



6N70-CBS

Preliminary

Power MOSFET

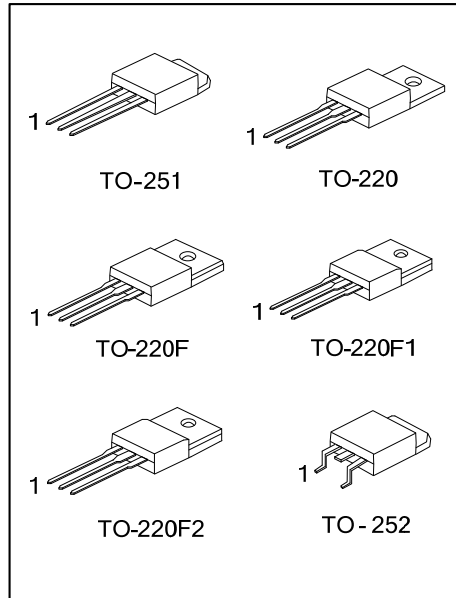
**6.0A, 700V N-CHANNEL
POWER MOSFET**

■ DESCRIPTION

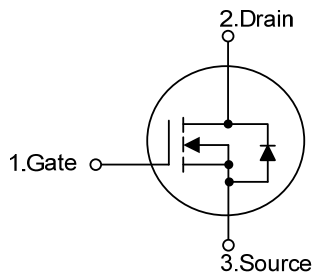
The UTC **6N70-CBS** is a high voltage MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

■ FEATURES

- * $R_{DS(ON)} < 2.24\Omega @ V_{GS} = 10V, I_D = 3.0A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness



■ SYMBOL



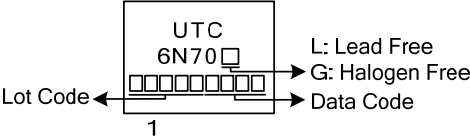
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N70L-TA3-T	6N70G-TA3-T	TO-220	G	D	S	Tube
6N70L-TF1-T	6N70G-TF1-T	TO-220F1	G	D	S	Tube
6N70L-TF2-T	6N70G-TF2-T	TO-220F2	G	D	S	Tube
6N70L-TF3-T	6N70G-TF3-T	TO-220F	G	D	S	Tube
6N70L-TM3-T	6N70G-TM3-T	TO-251	G	D	S	Tube
6N70L-TN3-R	6N70G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>6N70L-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252 (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		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	6.0	A
	Pulsed (Note 2)	I_{DM}	24	A
Avalanche Current		I_{AR}	2.4	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	29	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.1	V/ns
Power Dissipation	TO-220	P_D	125	W
	TO-220F/TO-220F1		42	W
	TO-220F2			
	TO-251/TO-252		55	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. $L=10\text{mH}$, $I_{AS}=2.4\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD}\leq 6.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.0	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		2.98	$^\circ\text{C}/\text{W}$
	TO-220F2			
	TO-251/TO-252		2.27	$^\circ\text{C}/\text{W}$

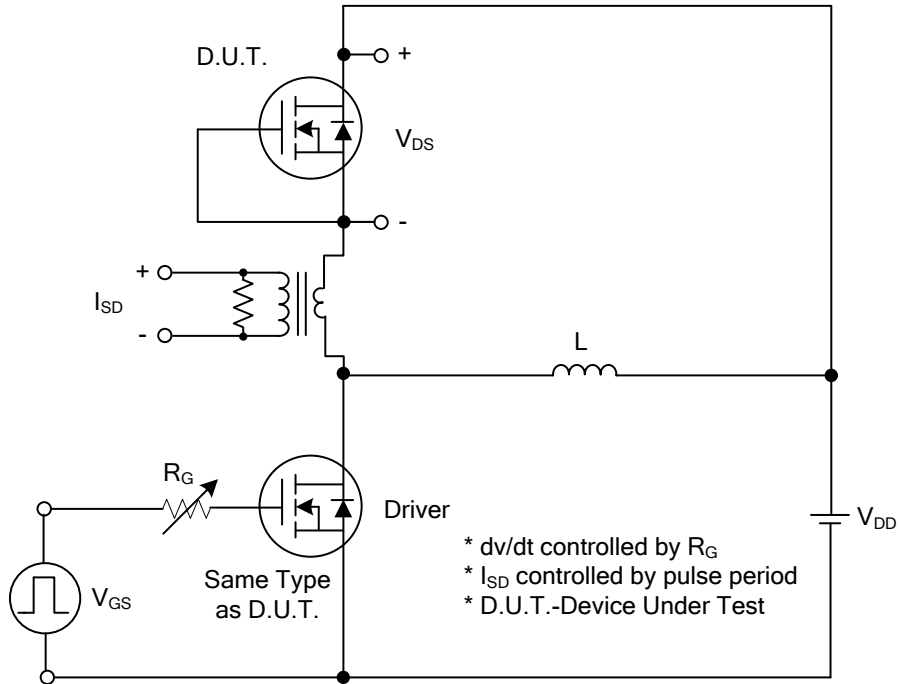
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS								
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	700			V	
Drain-Source Leakage Current		I _{DSS}	V _{DS} =700V, V _{GS} =0V			1	μA	
Gate- Source Leakage Current	Forward	I _{GSS}	V _G =30V, V _{DS} =0V			100	nA	
	Reverse		V _{GS} =-30V, V _{DS} =0V			-100	nA	
ON CHARACTERISTICS								
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V	
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =3.0A			2.24	Ω	
DYNAMIC CHARACTERISTICS								
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz		890		pF	
Output Capacitance		C _{OSS}				69		pF
Reverse Transfer Capacitance		C _{RSS}				53		pF
SWITCHING CHARACTERISTICS								
Total Gate Charge (Note 1)		Q _G	V _{DS} =50V, V _{GS} =10V, I _D =1.3A I _G =100μA (Note 1, 2)		59		nC	
Gate to Source Charge		Q _{GS}				5.3		nC
Gate to Drain Charge		Q _{GD}				5		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DS} =30V, V _{GS} =10V, I _D =0.5A, R _G =25Ω (Note 1, 2)		54		ns	
Rise Time		t _R				26		ns
Turn-OFF Delay Time		t _{D(OFF)}				161		ns
Fall-Time		t _F				30		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS								
Maximum Body-Diode Continuous Current		I _S				6.0	A	
Maximum Body-Diode Pulsed Current		I _{SM}				24	A	
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =6.0A, V _{GS} =0V			1.4	V	
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =6.0A, V _{GS} =0V		380		ns	
Body Diode Reverse Recovery Charge		Q _{rr}	dI _F /dt=200A/μs (Note 1)		2.02		μC	

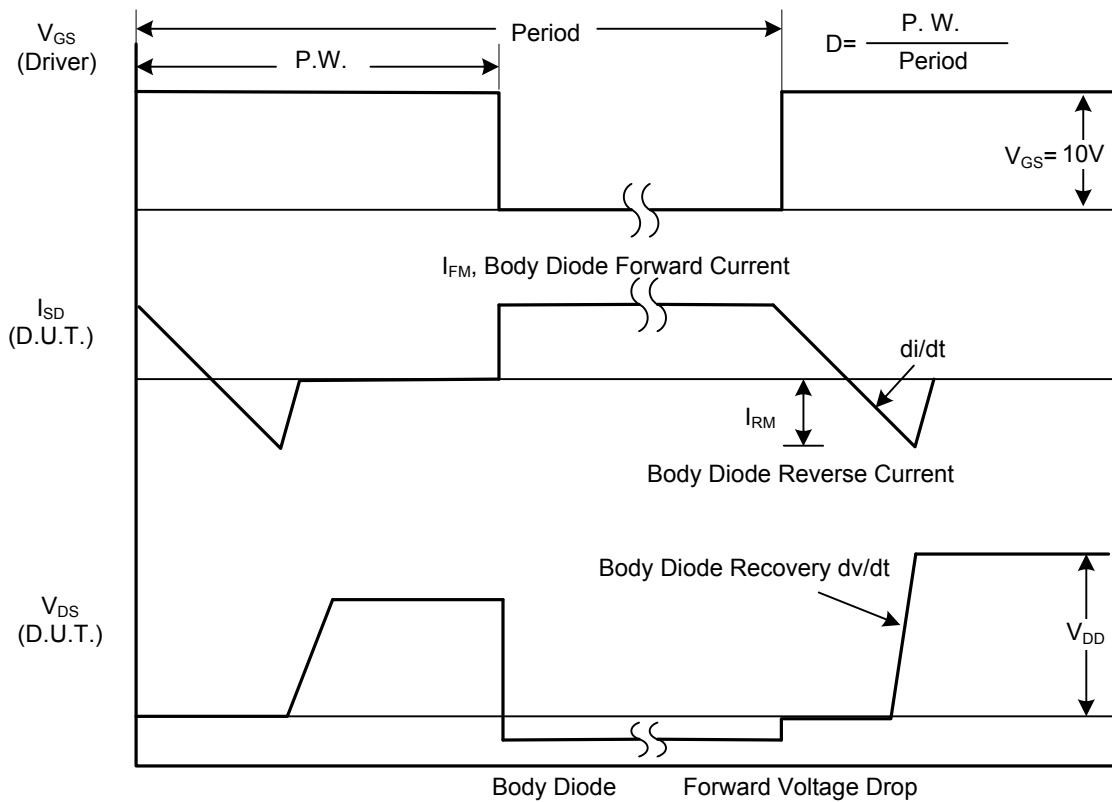
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

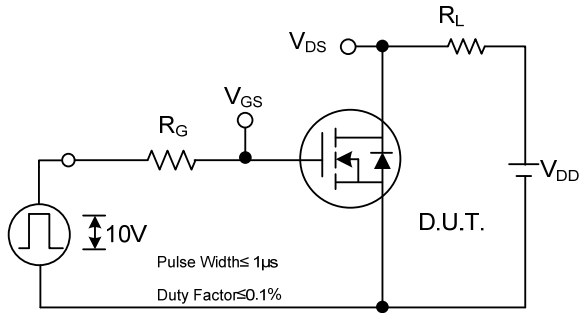


Peak Diode Recovery dv/dt Test Circuit

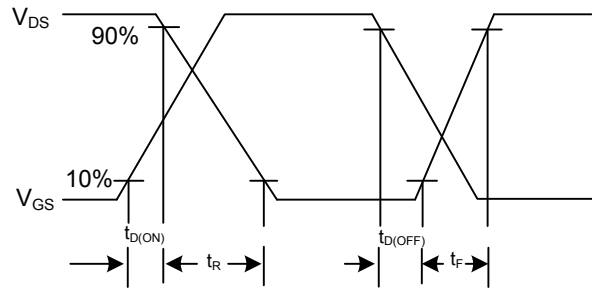


Peak Diode Recovery dv/dt Waveforms

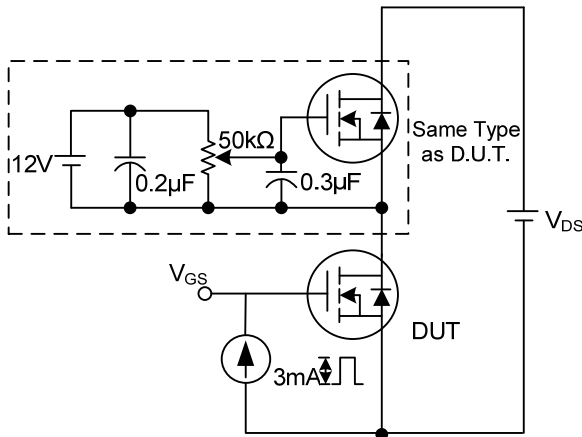
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



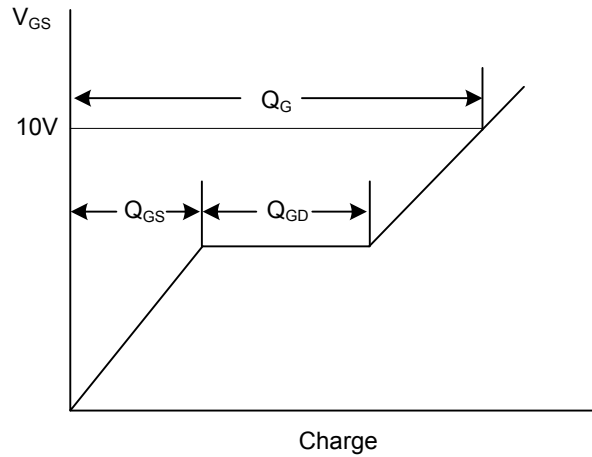
Switching Test Circuit



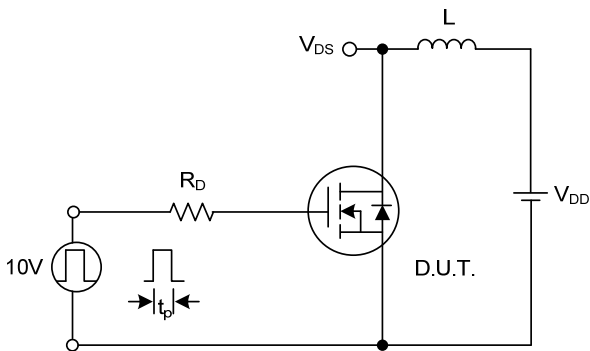
Switching Waveforms



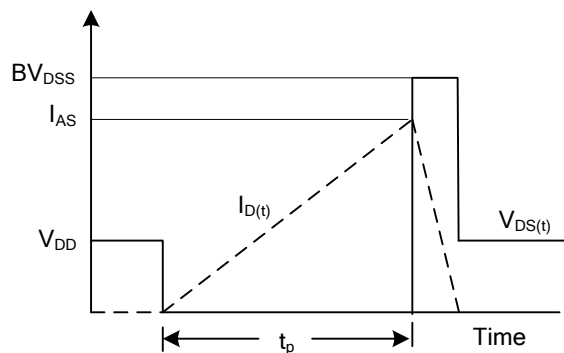
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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