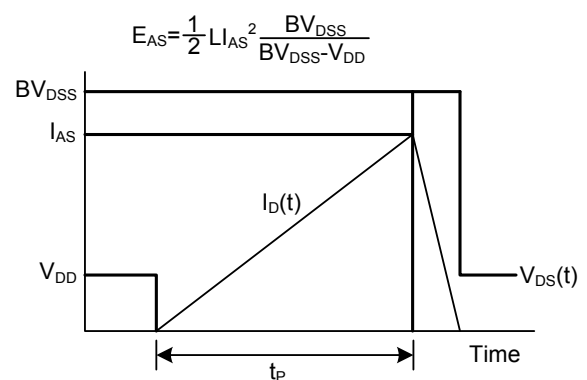
Resistive Switching Waveforms



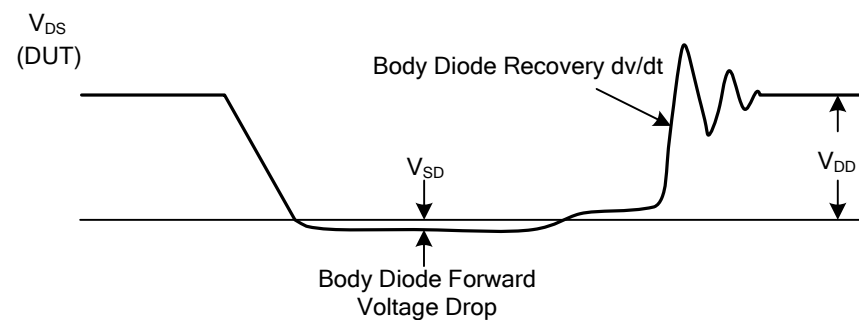
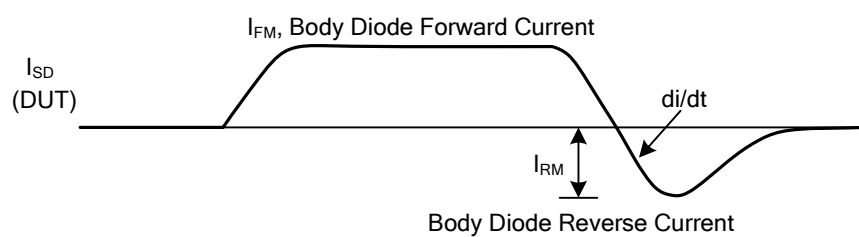
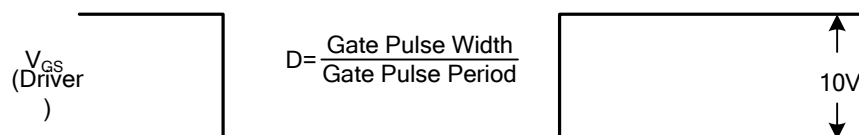
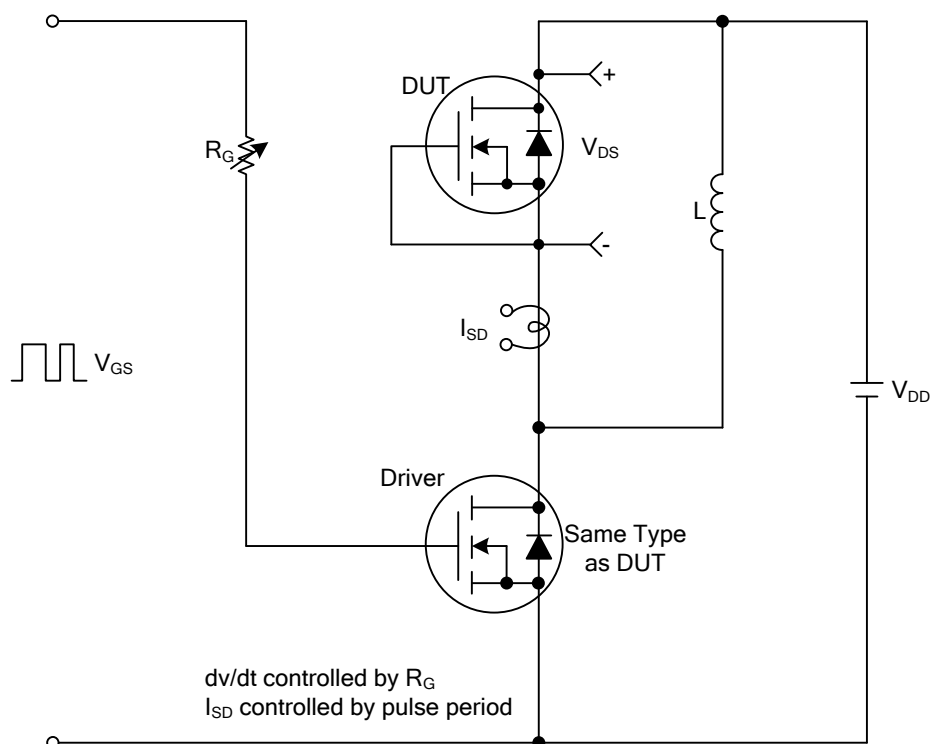
Unclamped Inductive Switching Test Circuit



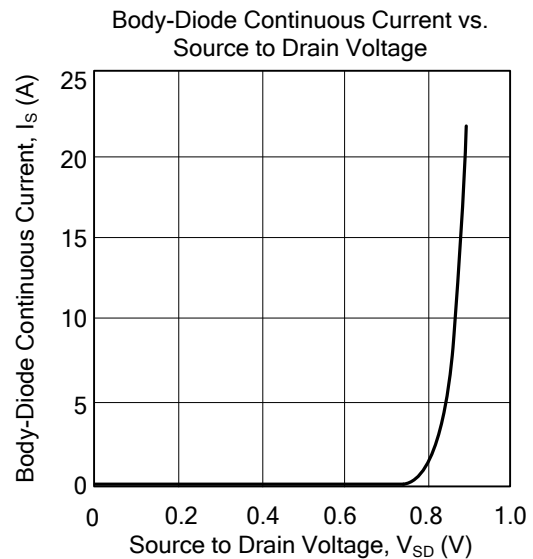
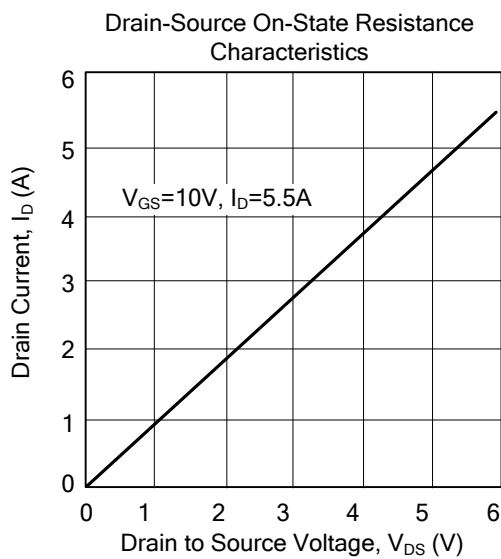
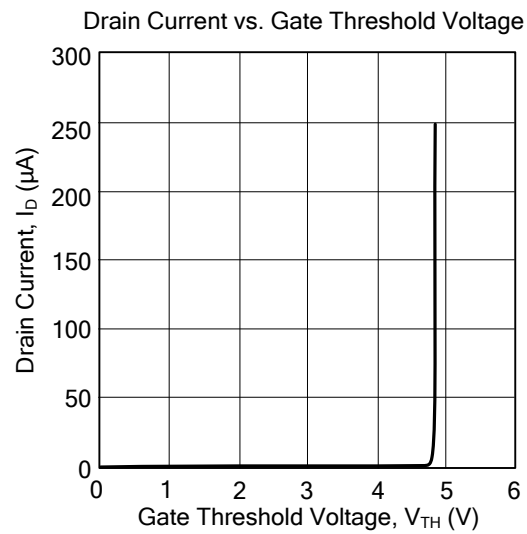
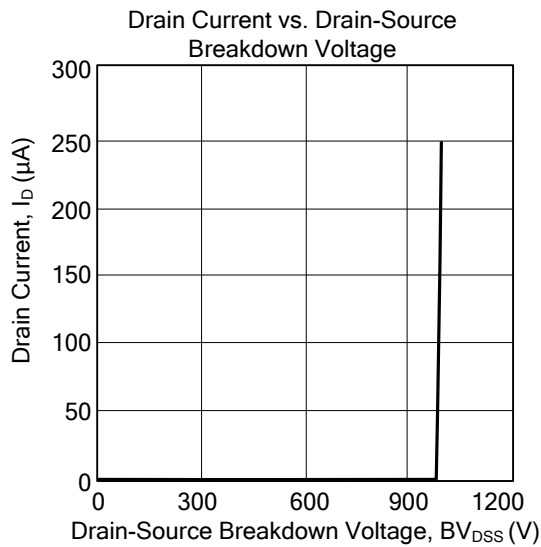
Unclamped Inductive Switching Waveforms



■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

■ TYPICAL CHARACTERISTICS



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