



## 6N90

## Power MOSFET

### 6.2A, 900V N-CHANNEL POWER MOSFET

#### DESCRIPTION

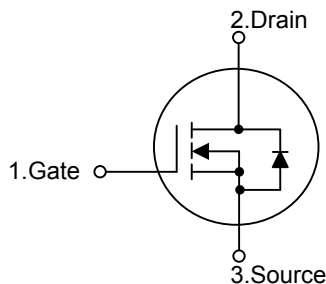
The UTC **6N90** is an N-channel enhancement mode power MOSFET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **6N90** is generally applied in high efficiency switch mode power supplies.

#### FEATURES

- \*  $R_{DS(ON)} = 2.3\Omega @ V_{GS} = 10V$
- \* Fast switching
- \* 100% avalanche tested
- \* Improved dv/dt capability

#### SYMBOL

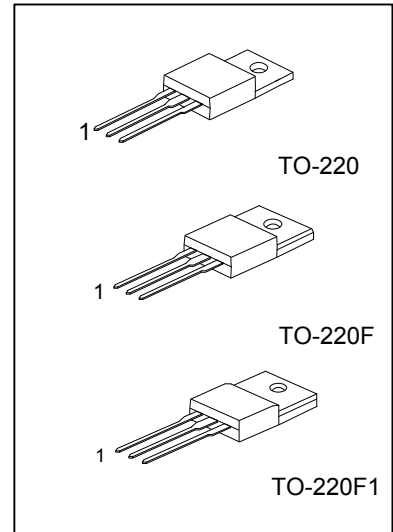


#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N90L-TA3-T	6N90G-TA3-T	TO-220	G	D	S	Tube
6N90L-TF3-T	6N90G-TF3-T	TO-220F	G	D	S	Tube
6N90L-TF1-T	6N90G-TF1-T	TO-220F1	G	D	S	Tube

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

6N90L - TA3 - T	(1) Packing Type (2) Package Type (3) Lead Free	(1) T: Tube (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1 (3) G: Halogen Free, L: Lead Free
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■ 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 ( $T_C=25^{\circ}\text{C}$ )	$I_D$	6.2	A
	Pulsed (Note 2)	$I_{DM}$	24	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	650	mJ
	Repetitive (Note 2)	$E_{AR}$	16.7	mJ
Peak Diode Recovery $dv/dt$ (Note 4)		$dv/dt$	4.5	V/ns
Power Dissipation	TO-220	$P_D$	167	W
	TO-220F/TO220F1		56	W
Junction Temperature		$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature		$T_{STG}$	-55~+150	$^{\circ}\text{C}$

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.  $L = 34\text{mH}$ ,  $I_{AS} = 6\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$

4.  $I_{SD} \leq 6\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^{\circ}\text{C}$

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		$\theta_{JA}$	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220	$\theta_{JC}$	0.75	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO220F1		2.25	$^{\circ}\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise specified)

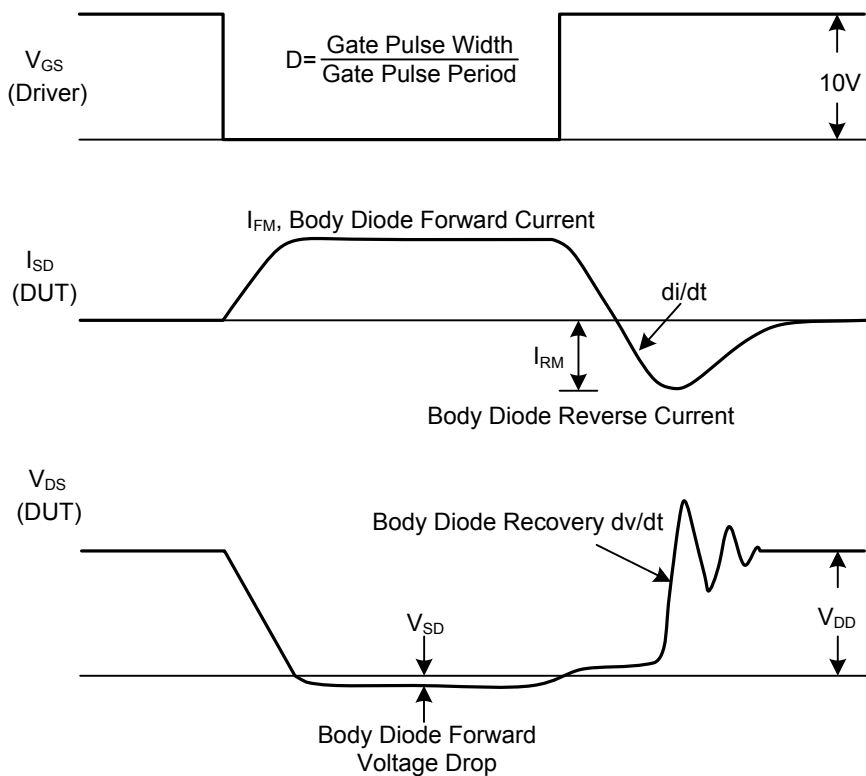
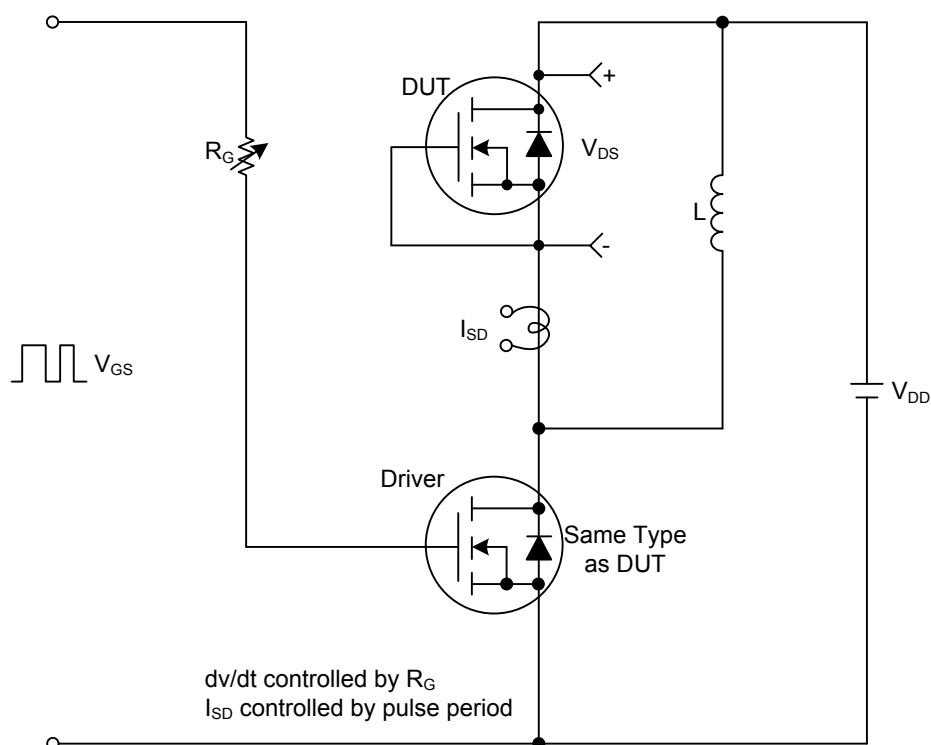
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	900			V
Breakdown Voltage Temperature Coefficient		ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =250μA		1.07		V/°C
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =900V, V <sub>GS</sub> =0V			10	μA
			V <sub>DS</sub> =720V, T <sub>C</sub> =125°C			100	
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V			+100	nA
	Reverse		V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	3.0		5.0	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.1A		1.85	2.3	Ω
Forward Transconductance		g <sub>FS</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =3.1A (Note 1)		5.5		S
DYNAMIC PARAMETERS							
Input Capacitance		C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		1360	1770	pF
Output Capacitance		C <sub>OSS</sub>			110	145	pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			11	15	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q <sub>G</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =720V, I <sub>D</sub> =6.2A (Note 1, 2)		30	40	nC
Gate to Source Charge		Q <sub>GS</sub>			9.0		nC
Gate to Drain Charge		Q <sub>GD</sub>			12		nC
Turn-ON Delay Time		t <sub>D(ON)</sub>	V <sub>DD</sub> =450V, I <sub>D</sub> =6.2A, R <sub>G</sub> =25Ω (Note 1, 2)		35	80	ns
Rise Time		t <sub>R</sub>			90	190	ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			55	120	ns
Fall-Time		t <sub>F</sub>			60	130	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I <sub>S</sub>				6.0	A
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>				24	A
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	I <sub>S</sub> =6.2A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time		t <sub>RR</sub>	I <sub>S</sub> =6.2A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/μs		630		ns
Body Diode Reverse Recovery Charge		Q <sub>RR</sub>	(Note 1)		6.9		μC

Note: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

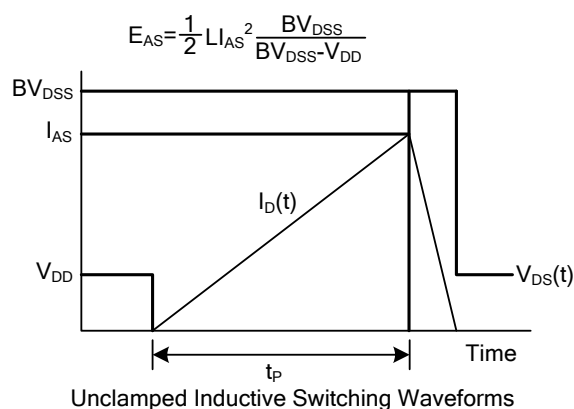
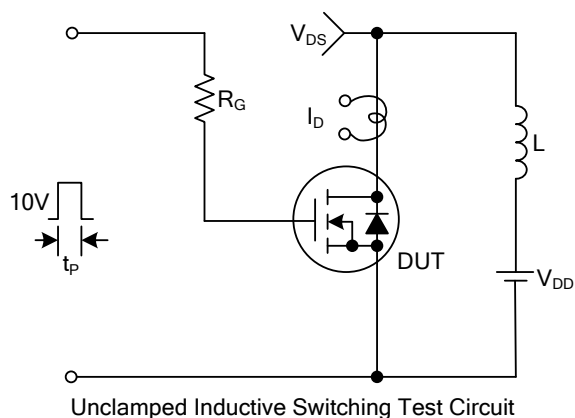
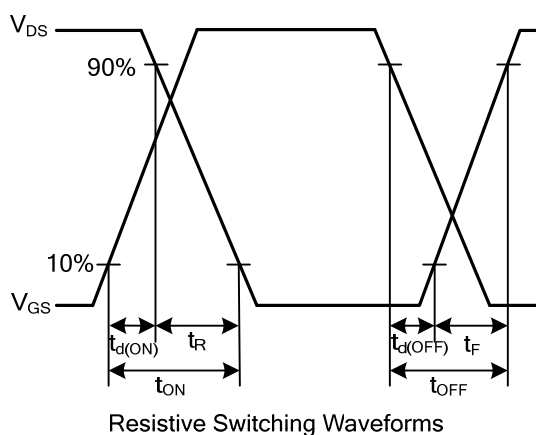
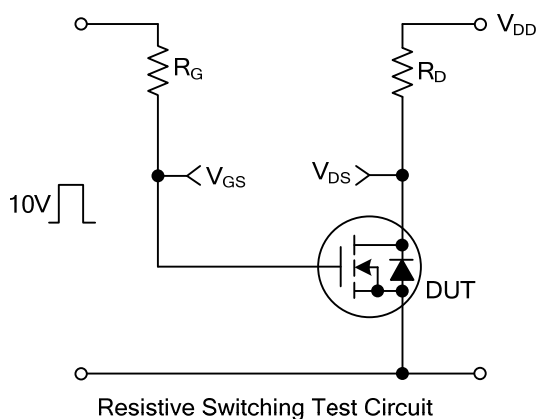
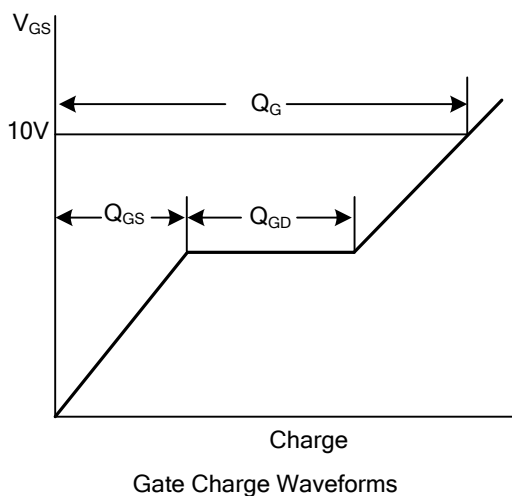
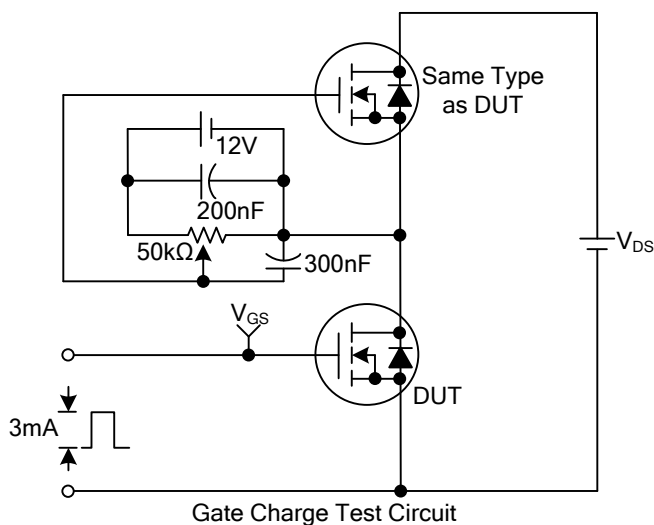
2. Essentially independent of operating temperature

# ■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit &amp; Waveforms



# ■ TEST CIRCUITS AND WAVEFORMS(Cont.)



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