

## 12A, 900V N-CHANNEL POWER MOSFET

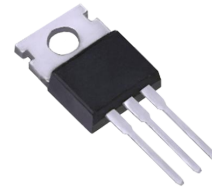
### ■ DESCRIPTION

The UTC **12N90** is an N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

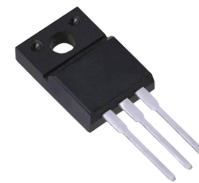
The UTC **12N90** is universally applied in high efficiency switch mode power supply.

### ■ FEATURES

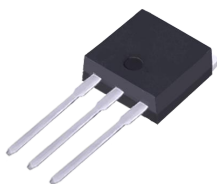
- \*  $R_{DS(on)} \leq 1.1\Omega$  @  $V_{GS}=10V, I_D=6.0A$
- \* High switching speed
- \* 100% avalanche tested



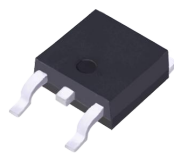
TO-220



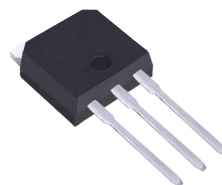
TO-220F



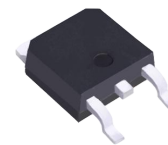
TO-262



TO-263



TO-251



TO-252

■ **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		$V_{GSS}$	$\pm 30$	V
Drain Current	Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$	12	A
	Pulsed (Note 2)	$I_{DM}$	48	A
Avalanche Current (Note 2)		$I_{AR}$	12	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	800	mJ
Power Dissipation	TO-220F/TO-220F1	$P_D$	38	W
	TO-220F2			
	TO-3P		182	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Notes: 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.  $L=12\text{mH}$ ,  $I_{AS}=11\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F1	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
	TO-220F2			
	TO-3P		40	
Junction to Case	TO-220F/TO-220F1	$\theta_{JC}$	3.28	$^\circ\text{C/W}$
	TO-220F2			
	TO-3P		0.68	

**ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	900			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$ , Referenced to $25^\circ\text{C}$		1.0		$\text{V}/^\circ\text{C}$
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	
Gate- Source Leakage Current	Forward	$V_{GS}=+30\text{V}$ , $V_{DS}=0\text{V}$			100	nA
	Reverse	$V_{GS}=-30\text{V}$ , $V_{DS}=0\text{V}$			-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
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=6\text{A}$		0.95	1.1	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		1800		pF
Output Capacitance	$C_{OSS}$			190		pF
Reverse Transfer Capacitance	$C_{RSS}$			20		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	$Q_G$	$V_{GS}=10\text{V}$ , $V_{DD}=50\text{V}$ , $I_D=1.3\text{A}$ , $I_G=100\mu\text{A}$ (Note 1, 2)		59		nC
Gate to Source Charge	$Q_{GS}$			14		nC
Gate to Drain Charge	$Q_{GD}$			20		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{GS}=10\text{V}$ , $V_{DD}=30\text{V}$ , $I_D=0.5\text{A}$ , $R_G=25\Omega$ (Note 1, 2)		120		ns
Rise Time	$t_R$			200		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			335		ns
Fall-Time	$t_F$			240		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				12	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				48	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=12\text{A}$ , $V_{GS}=0\text{V}$			1.4	V
Body Diode Reverse Recovery Time	$t_{rr}$	$V_{GS}=0\text{V}$ , $I_S=12\text{A}$ ,		1000		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$di_F/dt=100\text{A}/\mu\text{s}$ (Note 1)		17.0		$\mu\text{C}$

Notes: 1. Pulse Test: Pulse width  $\leq 250\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

■ TYPICAL CHARACTERISTICS

