



# 6N70K-TA

**Power MOSFET**

## 6.0A, 700V N-CHANNEL POWER MOSFET

■ DESCRIPTION

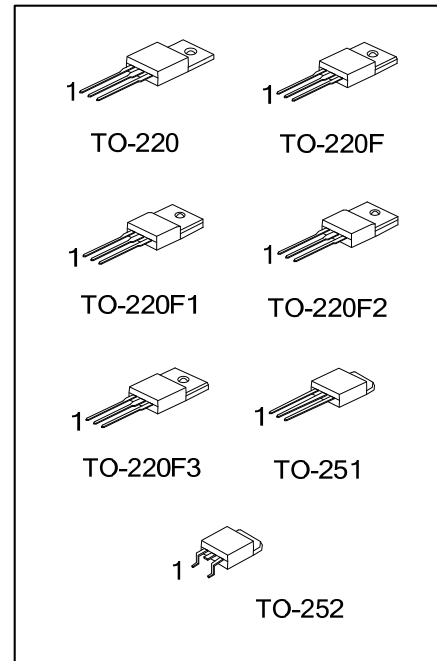
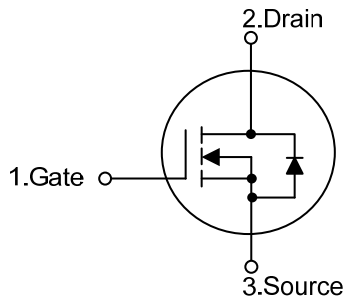
The UTC **6N70K-TA** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed, low gate charge and low input capacitance.

The UTC **6N70K-TA** is universally applied in high efficiency switch mode power supply.

■ FEATURES

- \*  $R_{DS(ON)} < 2.0\Omega$  @  $V_{GS}=10V, I_D=3.0A$
- \* High switching speed

■ SYMBOL



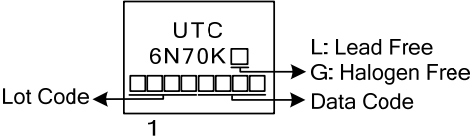
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N70KL-TA3-T	6N70KG-TA3-T	TO-220	G	D	S	Tube
6N70KL-TF3-T	6N70KG-TF3-T	TO-220F	G	D	S	Tube
6N70KL-TF1-T	6N70KG-TF1-T	TO-220F1	G	D	S	Tube
6N70KL-TF3-T	6N70KG-TF3-T	TO-220F2	G	D	S	Tube
6N70KL-TF3T-T	6N70KG-TF3T-T	TO-220F3	G	D	S	Tube
6N70KL-TM3-R	6N70KG-TM3-R	TO-251	G	D	S	Tape Reel
6N70KL-TN3-R	6N70KG-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>6N70KL-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TF3T: TO-220F3, TM3: TO-251, TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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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 (Note 2)		$V_{GSS}$	$\pm 30$	V	
Drain Current	Continuous $T_C=25^\circ\text{C}$	$I_D$	6	A	
	Pulsed	$I_{DM}$	24	A	
Avalanche Current (Note 2)		$I_{AR}$	6	A	
Avalanche Energy		Single Pulsed (Note 3)	$E_{AS}$	150	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3	V/ns	
Power Dissipation	TO-220	$P_D$	125	W	
	TO-220F/TO-220F1		42		
	TO-220F2/TO-220F3		55		
	TO-251/TO-252		1		
Linear Derating Factor	TO-220	$P_D$	1	$W/^\circ\text{C}$	
	TO-220F/TO-220F1		0.336		
	TO-220F2/TO-220F3		0.44		
	TO-251/TO-252		0.44		
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.  $L = 19\text{mH}$ ,  $I_{AS} = 4.0\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , 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 DATA

PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-220F3			
	TO-251/TO-252			
Junction to Case	TO-220	$\theta_{JC}$	1.0	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1			
	TO-220F2/TO-220F3			
	TO-251/TO-252			

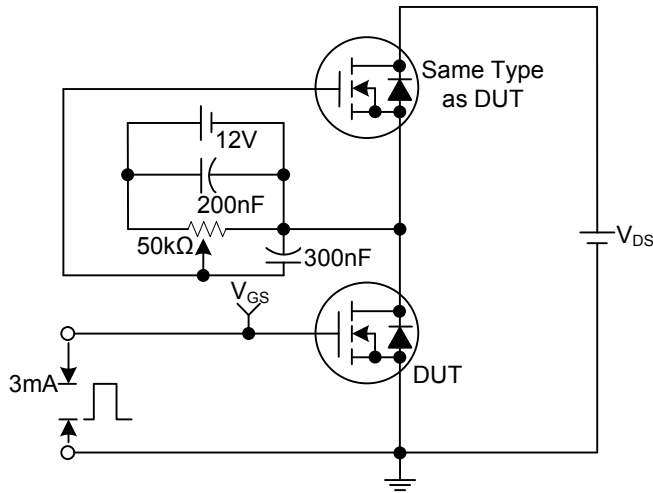
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	700			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =700V, V <sub>GS</sub> =0V			1	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>			+100	nA
	Reverse				-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.0A			2.0	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		970		pF
Output Capacitance	C <sub>OSS</sub>			70		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			6		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 1)	Q <sub>G</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =1.3A, I <sub>G</sub> =100μA (Note 1, 2)		62		nC
Gate to Source Charge	Q <sub>GS</sub>			5		nC
Gate to Drain Charge	Q <sub>GD</sub>			6		nC
Turn-ON Delay Time (Note 1)	t <sub>D(ON)</sub>	V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A, R <sub>G</sub> = 25Ω (Note 1, 2)		40		ns
Rise Time	t <sub>R</sub>			35		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			160		ns
Fall-Time	t <sub>F</sub>			40		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				6	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				24	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>S</sub> =6.0A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t <sub>rr</sub>	I <sub>S</sub> =6.0A, V <sub>GS</sub> =0V,		450		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>F</sub> /dt=100A/μs		3.0		μC

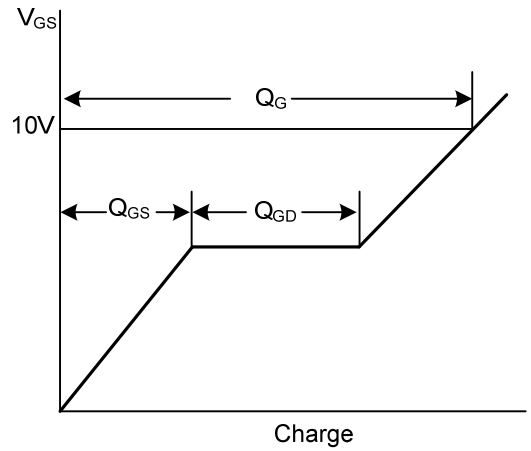
Notes: 1. Pulse Test: Pulse width ≤ 250μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

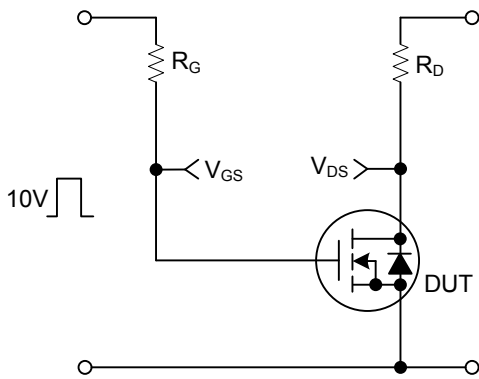
## TEST CIRCUITS AND WAVEFORMS



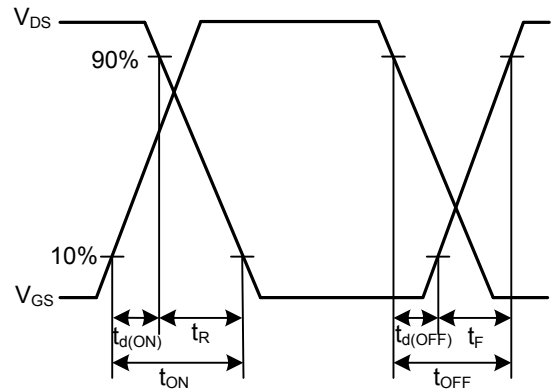
**Gate Charge Test Circuit**



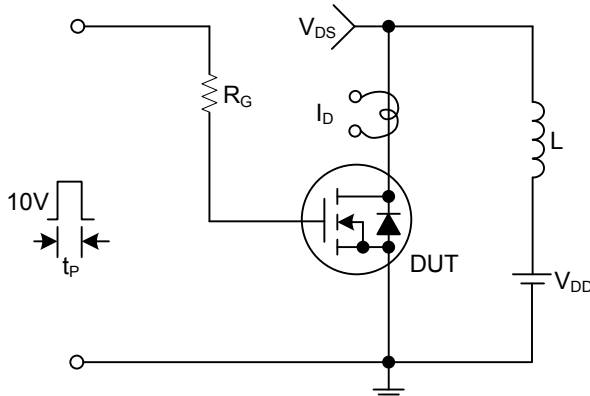
**Gate Charge Waveforms**



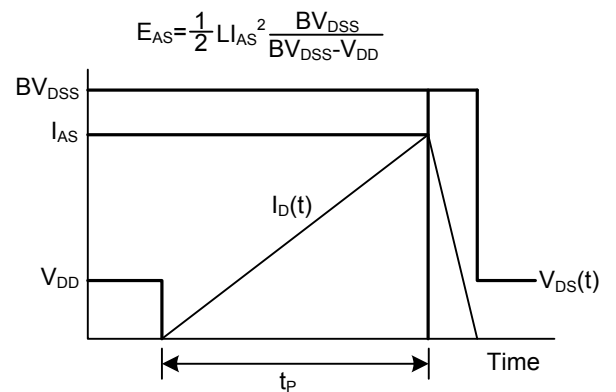
**Resistive Switching Test Circuit**



**Resistive Switching Waveforms**

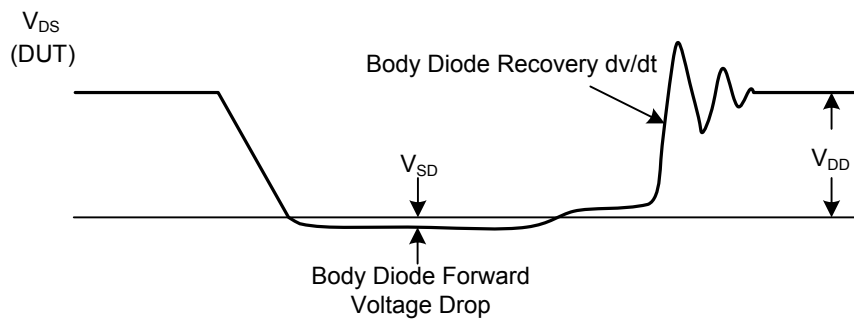
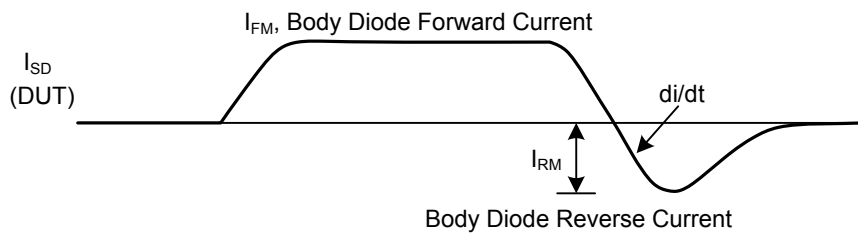
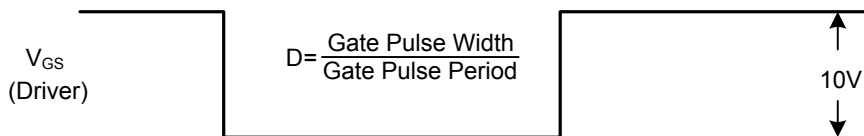
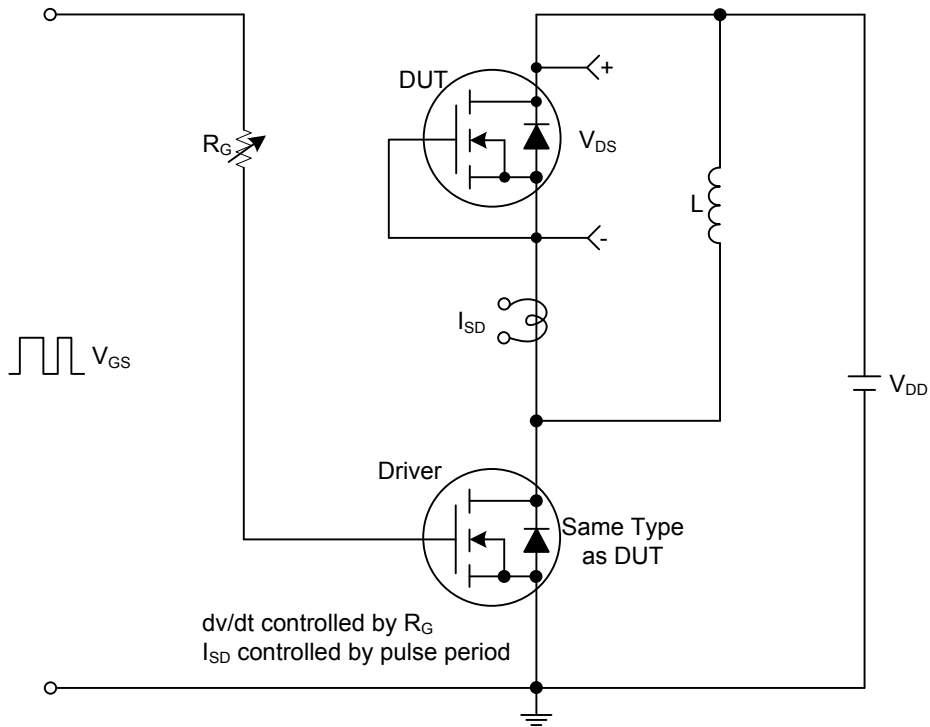


**Unclamped Inductive Switching Test Circuit**



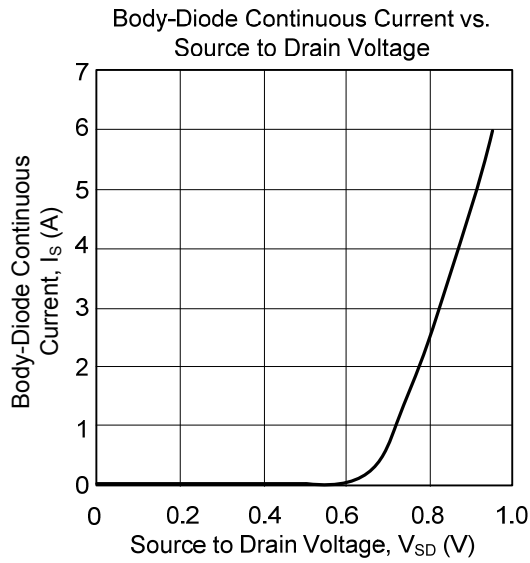
**Unclamped Inductive Switching Waveforms**

■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit and Waveforms

## ■ TYPICAL CHARACTERISTICS



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