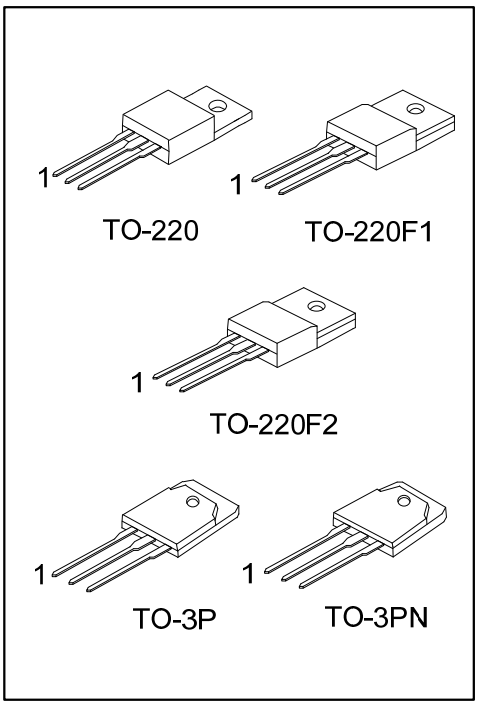
11 Amps, 900 Volts
N-CHANNEL POWER MOSFET



■ DESCRIPTION

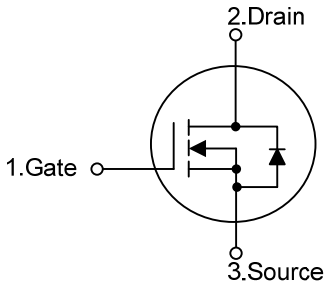
The UTC **11N90** is an N-channel enhancement mode Power FET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology specializes in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in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

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

■ FEATURES

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

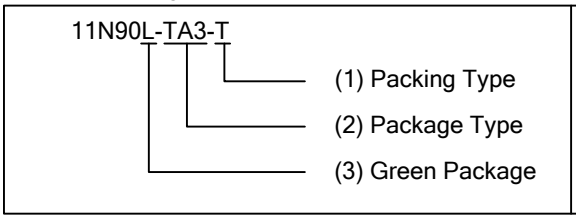
■ SYMBOL



■ ORDERING INFORMATION

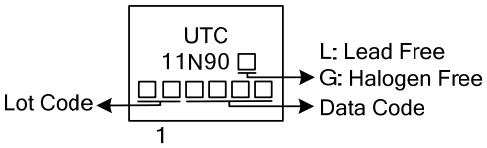
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
11N90L-TA3-T	11N90G-TA3-T	TO-220	G	D	S	Tube
11N90L-TF1-T	11N90G-TF1-T	TO-220F1	G	D	S	Tube
11N90L-TF2-T	11N90G-TF2-T	TO-220F2	G	D	S	Tube
11N90L-T3P-T	11N90G-T3P-T	TO-3P	G	D	S	Tube
11N90L-T3N-T	11N90G-T3N-T	TO-3PN	G	D	S	Tube

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



(1) T: Tube
(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2
T3P: TO-3P, T3N: TO-3PN
(3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS(T_C=25°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
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55~+150	°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 TO-220F2	θ_{JA}	62.5	°C/W
	TO-3P/TO-3PN		40	°C/W
Junction to Case	TO-220	θ_{JC}	0.78	°C/W
	TO-220F1/TO-220F2		2.48	°C/W
	TO-3P/TO-3PN		0.58	°C/W

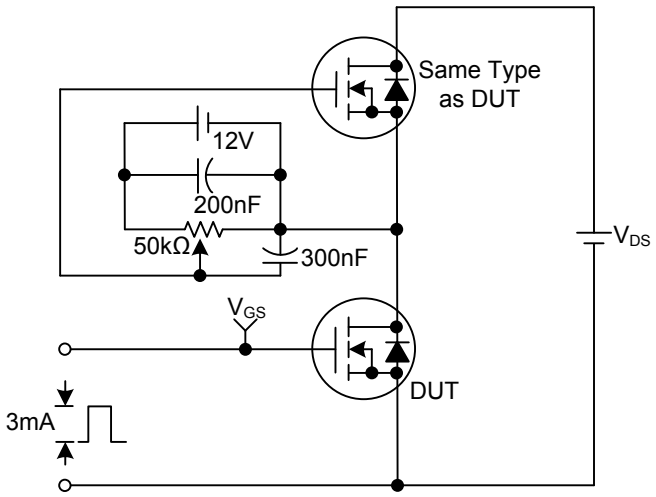
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise noted)

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		$\triangle BV_{DSS}/\triangle T_J$	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

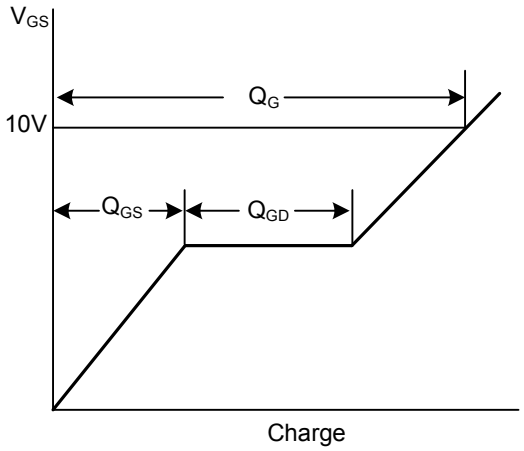
Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. L = 15mH, I_{AS} = 11A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 11.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

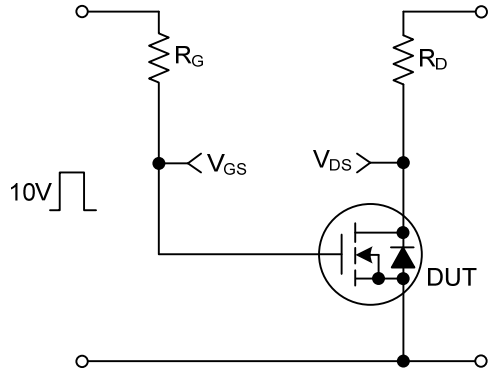
Gate Charge Test Circuit



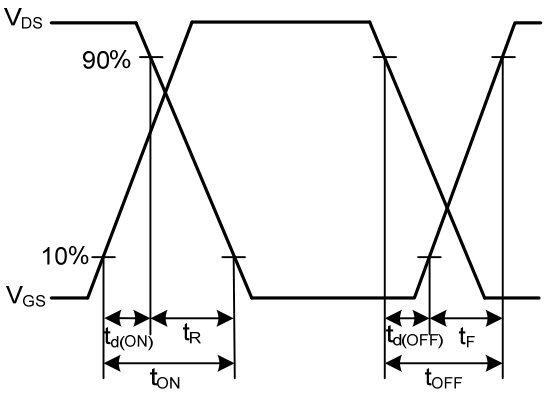
Gate Charge Waveforms



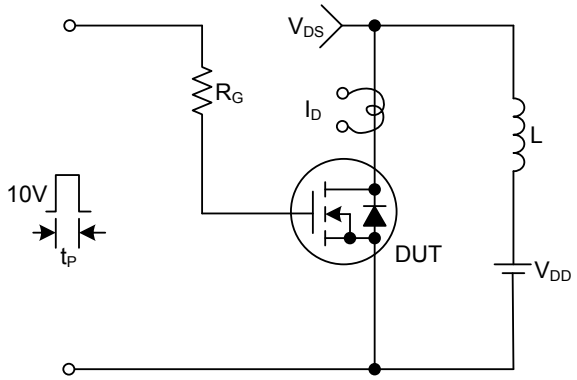
Resistive Switching Test Circuit



Resistive Switching Waveforms

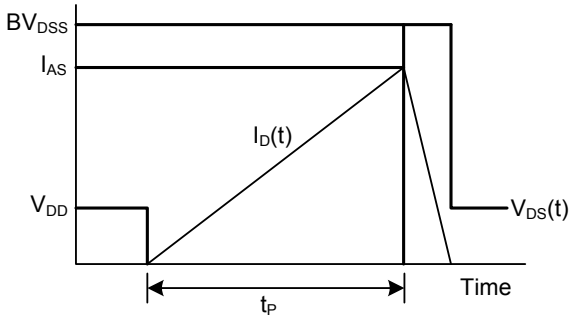


Unclamped Inductive Switching Test Circuit



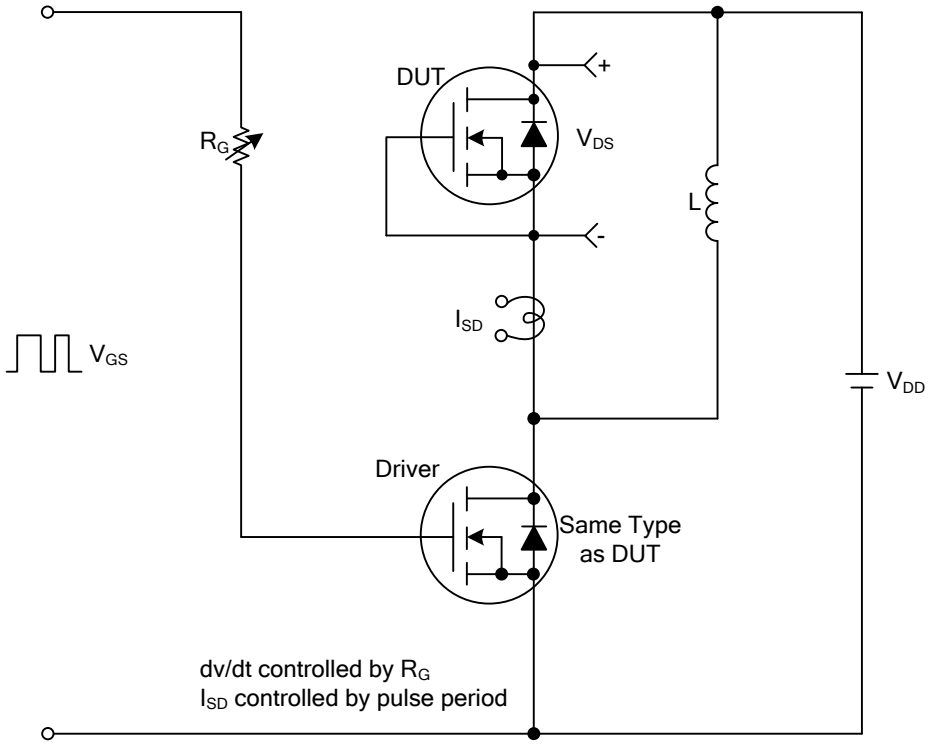
Unclamped Inductive Switching Waveforms

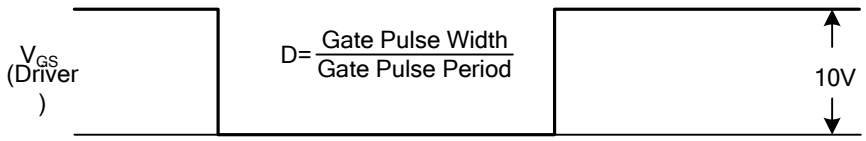
$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

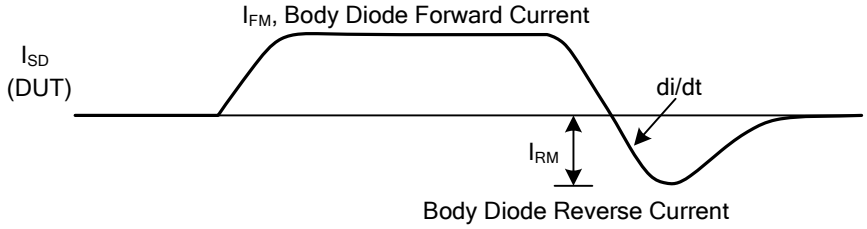


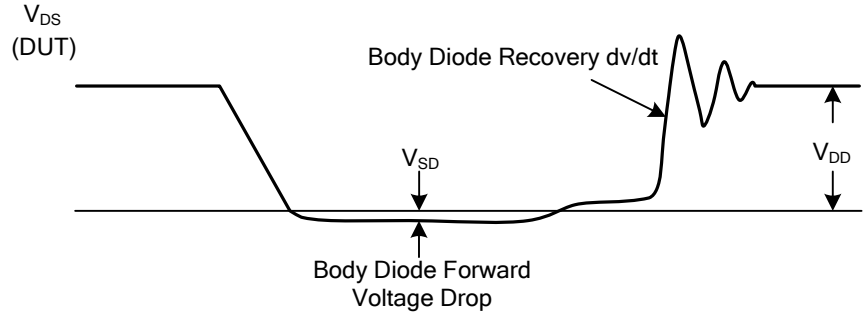
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms



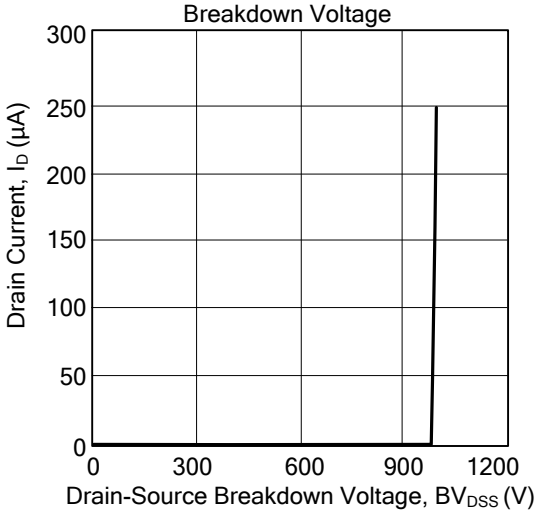




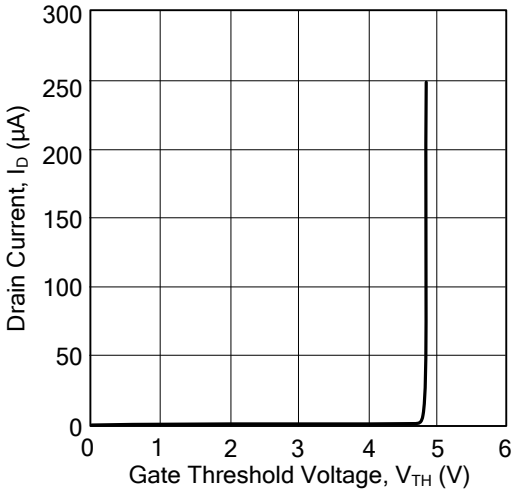


■ TYPICAL CHARACTERISTICS

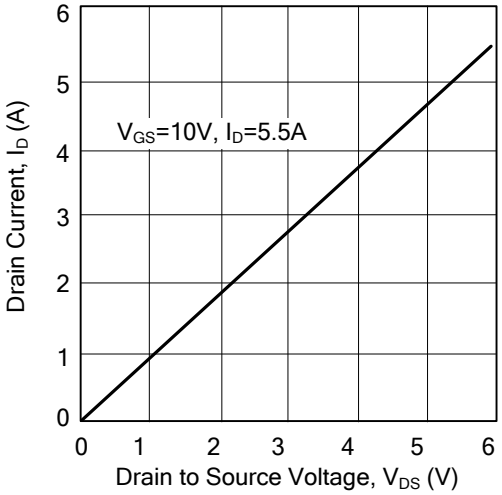
Drain Current vs. Drain-Source Breakdown Voltage



Drain Current vs. Gate Threshold Voltage



Drain-Source On-State Resistance Characteristics



Body-Diode Continuous Current vs. Source to Drain Voltage