



4N70-TC2

Power MOSFET

4A, 700V N-CHANNEL POWER MOSFET

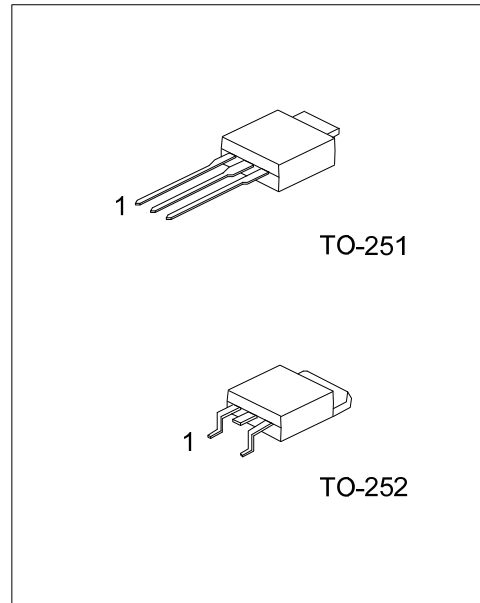
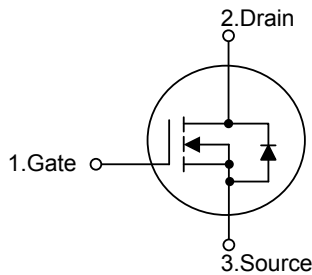
■ DESCRIPTION

The UTC **4N70-TC2** 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

- * $R_{DS(ON)} < 2.6 \Omega @ V_{GS} = 10V, I_D = 2.0A$
- * High Switching Speed

■ SYMBOL



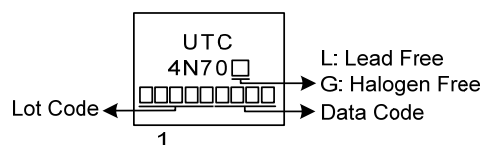
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N70L-TM3-T	4N70G-TM3-T	TO-251	G	D	S	Tube
4N70L-TN3-R	4N70G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>4N70G-TM3-T</p> <ul style="list-style-type: none"> (1) Packing Type (2) Package Type (3) Green Package 	<ul style="list-style-type: none"> (1) T: Tube, R: Tape Reel (2) TM3: TO-251, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free
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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		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	4	A
	Pulsed (Note 2)	I_{DM}	8	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	61	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.8	V/ns
Power Dissipation		P_D	49	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. $L = 10\text{mH}$, $I_{AS} = 3.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$ Starting $T_J = 25^\circ\text{C}$
 4. $I_{SD} \leq 2.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

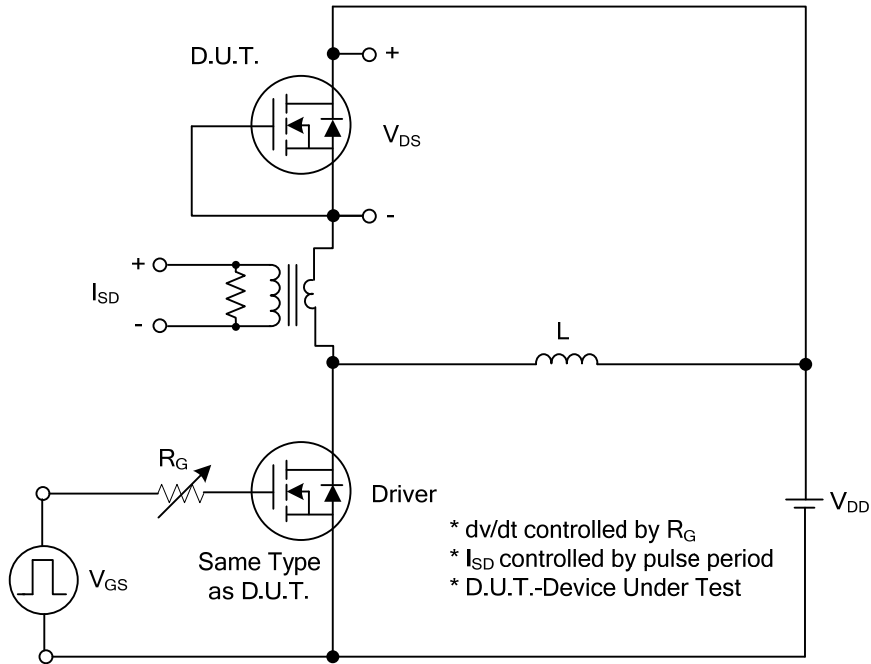
PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	110	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	2.55	$^\circ\text{C}/\text{W}$

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

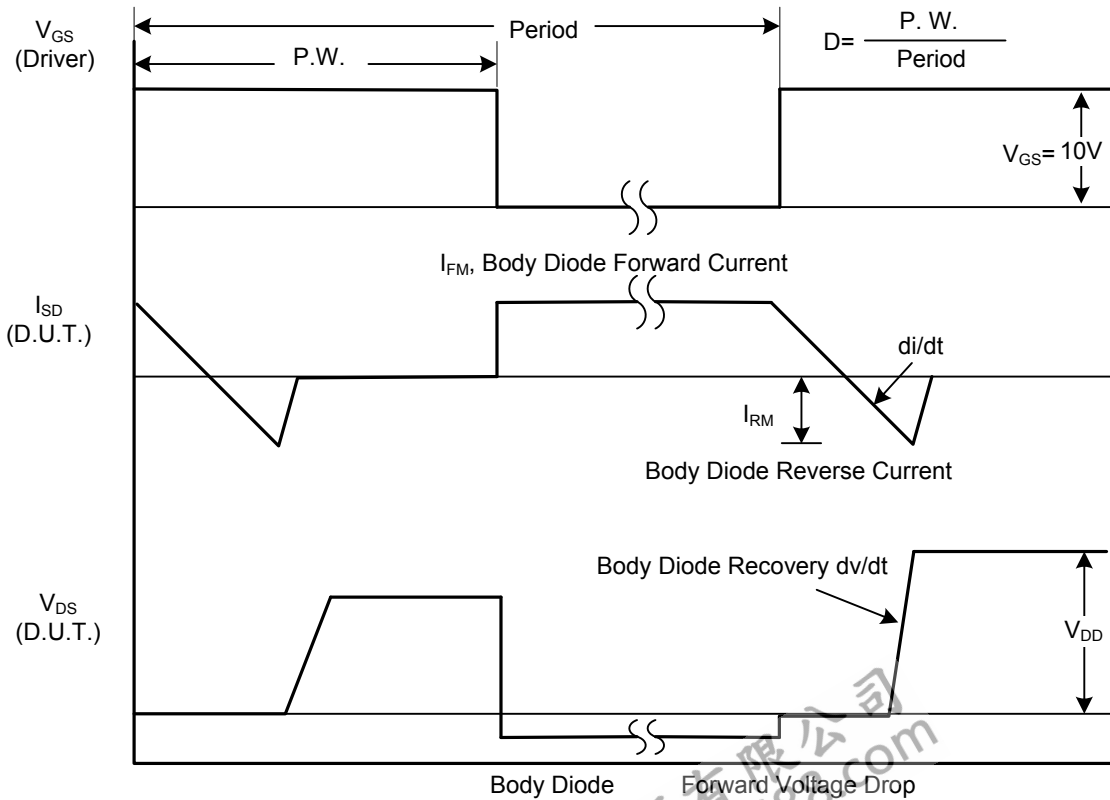
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS								
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	700			V	
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=700\text{V}$, $V_{GS}=0\text{V}$			1	μA	
Gate-Source Leakage Current	Forward	I_{GSS}	$V_{GS}=30\text{V}$, $V_{DS}=0\text{V}$			100	nA	
	Reverse		$V_{GS}=-30\text{V}$, $V_{DS}=0\text{V}$			-100	nA	
ON CHARACTERISTICS								
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		$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=2.0\text{A}$			2.6	Ω	
DYNAMIC CHARACTERISTICS								
Input Capacitance		C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		615		pF	
Output Capacitance		C_{OSS}				65		pF
Reverse Transfer Capacitance		C_{RSS}				3		pF
SWITCHING CHARACTERISTICS								
Total Gate Charge (Note 1)		Q_G	$V_{DS}=50\text{V}$, $V_{GS}=10\text{V}$, $I_D=1.3\text{A}$ $I_G=100\mu\text{A}$ (Note 1, 2)		20		nC	
Gate-source Charge		Q_{GS}				3.6		nC
Gate-drain Charge		Q_{GD}				4		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	$V_{DS}=350\text{V}$, $V_{GS}=10\text{V}$, $I_D=4.0\text{A}$, $R_G=25\ \Omega$ (Note 1, 2)		11		ns	
Rise Time		t_R				19		ns
Turn-off Delay Time		$t_{D(OFF)}$				36		ns
Fall-Time		t_F				21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS								
Maximum Body-Diode Continuous Current		I_S				4	A	
Maximum Body-Diode Pulsed Current		I_{SM}				16	A	
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	$V_{GS}=0\text{V}$, $I_S=4.0\text{A}$			1.4	V	
Reverse Recovery Time (Note 1)		t_{rr}	$V_{GS}=0\text{V}$, $I_S=4.0\text{A}$			265	ns	
Reverse Recovery Charge		Q_{rr}	$di/dt=100\text{A}/\mu\text{s}$ (Note1)			2.5	μC	

- Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.
 2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

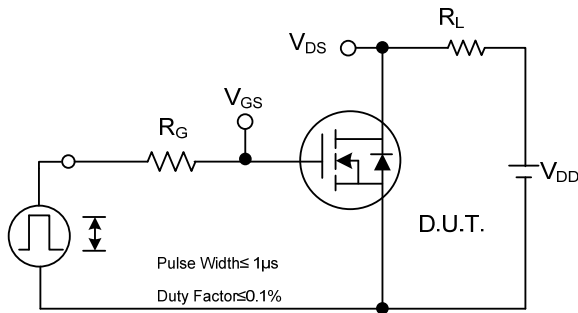


Peak Diode Recovery dv/dt Test Circuit

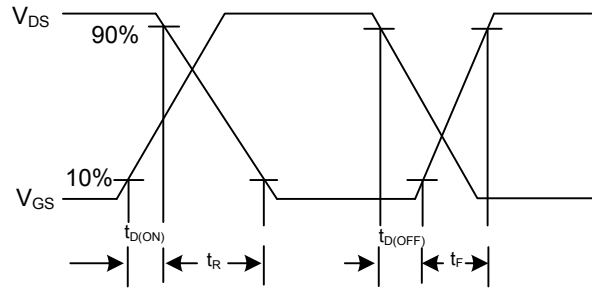


Peak Diode Recovery dv/dt Waveforms

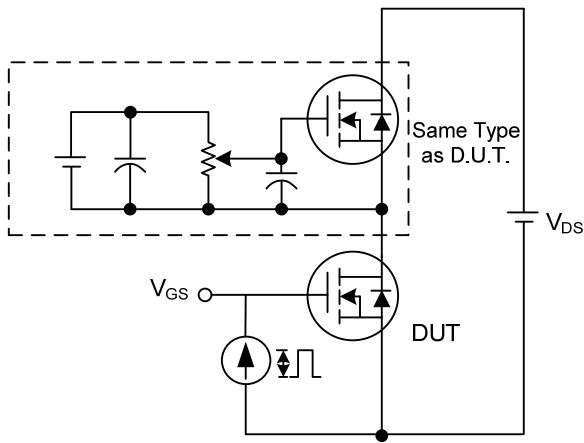
■ TEST CIRCUITS AND WAVEFORMS



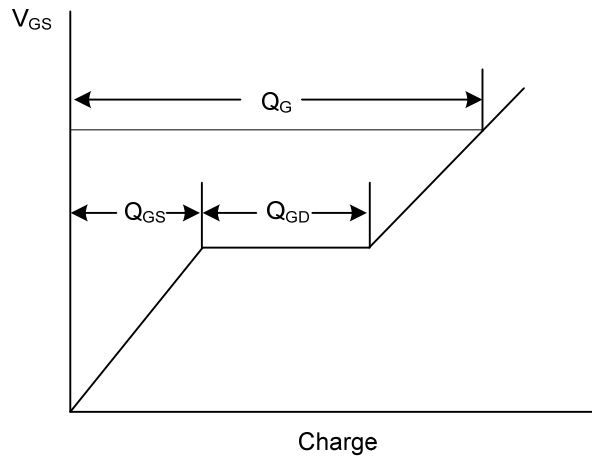
Switching Test Circuit



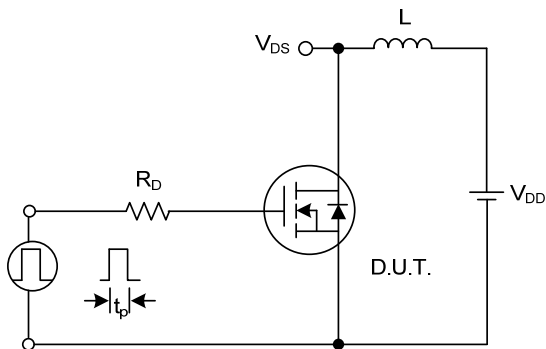
Switching Waveforms



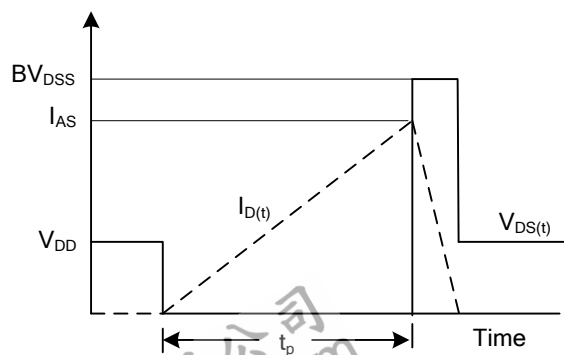
Gate Charge Test Circuit



Gate Charge Waveform

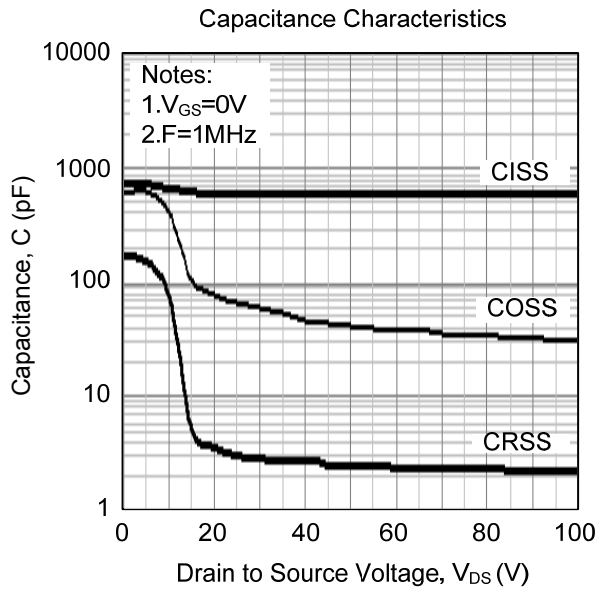


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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