

7A, 900V N-CHANNEL POWER MOSFET

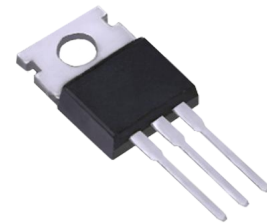
■ DESCRIPTION

The UTC **7N90** is an N-channel mode power MOSFET using UTC's advanced technology to provide costumers 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.

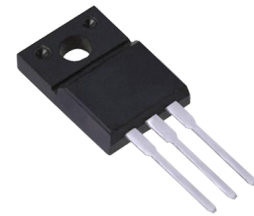
The UTC **7N90** is universally applied in active power factor correction, electronic lamp ballast based on half bridge topology and high efficient switched mode power supply.

■ FEATURES

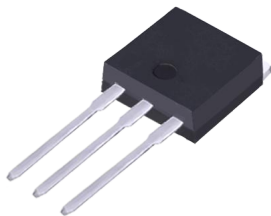
- * High switching speed
- * $R_{DS(ON)} \leq 1.8 \Omega @ V_{GS}=10V, I_D=3.5A$
- * 100% avalanche tested
- * Improved dv/dt capability



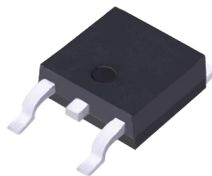
TO-220



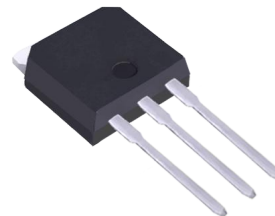
TO-220F



TO-262



TO-263



TO-251



TO-252

■ **ABSOLUTE MAXIMUM RATINGS** ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage		V_{DSS}	900	V
Gate to Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current	$T_C=25^\circ\text{C}$	I_D	7.0	A
	$T_C=100^\circ\text{C}$		4.4	A
Pulsed Drain Current (Note 2)		I_{DM}	14	A
Avalanche Current (Note 2)		I_{AR}	6.4	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	540	mJ
Repetitive Avalanche Energy (Note 2)		E_{AR}	21	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.35	V/ns
Power Dissipation	TO-3P	P_D	240	W
	TO-220F/TO-220F1 TO-220F2		39	W
	TO-247		230	W
	TO-262/TO-263		155	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. $L=20\text{mH}$, $I_{AS}=7.35\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD} \leq 7.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-3P	θ_{JA}	40	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2/TO-262 TO-263		62.5	$^\circ\text{C}/\text{W}$
	TO-247		50	$^\circ\text{C}/\text{W}$
	TO-3P		0.52	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1 TO-220F2	θ_{JC}	3.2	$^\circ\text{C}/\text{W}$
	TO-247		0.54	$^\circ\text{C}/\text{W}$
	TO-262/TO-263		0.8	$^\circ\text{C}/\text{W}$

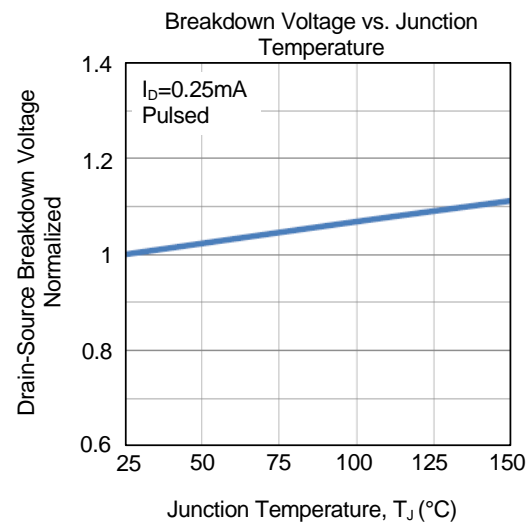
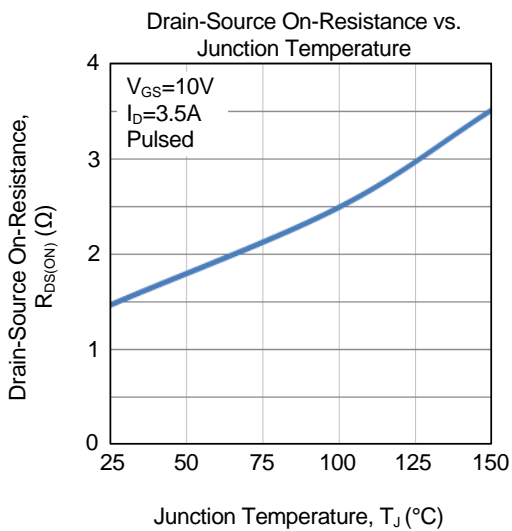
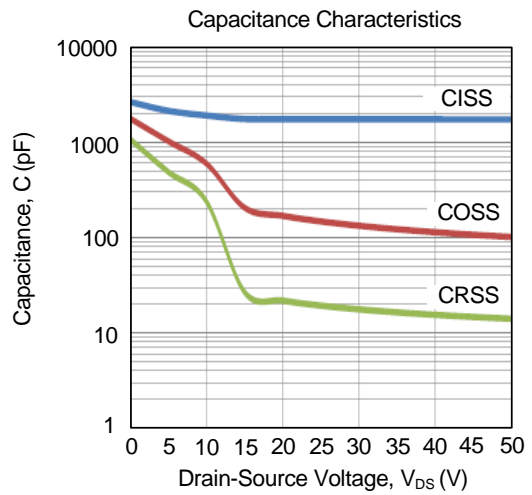
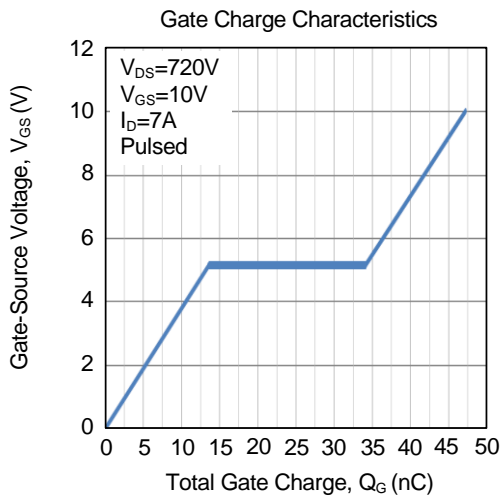
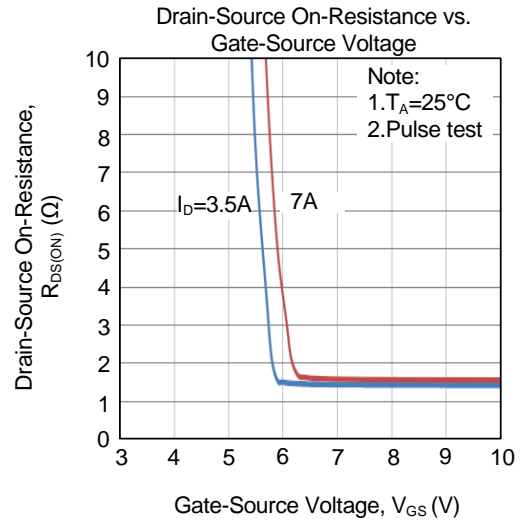
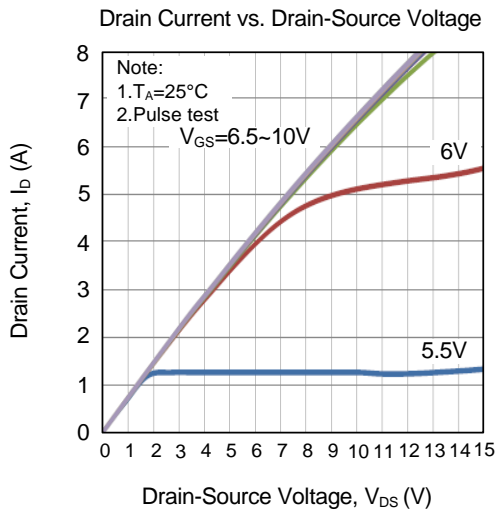
ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	900			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$, Referenced to 25°C		0.96		$V/^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=900V, V_{GS}=0V$			10	μA
		$V_{DS}=720V, T_C=125^\circ\text{C}$			100	μA
Gate-Source Leakage Current	Forward	$V_{DS}=0V, V_{GS}=30V$			100	nA
	Reverse	$V_{DS}=0V, V_{GS}=-30V$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0		5.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=3.5A$		1.5	1.8	Ω
Forward Transconductance	g_{FS}	$V_{DS}=50V, I_D=3.5A$ (Note 4)		5.7		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{MHz}$			1880	pF
Output Capacitance	C_{OSS}				185	pF
Reverse Transfer Capacitance	C_{RSS}				23	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=720V, V_{GS}=10V, I_D=7A$ $I_G=1\text{mA}$ (Note 1, 2)		47		nC
Gate-Source Charge	Q_{GS}			11		nC
Gate-Drain Charge	Q_{GD}			13.6		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=100V, V_{GS}=10V, I_D=7A,$ $R_G=25\Omega$ (Note 1, 2)		28		ns
Turn-ON Rise Time	t_R			22		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			130		ns
Turn-OFF Fall Time	t_F			53		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				6.4	A
Maximum Body-Diode Pulsed Current	I_{SM}				14	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=7.0A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=7.0A, V_{GS}=0V,$		624		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$dI_F/dt=100A/\mu s$ (Note 4)		18.25		μC

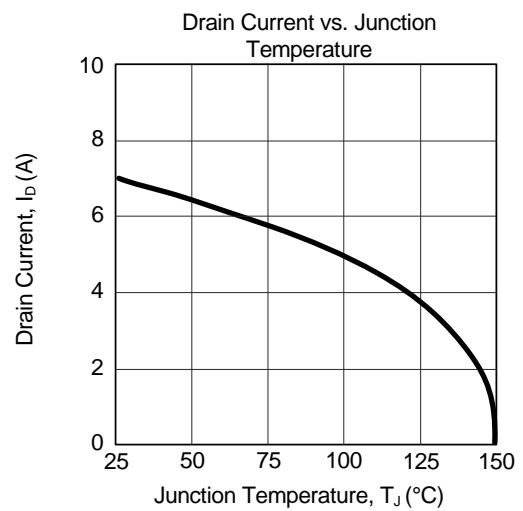
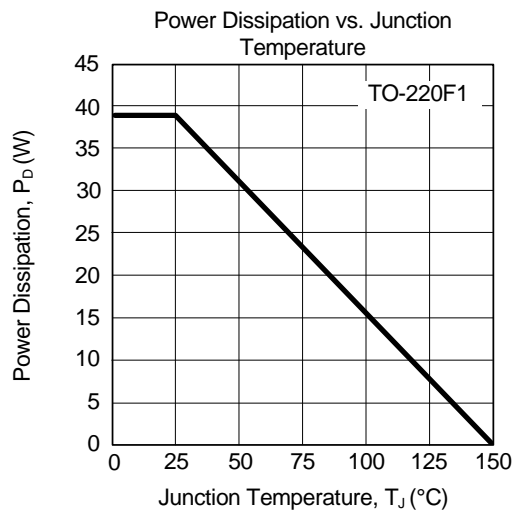
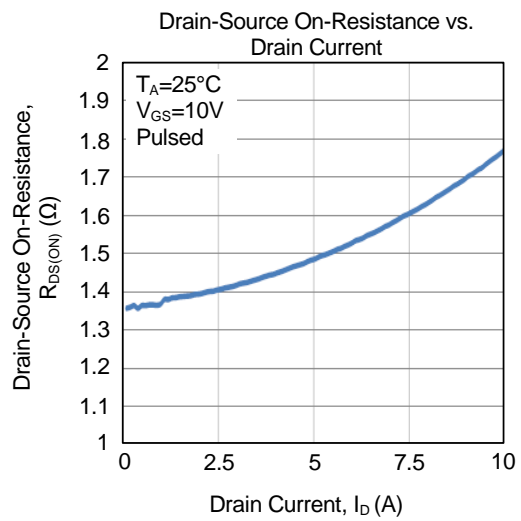
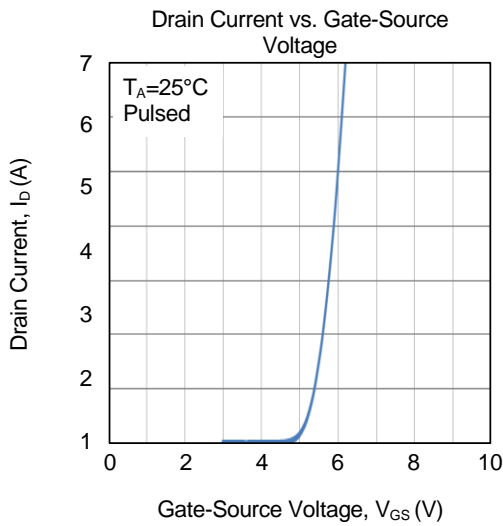
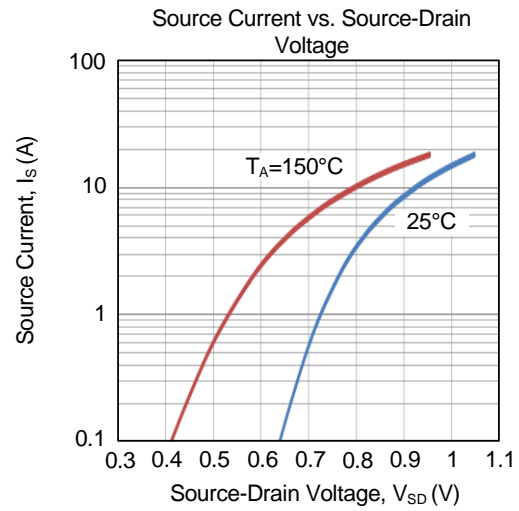
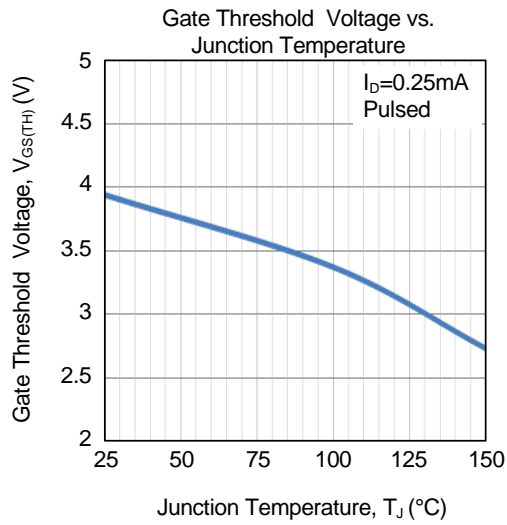
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)

