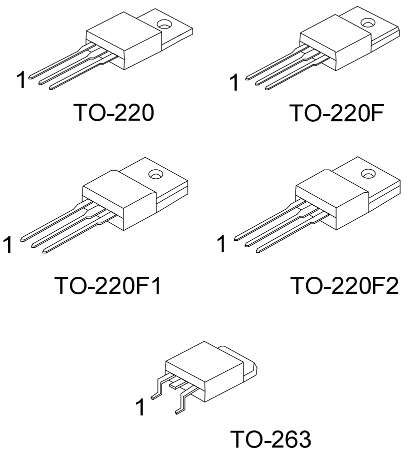
3N90

Power MOSFET

3A, 900V N-CHANNEL POWER MOSFET



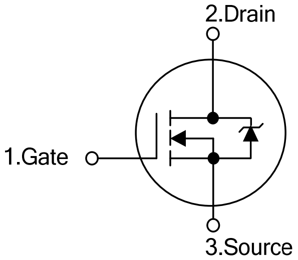
■ DESCRIPTION

The UTC **3N90** provides excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

* $R_{DS(ON)} \leq 4.8\ \Omega$ @ V_{GS}=10V, I_D=1.5A
* Fast Switching Capability
* Avalanche Energy Specified
* Improved dv/dt Capability, High Ruggedness

■ SYMBOL



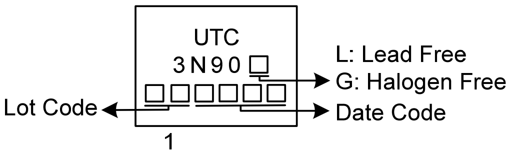
■ RDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
3N90L-TA3-T	3N90G-TA3-T	TO-220	G	D	S	Tube
3N90L-TF3-T	3N90G-TF3-T	TO-220F	G	D	S	Tube
3N90L-TF1-T	3N90G-TF1-T	TO-220F1	G	D	S	Tube
3N90L-TF2-T	3N90G-TF2-T	TO-220F2	G	D	S	Tube
3N90L-TQ2-T	3N90G-TQ2-T	TO-263	G	D	S	Tube
3N90L-TQ2-R	3N90G-TQ2-R	TO-263	G	D	S	Tape Reel

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

3N90G-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1 TF2: TO-220F2, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage (V_{GS}=0V)		V_{DSS}	900	V
Drain-Gate Voltage (R_G=20kΩ)		V_{DGR}	900	V
Gate-Source Voltage		V_{GSS}	±30	V
Gate-Source Breakdown Voltage (I_{GS}=±1mA)		BV_{GSO}	30(MIN)	V
Continuous Drain Current		I_D	3	A
Pulsed Drain Current		I_{DM}	10	A
Single Pulse Avalanche Energy (Note 3)		E_{AS}	180	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220/TO-263	P_D	90	W
	TO-220F/TO-220F1		25	
	TO-220F2		26	
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

Note: 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 = 40mH, I_{AS} = 3A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
4. $I_{SD} \leqq$ 3A, di/dt $\leqq$ 200A/μs, $V_{DD} \leqq BV_{DSS}$, $T_J \leqq T_{J(MAX)}$.

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220/ TO-263	θ_{JC}	1.38	°C/W
	TO-220F/TO-220F1		5	
	TO-220F2		4.9	

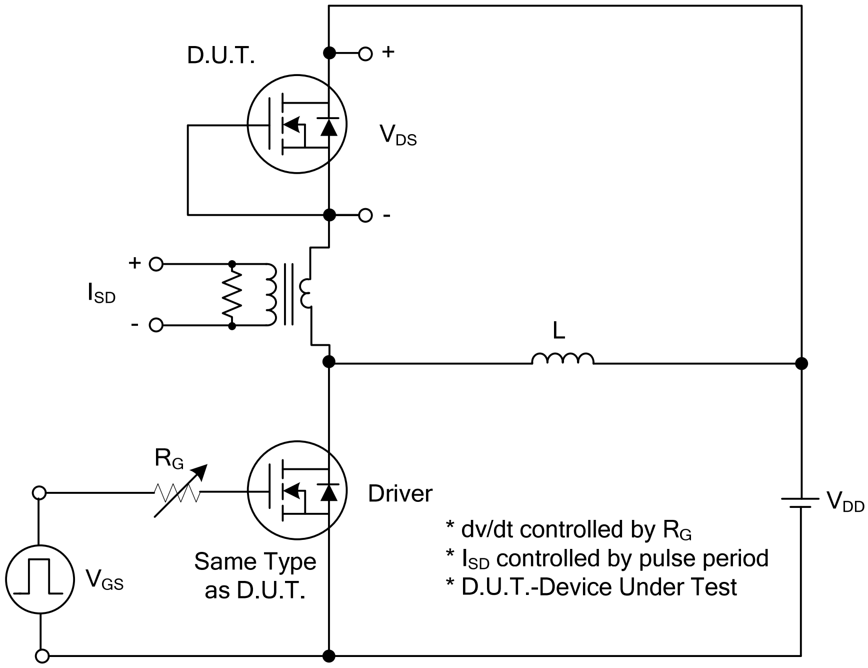
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	900			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=900V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V			±10	μA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	3	3.75	4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=1.5A		4.1	4.8	Ω
Forward Transconductance (Note 1)	g_{FS}	V_{DS}=15V, I_D=1.5A		2.1		S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1MHz		560		pF
Output Capacitance	C_{OSS}			69		pF
Reverse Transfer Capacitance	C_{RSS}			11		pF
Equivalent Output Capacitance (Note 2)	$C_{OSS(EQ)}$	V_{GS}=0V, V_{DS}=0V~400V		34		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	V_{DS}=50V, I_D=1.3A, V_{GS}=10V		25.9		nC
Gate-Source Charge	Q_{GS}			7		nC
Gate-Drain Charge	Q_{GD}			7.6		nC
Turn-On Delay Time	$t_{D(ON)}$	V_{DS}=30V, I_D=0.5A, R_G=25Ω		56		ns
Turn-On Rise Time	t_R			78		ns
Turn-Off Delay Time	$t_{D(OFF)}$			140		ns
Turn-Off Fall Time	t_F			72		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Source-Drain Current	I_S				3	A
Source-Drain Current (Pulsed)	I_{SM}				12	A
Diode Forward Voltage(Note 1)	V_{SD}	I_{SD}=3A ,V_{GS}=0V			1.6	V

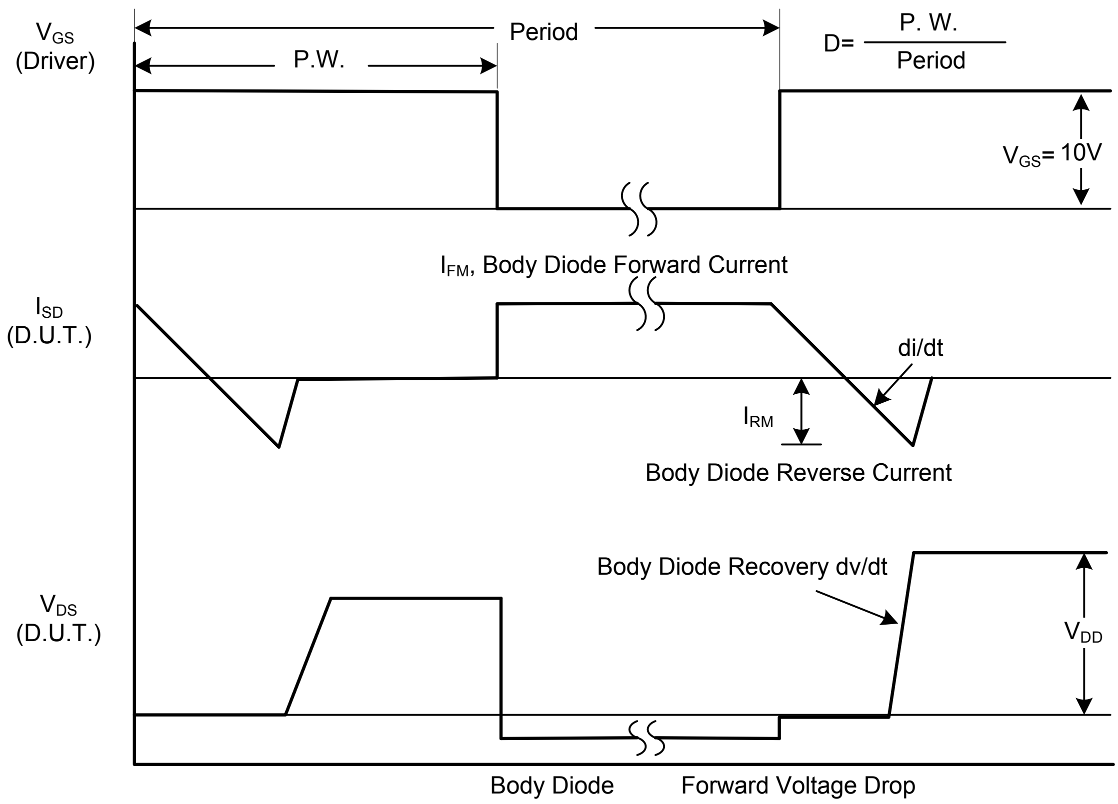
Notes: 1. Pulse width=300μs, Duty cycle≦1.5%

2. $C_{OSS(EQ)}$ is defined asa constant equivalent capacitance giving the same charging time as C_{OSS} when V_{DS} increases from 0to 80% V_{DSS}.

■ TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

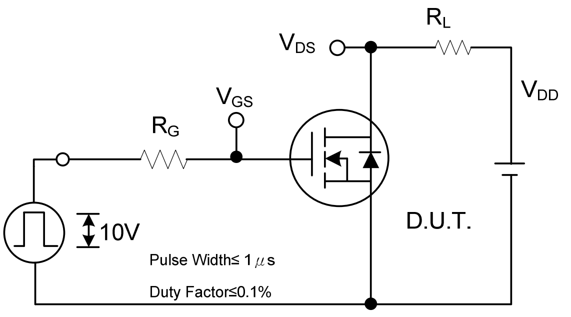


Fig. 2A Switching Test Circuit

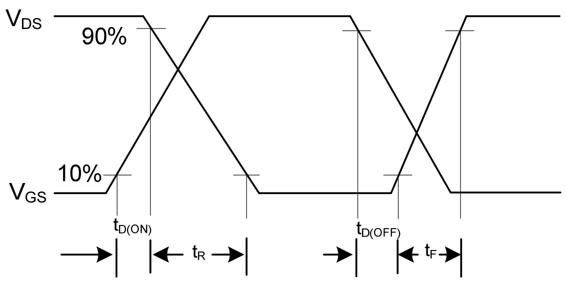


Fig. 2B Switching Waveforms

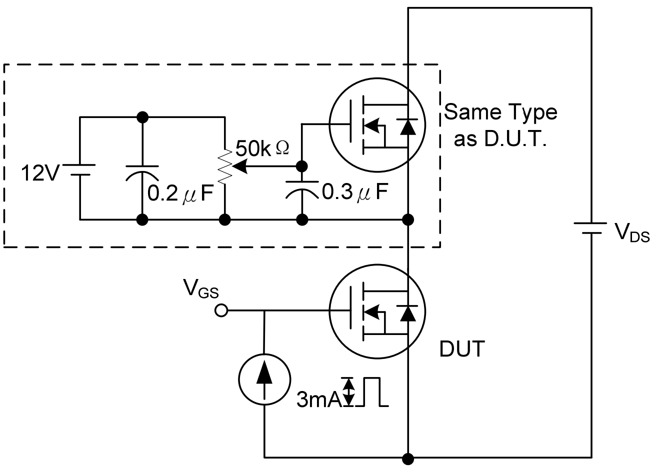


Fig. 3A Gate Charge Test Circuit

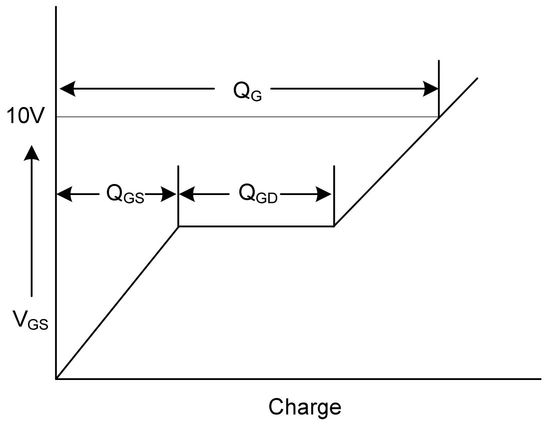


Fig. 3B Gate Charge Waveform

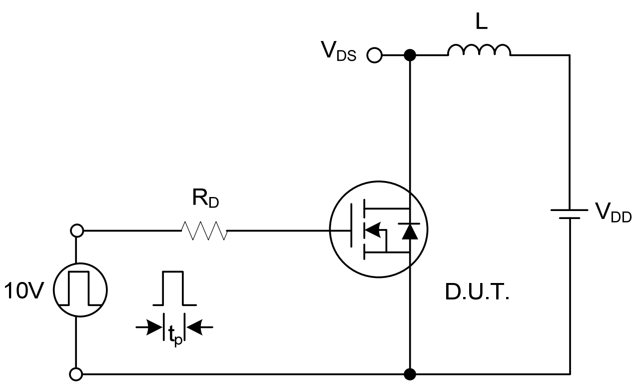


Fig. 4A Unclamped Inductive Switching Test Circuit

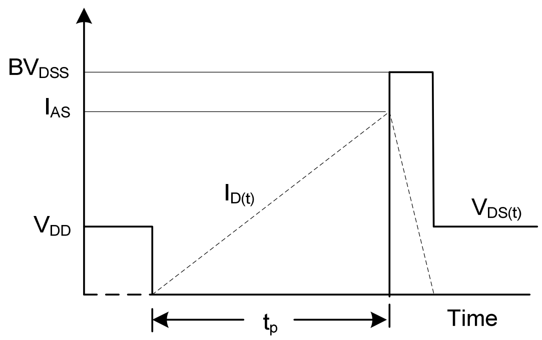


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS