



## 7N70-M

Preliminary

Power MOSFET

### 7A, 700V N-CHANNEL POWER MOSFET

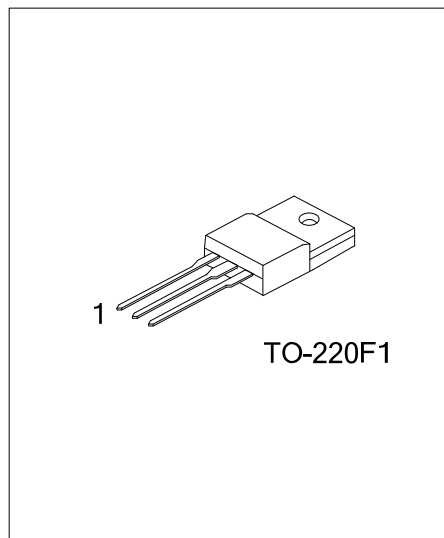
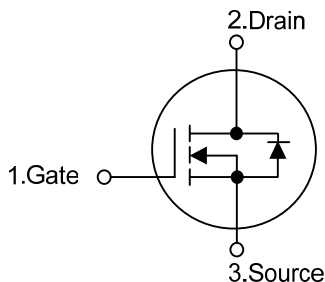
#### DESCRIPTION

The **UTC 7N70-M** is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

#### FEATURES

- \*  $R_{DS(ON)} < 1.4\Omega @ V_{GS} = 10V, I_D = 3.5A$
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

#### SYMBOL



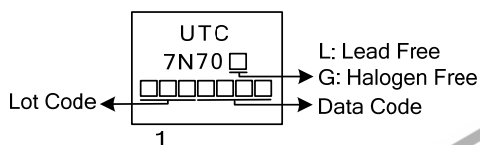
#### ORDERING INFORMATION

Order Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N70L-TF1-T	7N70G-TF1-T	TO-220F1	G	D	S	Tube

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

<p>7N70L-TF1-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube</p> <p>(2) TF1: TO-220F1</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
---	--

#### MARKING



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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	700	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ\text{C}$	7.0
		$T_C = 100^\circ\text{C}$	4.7
Drain Current Pulsed (Note 2)	$I_{DM}$	28	A
Avalanche Energy, Single Pulsed (Note 3)	$E_{AS}$	380	mJ
Avalanche Energy, Repetitive, Limited by $T_{JMAX}$	$E_{AR}$	14.2	mJ
Peak Diode Recovery $dv/dt$ (Note 4)	$dv/dt$	4.5	V/ns
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	48	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  $T_J$

3.  $L=15.5\text{mH}$ ,  $I_{AS}=7.0\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=0\ \Omega$ , Starting  $T_J=25^\circ\text{C}$

4.  $I_{SD} \leq 7.0\text{A}$ ,  $di/dt \leq 100\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	2.6	$^\circ\text{C}/\text{W}$

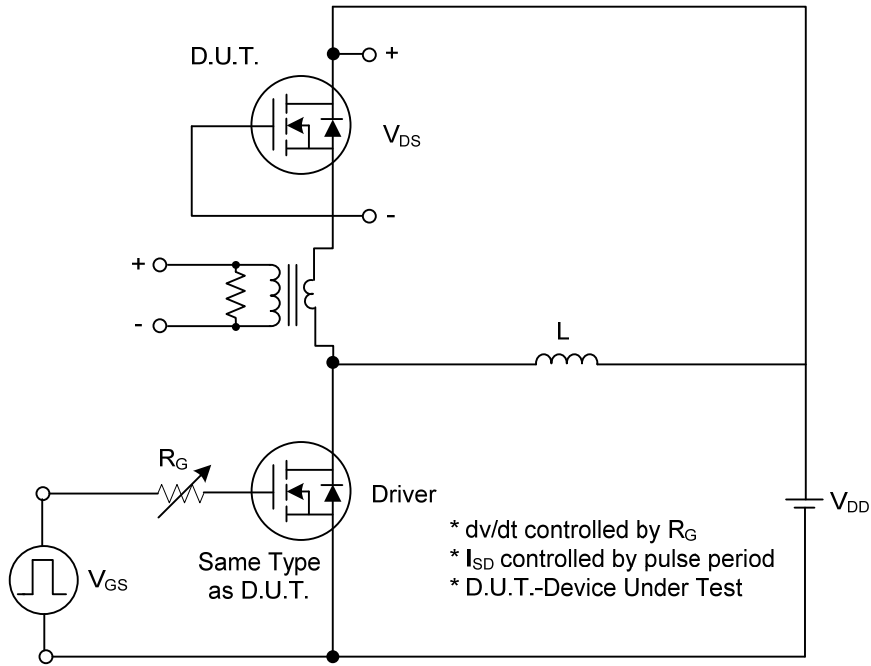
■ ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	700			V	
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 700V, V_{GS} = 0V$			1	$\mu A$	
		$V_{DS} = 560V, T_C = 125^\circ C$			1	$\mu A$	
Gate-Source Leakage Current	Forward	$I_{GSS}$			100	nA	
	Reverse				-100	nA	
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250mA$ Referenced to $25^\circ C$		0.67		$V/^\circ C$	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0		4.0	V	
Drain-Source ON-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 3.5A$			1.4	$\Omega$	
<b>DYNAMIC CHARACTERISTICS</b>							
Input Capacitance	$C_{ISS}$	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1MHz$		1000		pF	
Output Capacitance	$C_{OSS}$				97		pF
Reverse Transfer Capacitance	$C_{RSS}$				19		pF
<b>SWITCHING CHARACTERISTICS</b>							
Total Gate Charge	$Q_G$	$V_{DS} = 50V, I_D = 1.3A,$ $V_{GS} = 10V, I_G = 100\mu A$ (Note 1, 2)		120		nC	
Gate-Source Charge	$Q_{GS}$				7		nC
Gate-Drain Charge	$Q_{DD}$				18		nC
Turn-on Delay Time	$t_{D(ON)}$	$V_{DD} = 30V, V_{GS} = 10V,$ $I_D = 0.5A, R_G = 25\Omega$ (Note 1, 2)		50		ns	
Turn-on Rise Time	$t_R$				80		ns
Turn-off Delay Time	$t_{D(OFF)}$				295		ns
Turn-off Fall Time	$t_F$				75		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 7.0A$			1.4	V	
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				7.0	A	
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				28	A	
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_S = 7.0A,$		320		ns	
Reverse Recovery Charge	$Q_{RR}$	$di/dt = 100 A/\mu s$ (Note 1)		2.4		$\mu C$	

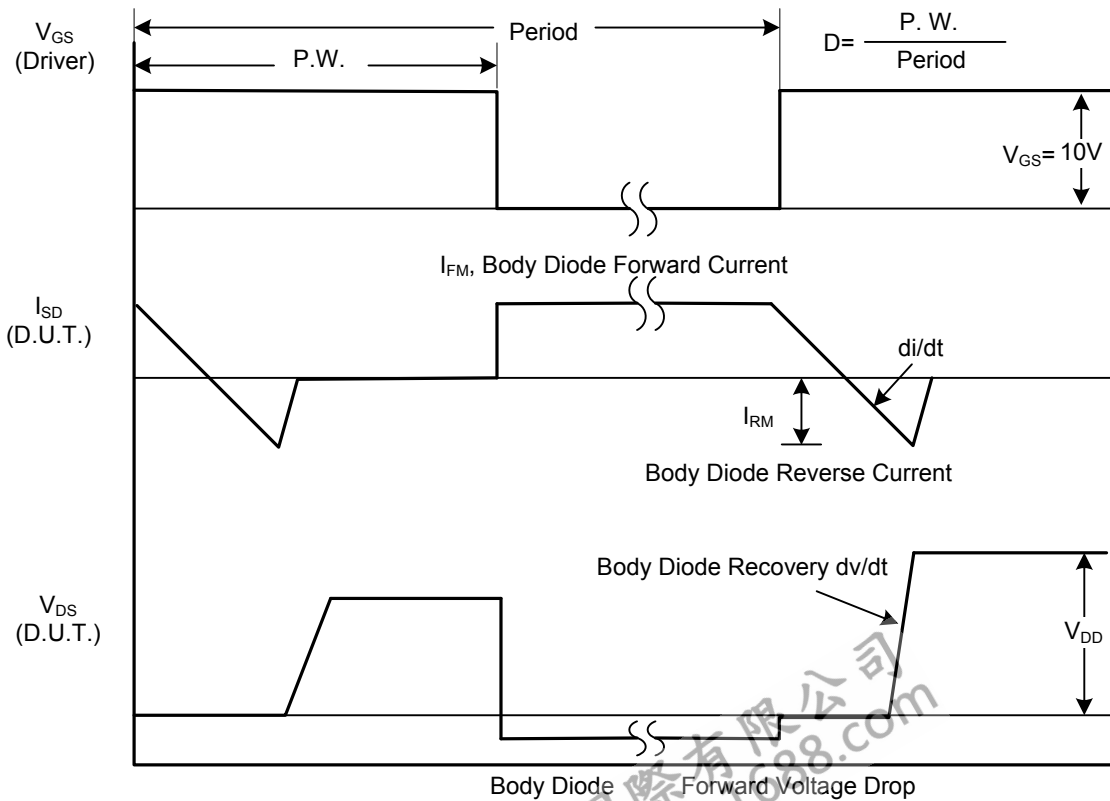
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

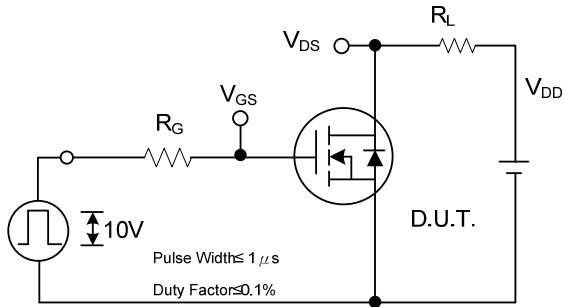


Peak Diode Recovery dv/dt Test Circuit

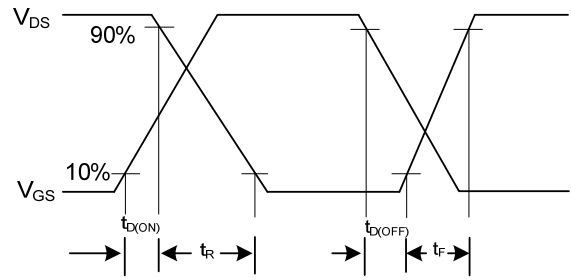


Peak Diode Recovery dv/dt Waveforms

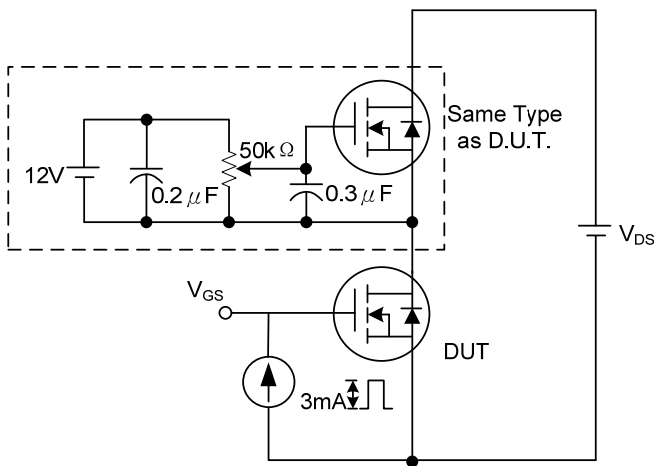
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



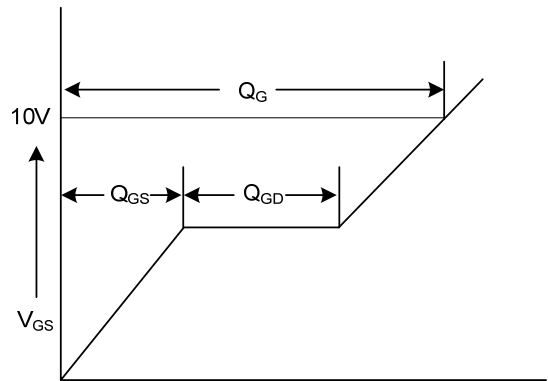
Switching Test Circuit



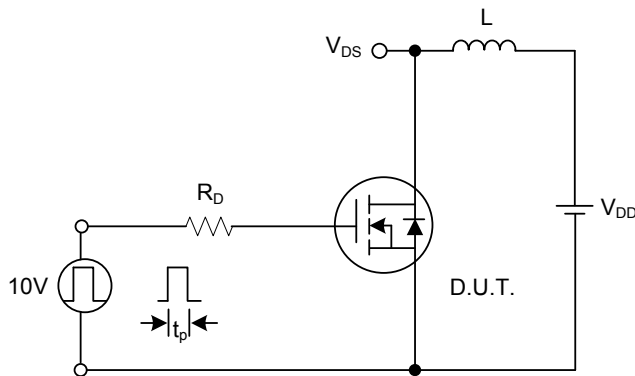
Switching Waveforms



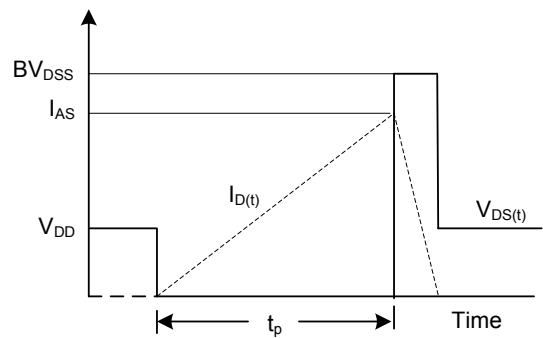
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.