



## 8N90

Preliminary

Power MOSFET

### 8 Amps, 900 Volts N-CHANNEL POWER MOSFET

#### DESCRIPTION

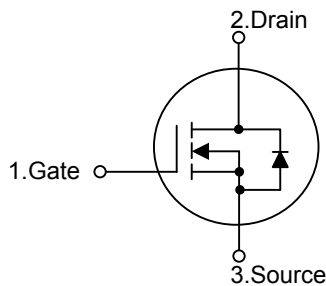
The UTC **8N90** is an N-channel mode power MOSFET, using UTC's advanced technology to provide costumers planar stripe and DMOS technology. This technology allows a minimum on-state resistance, superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **8N90** is generally applied in high efficiency switch mode power supplies.

#### FEATURES

- \* 8A, 900V,  $R_{DS(ON)}=1.55\Omega @ V_{GS}=10V$
- \* Fast Switching Speed
- \* 100% Avalanche Tested
- \* Improved dv/dt Capability

#### SYMBOL

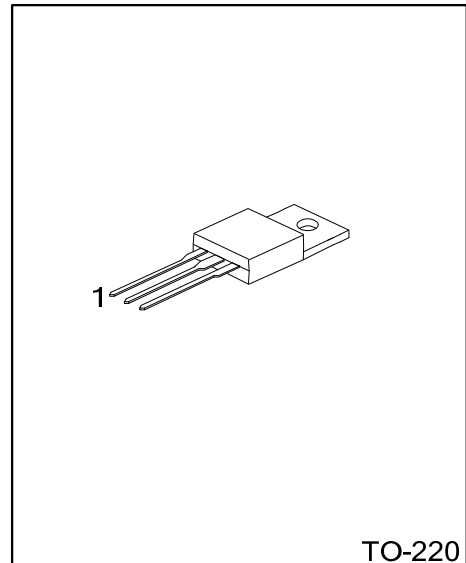


#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8N90L-TA3-T	8N90G-TA3-T	TO-220	G	D	S	Tube

Note: G: GND, D: Drain, S: Source

<p>8N90G-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Halogen Free</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Drain to Source Voltage	$V_{DSS}$	900	V
Gate to Source Voltage	$V_{GSS}$	$\pm 30$	V
Continuous Drain Current ( $T_C=25^\circ\text{C}$ )	$I_D$	8	A
Pulsed Drain Current (Note 1)	$I_{DM}$	25	A
Avalanche Current (Note 1)	$I_{AR}$	6.3	A
Single Pulsed Avalanche Energy (Note 2)	$E_{AS}$	850	mJ
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	17.1	mJ
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.0	V/ns
Total Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	147	W
Linear Derating Factor above $T_C=25^\circ\text{C}$		1.17	W/ $^\circ\text{C}$
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55~+150	$^\circ\text{C}$

- Note: 1. Repetitive Rating : Pulse width limited by maximum junction temperature  
 2.  $L=40\text{mH}$ ,  $I_{AS}=6.3\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$   
 3.  $I_{SD}\leq 8\text{A}$ ,  $di/dt\leq 200\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$   
 4. 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 DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	0.85	$^\circ\text{C}/\text{W}$

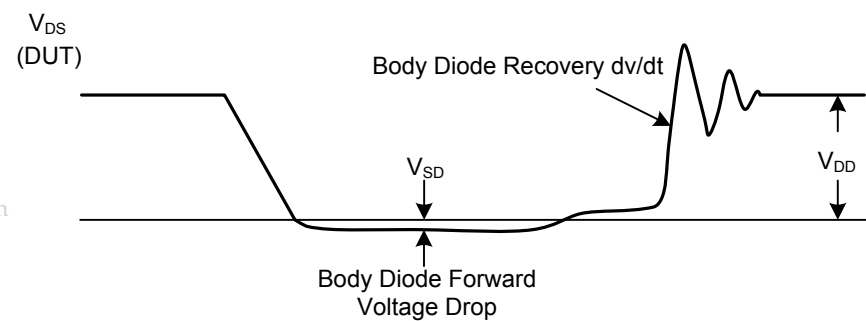
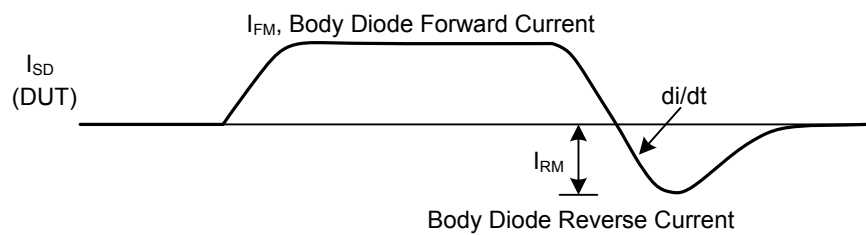
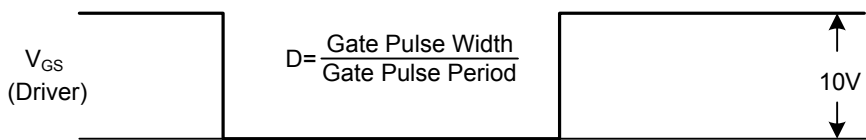
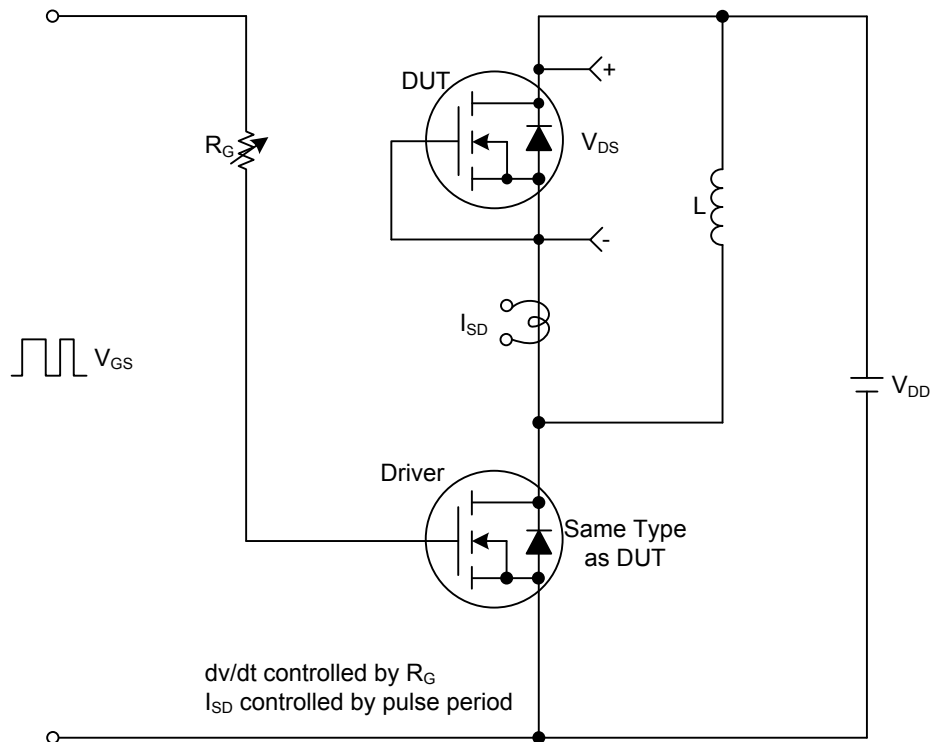
### ■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{V}$ , $I_D=250\mu\text{A}$	900			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$ , Referenced to $25^\circ\text{C}$		0.95		$\text{V}/^\circ\text{C}$
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	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 30\text{V}$			$\pm 100$	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
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=4\text{A}$		940	1550	m $\Omega$
Forward Transconductance (Note 1)	$g_{FS}$	$V_{DS}=50\text{V}$ , $I_D=4\text{A}^4$		5.5		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25\text{V}$ , $V_{GS}=0\text{V}$ , $f=1.0\text{MHz}$		1600	2080	pF
Output Capacitance	$C_{OSS}$			130	170	pF
Reverse Transfer Capacitance	$C_{RSS}$			12	15	pF
<b>SWITCHING PARAMETERS (Note 1, Note 2)</b>						
Total Gate Charge	$Q_G$	$V_{DS}=720\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=8\text{A}$		35	45	nC
Gate-Source Charge	$Q_{GS}$			10		nC
Gate-Drain Charge	$Q_{GD}$			14		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=450\text{V}$ , $I_D=8\text{A}$ , $R_G=25\Omega$		40	90	ns
Turn-ON Rise Time	$t_R$			110	230	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			70	150	ns
Turn-OFF Fall Time	$t_F$			70	150	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$				8	A
Maximum Body-Diode Pulsed Current	$I_{SM}$				25	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=8\text{A}$ , $V_{GS}=0\text{V}$			1.4	V
Body Diode Reverse Recovery Time	$t_{RR}$	$V_{GS}=0\text{V}$ , $I_S=8\text{A}$ , $di_F/dt=100\text{A}/\mu\text{s}$		530		ns
Body Diode Reverse Recovery Charge	$Q_{RR}$	(Note 1)		5.8		$\mu\text{C}$

- Note: 1. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$   
 2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

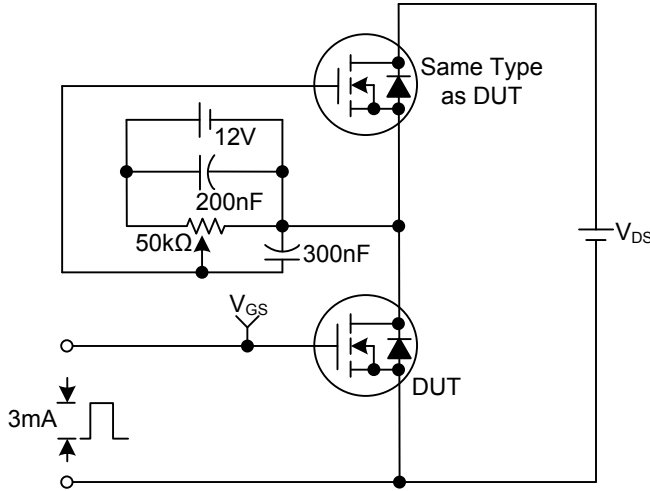
Peak Diode Recovery dv/dt Test Circuit & Waveforms



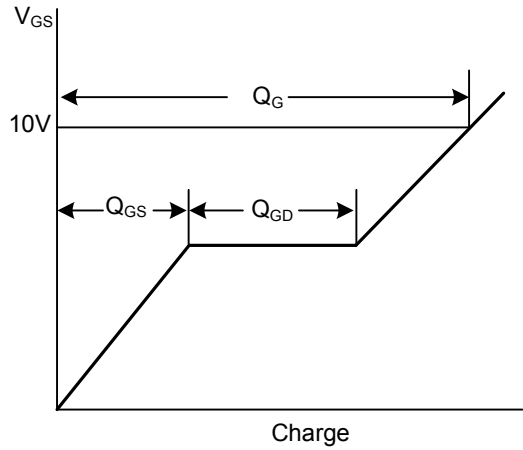
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■ TEST CIRCUITS AND WAVEFORMS

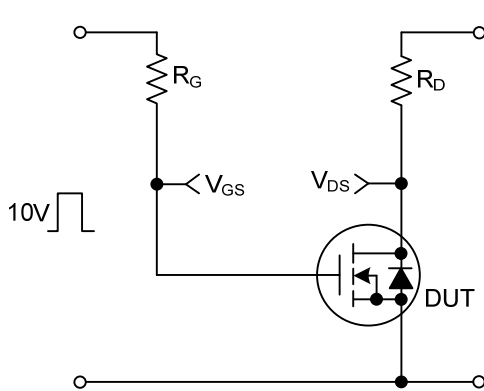
Gate Charge Test Circuit



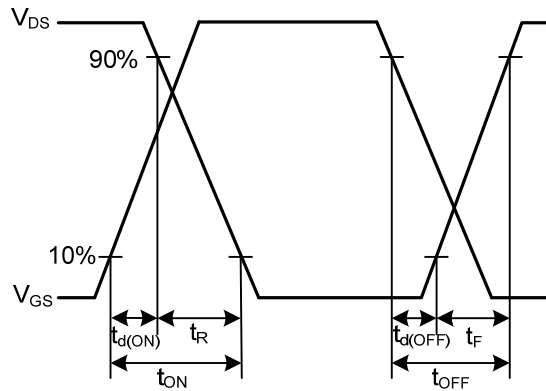
Gate Charge Waveforms



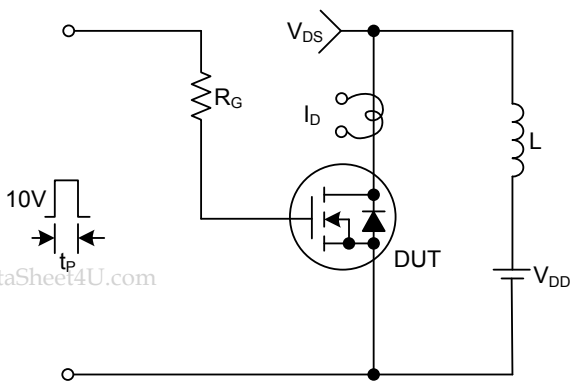
Resistive Switching Test Circuit



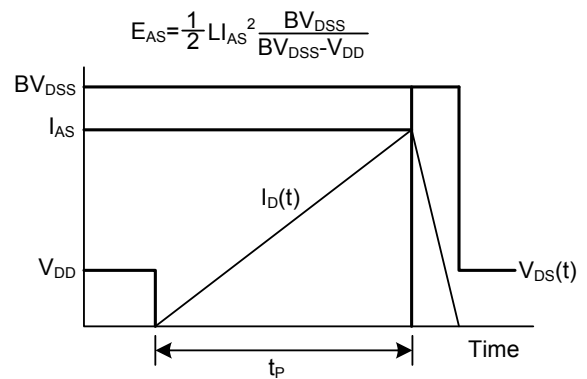
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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