

**10N90**

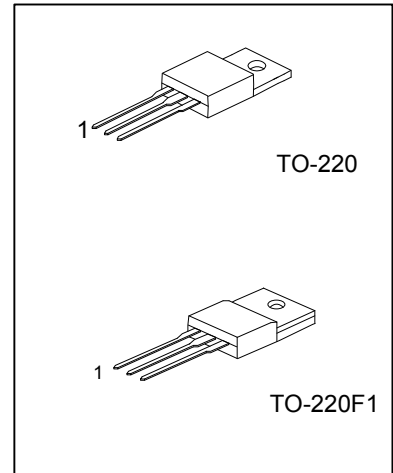
Preliminary

Power MOSFET**10 Amps, 900 Volts
N-CHANNEL POWER MOSFET**

■ DESCRIPTION

The UTC**10N90** is a N-channel mode Power FET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

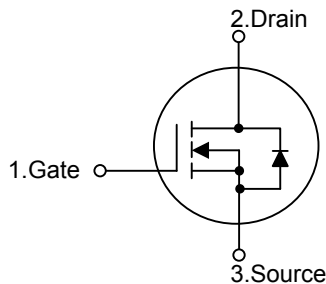
The UTC **10N90** is generally applied in high efficiency switch mode power supply.



■ FEATURES

- * Lower Leakage Current: 25 μ A (Max.) @ $V_{DS} = 900V$
- * Improved Gate Charge

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10N90L-TA3-T	10N90G-TA3-T	TO-220	G	D	S	Tube
10N90L-TF1-T	10N90G-TF1-T	TO-220F1	G	D	S	Tube

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

10N90L - TA3 - T	(1) Packing Type	(1) T: Tube
	(2) Package Type	(2) TA3: TO-220, TF1: TO-220F1
	(3) Lead Free	(3) G: Halogen Free, L: Lead Free

■ 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	10	A
	Pulsed (Note 1)	I_{DM}	40	A
Avalanche Current (Note 1)		I_{AR}	10	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	794	mJ
	Repetitive (Note 1)	E_{AR}	28	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	1.5	V/ns
Power Dissipation	TO-220	P_D	156	W
	TO-220F1		50	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	θ_{JA}	62.5	$^{\circ}\text{C/W}$
	TO-220F1		62.5	$^{\circ}\text{C/W}$
Junction to Case	TO-220	θ_{JC}	0.8	$^{\circ}\text{C/W}$
	TO-220F1		2.5	$^{\circ}\text{C/W}$

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

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 =250μ		1.11		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =900V			25	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V			100	nA
	Reverse		V _{GS} =-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =5V, I _D =250μA	2.0		3.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =5A			1.2	Ω
Forward Transconductance		g _{FS}	V _{DS} =50V, I _D =5A (Note 4)		7.85		S
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		2760	3580	pF
Output Capacitance		C _{OSS}			245	290	pF
Reverse Transfer Capacitance		C _{RSS}			105	125	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{GS} =10V, V _{DS} =720V, I _D =10A (Note 4, 5)		127	165	nC
Gate to Source Charge		Q _{GS}			19.2		nC
Gate to Drain Charge		Q _{GD}			56.8		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =450V, I _D =10A, R _G =9.6Ω (Note 4, 5)		29	70	ns
Rise Time		t _R			54	20	ns
Turn-OFF Delay Time		t _{D(OFF)}			161	330	ns
Fall-Time		t _F			47	105	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S	Integral Reverse Pn-Diode In The MOSFET			10	A
Maximum Body-Diode Pulsed Current (Note1)		I _{SM}				40	A
Drain-Source Diode Forward Voltage (Note 4)		V _{SD}	I _S =10A, V _{GS} =0V, T _J =25°C			1.4	V
Body Diode Reverse Recovery Time		t _{RR}	I _F =10A, dI _F /dt=100A/μs, T _J =25°C		690		ns
Body Diode Reverse Recovery Charge		Q _{RR}	(Note 4)		11.94		μC

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

2. $L = 15\text{mH}$, $I_{AS} = 10\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 27\Omega$, Starting $T_J = 25^\circ\text{C}$

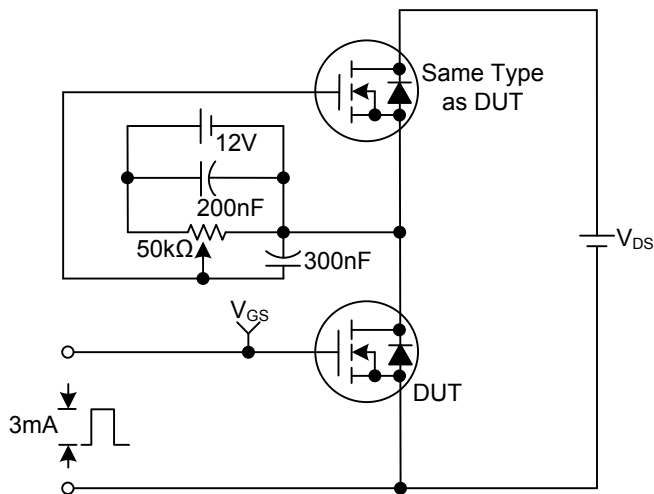
3. $I_{SD} \leq 10\text{A}$, $di/dt \leq 190\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

4. Pulse Test: Pulse width $\leq 250\mu\text{s}$, Duty cycle $\leq 2\%$

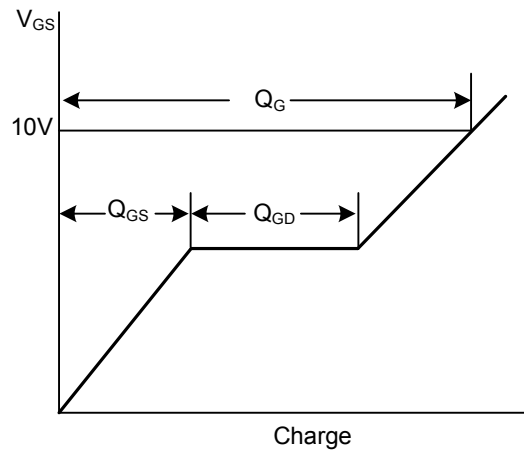
5. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

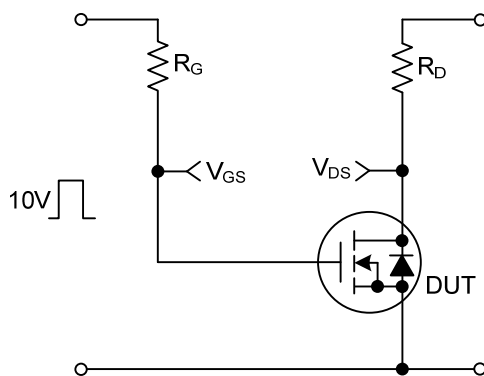
Gate Charge Test Circuit



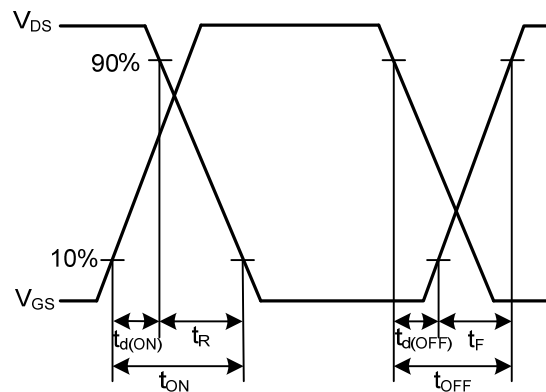
Gate Charge Waveforms



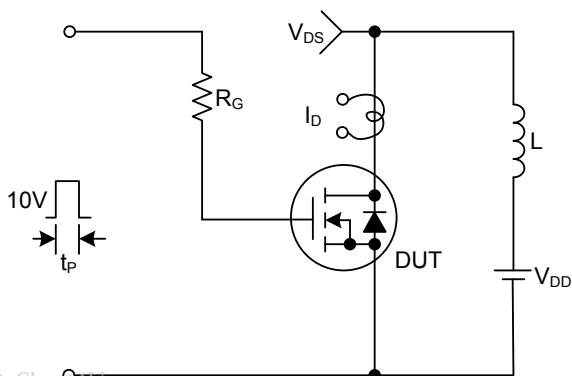
Resistive Switching Test Circuit



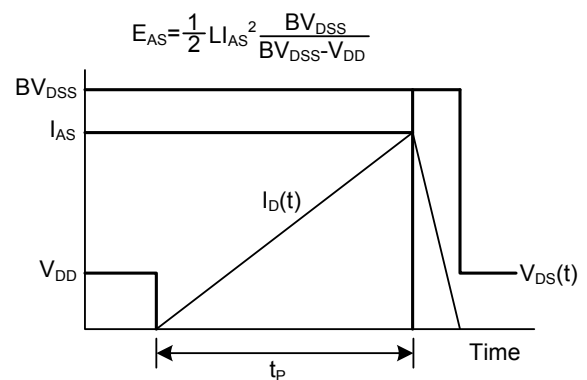
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

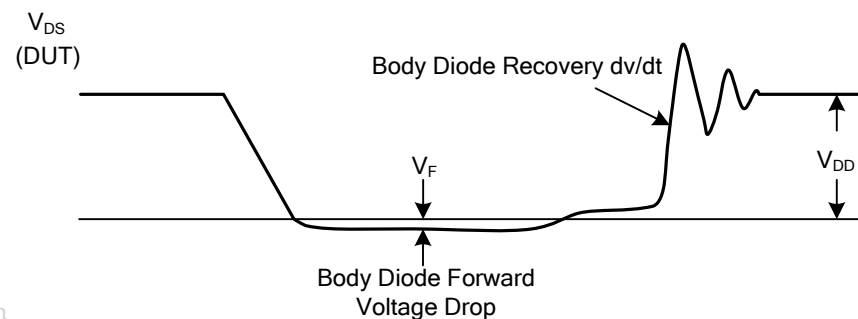
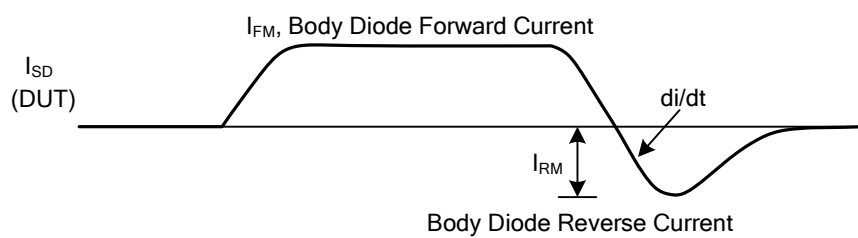
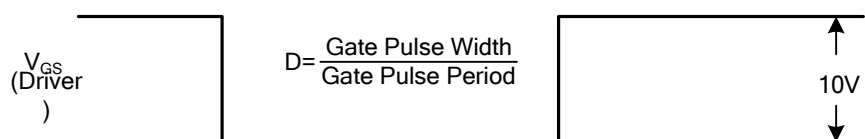
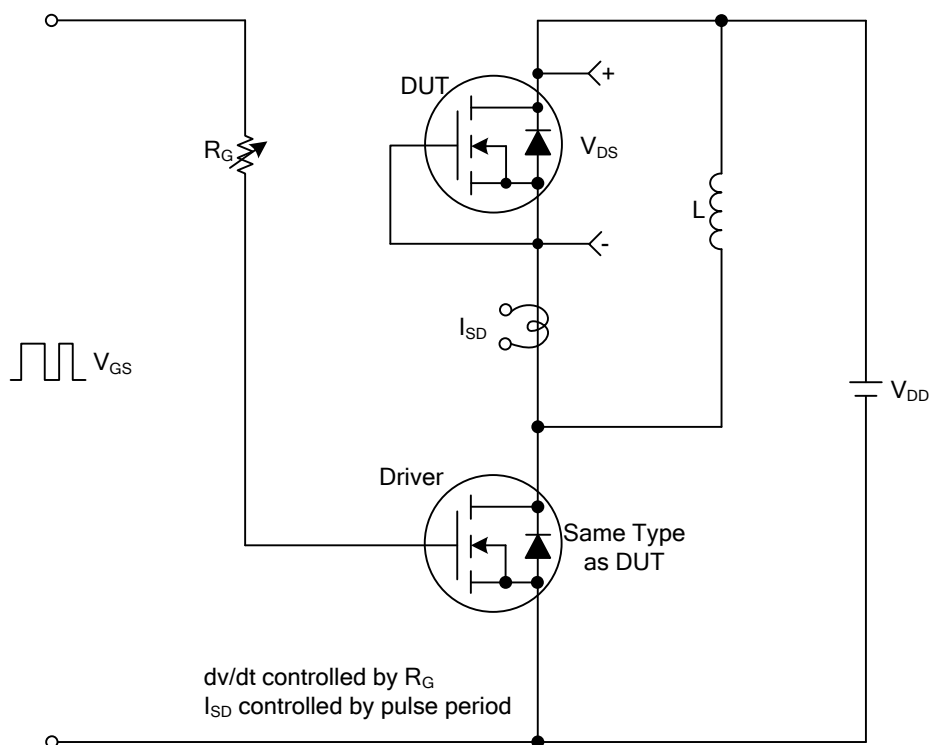


Unclamped Inductive Switching Waveforms



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Peak Diode Recovery dv/dt Test Circuit & Waveforms



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