



**8N70**

Preliminary

**Power MOSFET**

**8A, 700V N-CHANNEL  
POWER MOSFET**

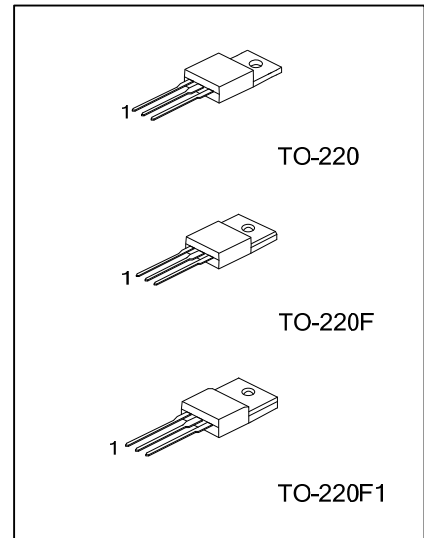
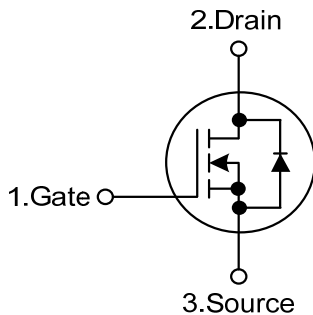
■ DESCRIPTION

The UTC **8N70** is an N-channel power MOSFET using UTC's advanced technology to provide the customers with minimum on-state resistance, superior switching performance and withstand high energy pulse in the avalanche and commutation mode.

■ FEATURES

- \*  $R_{DS(ON)} < 1.4\Omega @ V_{GS}=10V, I_D=4A$
- \* High switching speed
- \* Low Gate Charge (typical 112nC)
- \* Low  $C_{RSS}$  (typical 13.7pF)

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8N70L-TA3-T	8N70G-TA3-T	TO-220	G	D	S	Tube
8N70L-TF1-T	8N70G-TF1-T	TO-220F1	G	D	S	Tube
8N70L-TF3-T	8N70G-TF3-T	TO-220F	G	D	S	Tube

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

<p>8N70L-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F</p> <p>(3) L: Lead Free, G: Halogen Free</p>
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■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	700	V	
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V	
Drain Current	Continuous	$I_D$	$T_C=25^\circ\text{C}$	8	A
			$T_C=100^\circ\text{C}$	4.8	A
	Pulsed (Note 4)		$I_{DM}$	32	A
Avalanche Current	Repetitive (Note 2)	$I_{AR}$	8	A	
	Repetitive (Note 3)	$I_{AS}$	8	A	
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	230	mJ	
	Repetitive (Note 2)	$E_{AR}$	11.6	mJ	
Power Dissipation ( $T_C=25^\circ\text{C}$ )	TO-220	$P_D$	147	W	
	TO-220F/TO-220F1		49		
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.  $L = 7.74\text{mH}$ ,  $I_{AS} = 8\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

4. Limited by maximum junction temperature

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	$\theta_{JC}$	0.85	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		2.55	

Note: 3 surface mounted on FR4 board  $t \leq 10\text{sec}$

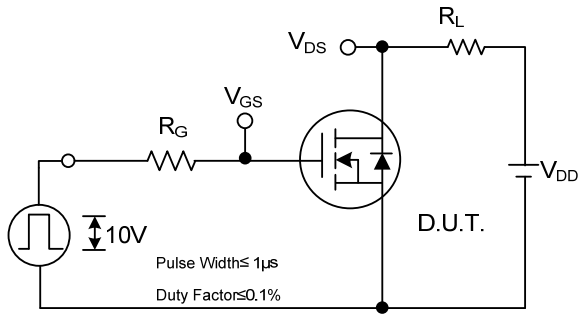
■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	700			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=700\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$
		$V_{DS}=560\text{V}$ , $T_C=125^\circ\text{C}$			100	$\mu\text{A}$
Gate-Source Leakage Current	Forward	$I_{GSS}$				
	Reverse					
		$V_{GS}=+30\text{V}$ , $V_{DS}=0\text{V}$			+10	nA
		$V_{GS}=-30\text{V}$ , $V_{DS}=0\text{V}$			-10	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=4\text{A}$		1.2	1.4	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		1600		pF
Output Capacitance	$C_{OSS}$			124		pF
Reverse Transfer Capacitance	$C_{RSS}$			13.7		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	$Q_G$	$V_{GS}=10\text{V}$ , $V_{DS}=560\text{V}$ , $I_D=8\text{A}$ (Note 1, 2)		112		nC
Gate to Source Charge	$Q_{GS}$			38		nC
Gate to Drain Charge	$Q_{GD}$			33		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=300\text{V}$ , $I_D=10\text{A}$ , $R_G=25\Omega$ , $V_{GS}=10\text{V}$ (Note 1, 2)		95		ns
Rise Time	$t_R$			115		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			166		ns
Fall-Time	$t_F$			80		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$	Integral reverse diode in the MOSFET			8	A
Maximum Body-Diode Pulsed Current	$I_{SM}$				32	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	$t_{rr}$	$I_S=8\text{A}$ , $V_{GS}=0\text{V}$ , $dI_F/dt=100\text{A}/\mu\text{s}$		420		ns
Body Diode Reverse Recovery Charge	$Q_{RR}$			4.2		$\mu\text{C}$

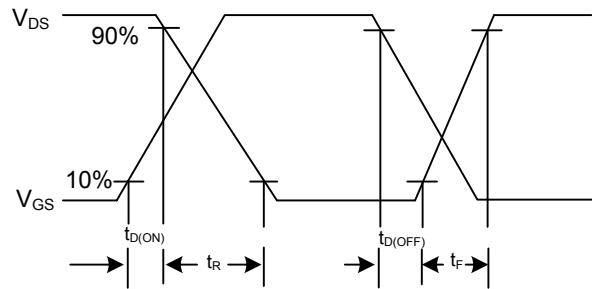
Notes: 1. Essentially independent of operating temperature.

2. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

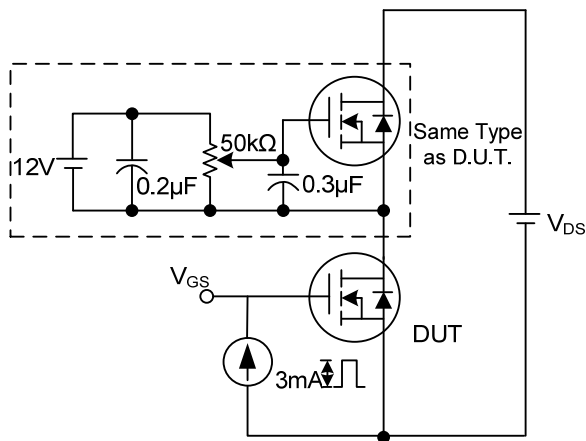
■ TEST CIRCUITS AND WAVEFORMS



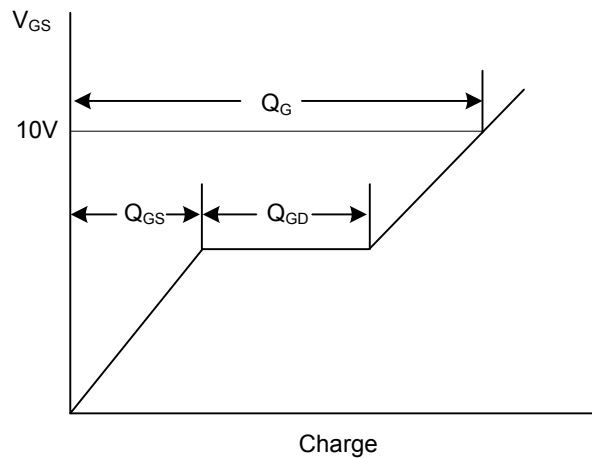
Switching Test Circuit



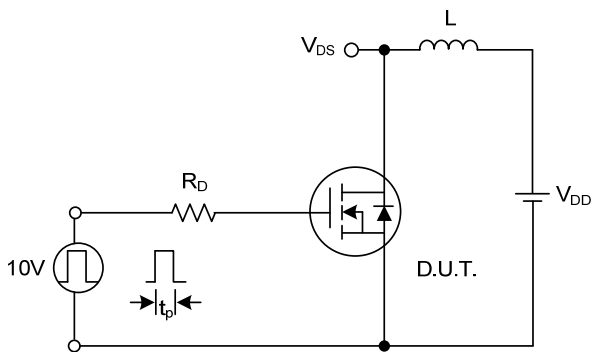
Switching Waveforms



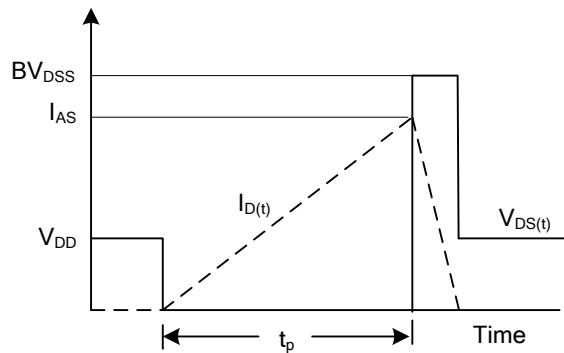
Gate Charge Test Circuit



Gate Charge Waveform

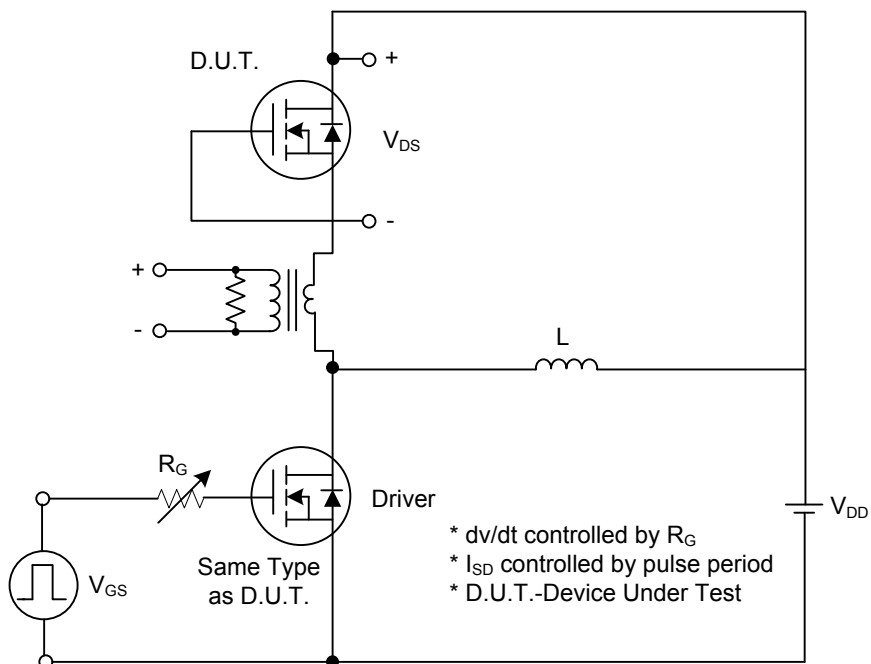


Unclamped Inductive Switching Test Circuit

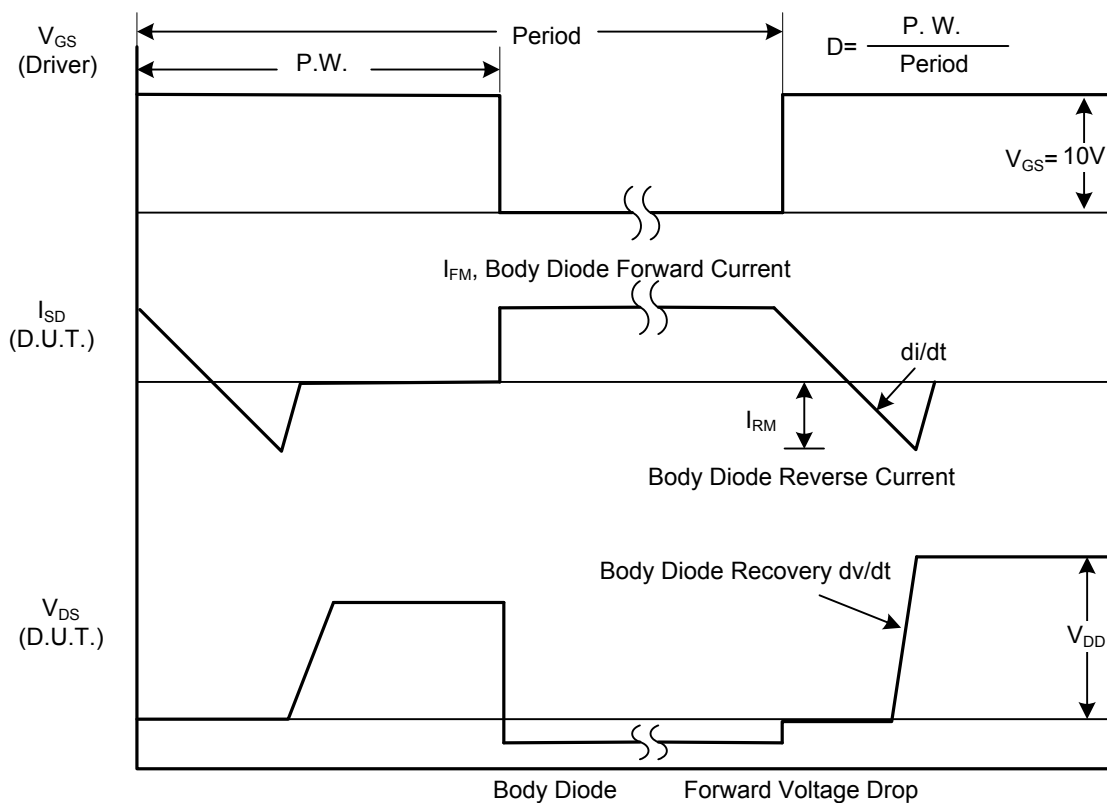


Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)

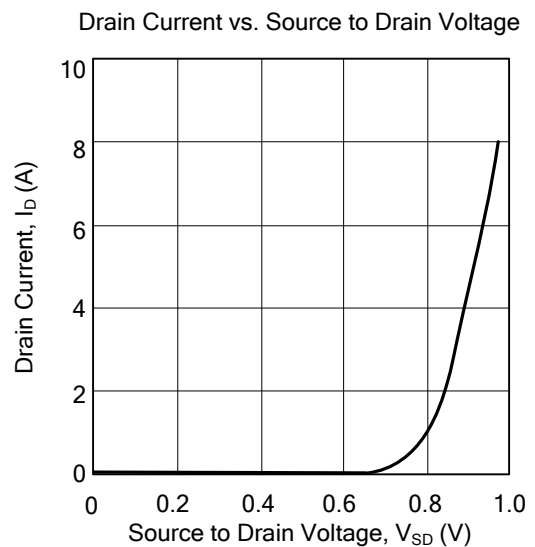
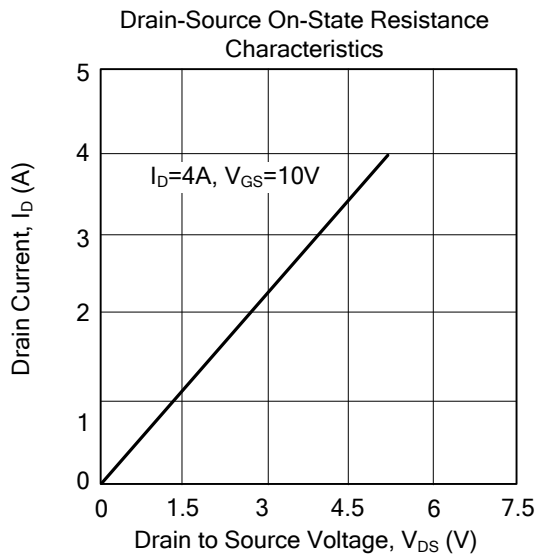
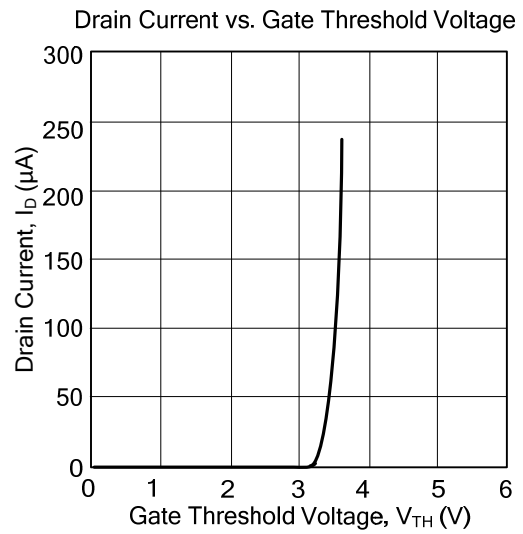
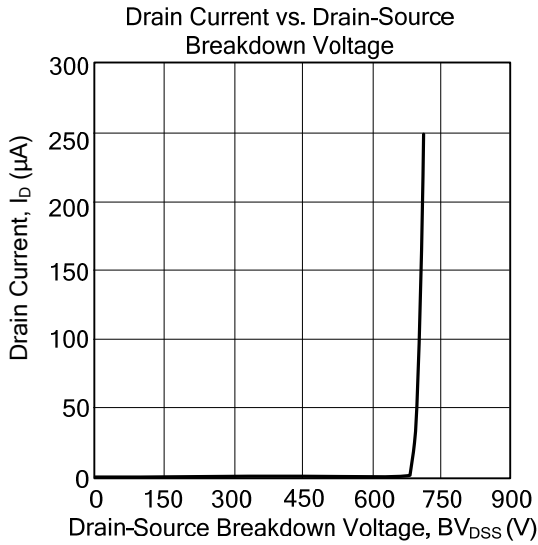


Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ TYPICAL CHARACTERISTICS



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