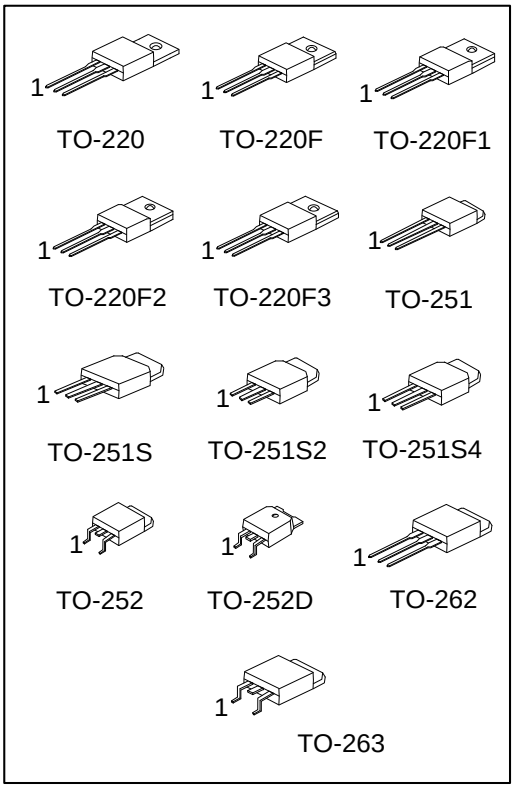
6N70K-MT

Power MOSFET

6A, 700V N-CHANNEL POWER MOSFET



■ DESCRIPTION

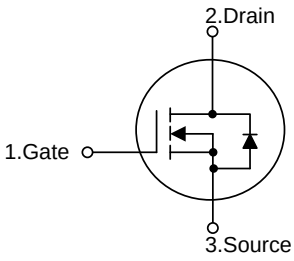
The UTC **6N70K-MT** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed, low gate charge and low input capacitance.

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

■ FEATURES

* $R_{DS(ON)} \leq 1.6\Omega$ @ V_{GS}=10V, I_D=3.0A
* High switching speed

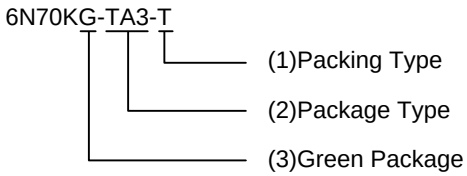
■ SYMBOL



■ ORDERING INFORMATION

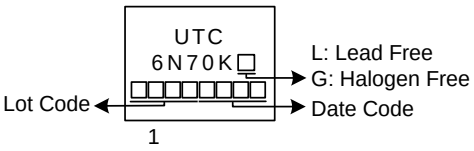
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N70KL-TA3-T	6N70KG-TA3-T	TO-220	G	D	S	Tube
6N70KL-TF3-T	6N70KG-TF3-T	TO-220F	G	D	S	Tube
6N70KL-TF1-T	6N70KG-TF1-T	TO-220F1	G	D	S	Tube
6N70KL-TF2-T	6N70KG-TF2-T	TO-220F2	G	D	S	Tube
6N70KL-TF3T-T	6N70KG-TF3T-T	TO-220F3	G	D	S	Tube
6N70KL-TM3-T	6N70KG-TM3-T	TO-251	G	D	S	Tube
6N70KL-TMS-T	6N70KG-TMS-T	TO-251S	G	D	S	Tube
6N70KL-TMS2-T	6N70KG-TMS2-T	TO-251S2	G	D	S	Tube
6N70KL-TMS4-T	6N70KG-TMS4-T	TO-251S4	G	D	S	Tube
6N70KL-TN3-R	6N70KG-TN3-R	TO-252	G	D	S	Tape Reel
6N70KL-TND-R	6N70KG-TND-R	TO-252D	G	D	S	Tape Reel
6N70KL-T2Q-T	6N70KG-T2Q-T	TO-262	G	D	S	Tube
6N70KL-TQ2-T	6N70KG-TQ2-T	TO-263	G	D	S	Tube
6N70KL-TQ2-R	6N70KG-TQ2-R	TO-263	G	D	S	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F, TF3T: TO-220F3, TM3: TO-251, TMS: TO-251S, TMS2: TO-251S2, TN3: TO-252, TMS4: TO-251S4, TND: TO-252D, T2Q: TO-262, TQ2: TO-263
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	700	V
Gate-Source Voltage (Note 2)			V_{GSS}	±30	V
Drain Current	Continuous	T_C=25°C	I_D	6	A
		T_C=100°C		3.8	A
	Pulsed		I_{DM}	24	A
Avalanche Current (Note 2)			I_{AR}	6	A
Avalanche Energy	Single Pulsed (Note 3)		E_{AS}	284	mJ
	Repetitive (Note 2)		E_{AR}	13	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	2.5	V/ns
Power Dissipation		TO-220/TO-263	P_D	125	W
		TO-220F		32	W
		TO-220F1/TO-220F2 TO-220F3		33	W
		TO-251/TO-251S TO-251S2/TO-251S4 TO-252/TO-252D		48	W
		TO-262		125	W
Junction Temperature			T_J	+150	°C
Storage Temperature			T_{STG}	-55 ~ +150	°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 = 15.77mH, I_{AS} = 6A, V_{DD} = 50V, R_G = 27Ω, Starting T_J = 25°C
4. I_{SD} ≤ 6A, di/dt ≤140A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-220F3/TO-262 TO-263	$θ_{JA}$	62.5	°C/W
	TO-251/TO-251S TO-251S2/TO-251S4 TO-252/TO-252D		110	°C/W
Junction to Case	TO-220	$θ_{JC}$	1	°C/W
	TO-220F		3.9	°C/W
	TO-220F1/TO-220F2 TO-220F3		3.78	°C/W
	TO-251/TO-251S TO-251S2/TO-251S4 TO-252/TO-252D		2.6 (Note)	°C/W
	TO-262		1	°C/W

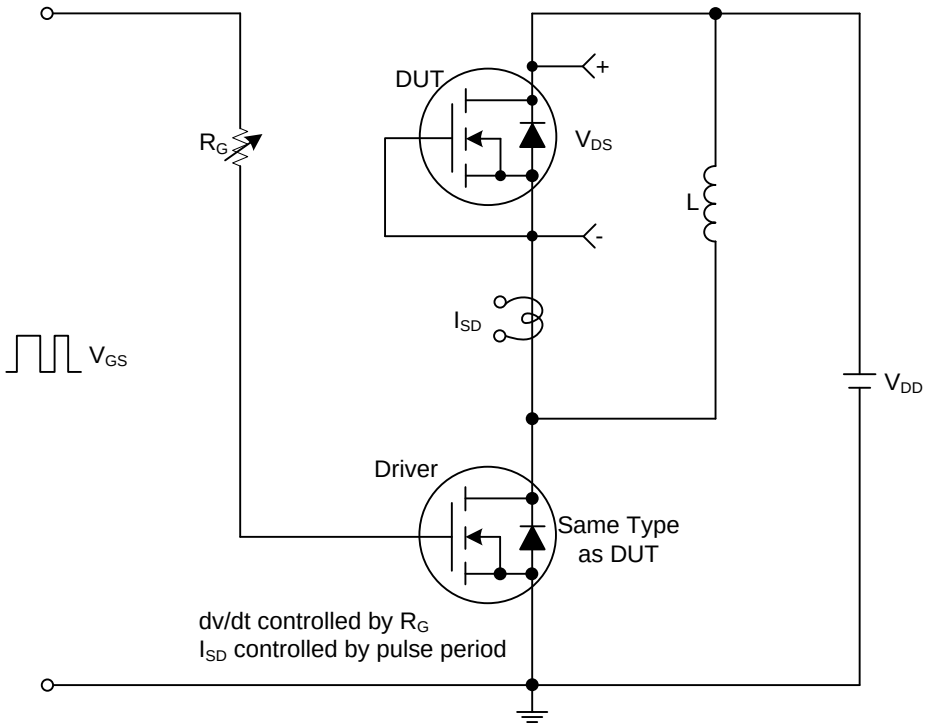
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

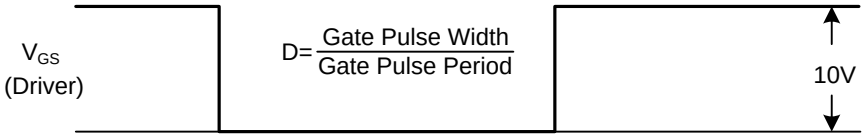
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

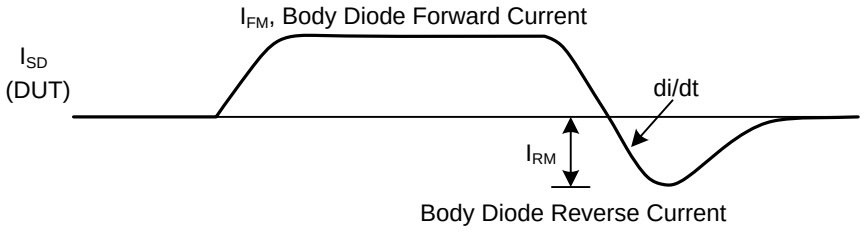
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	700			V
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA		0.79		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=700V			25	μA
			V_{DS}=560V, T_C=125°C			250	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+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 (Note 1)		1.35	1.6	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz (Note 1, 2)		480	600	pF
Output Capacitance		C_{OSS}			80	100	pF
Reverse Transfer Capacitance		C_{RSS}			6.5	25	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=50V, V_{GS}=10V, I_D=1.3A I_G=100μA (Note 1, 2)		21.8	32	nC
Gate to Source Charge		Q_{GS}			6.8		nC
Gate to Drain Charge		Q_{GD}			4.8		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G=25Ω (Note 1, 2)		57	80	ns
Rise Time		t_R			60	85	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			130	140	ns
Fall-Time		t_F			54	60	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S	Integral reverse pn-diode in the MOSFET			6	A
Maximum Body-Diode Pulsed Current (Note 3)		I_{SM}				24	A
Drain-Source Diode Forward Voltage (Note 2)		V_{SD}	I_S=6A, V_{GS}=0V, T_J = 25°C			1.4	V
Reverse Recovery Time		t_{rr}	I_S=6A, V_{DD}=100V di/dt = 100A/μs		480		ns
Reverse Recovery Charge		Q_{rr}			3.5		μC

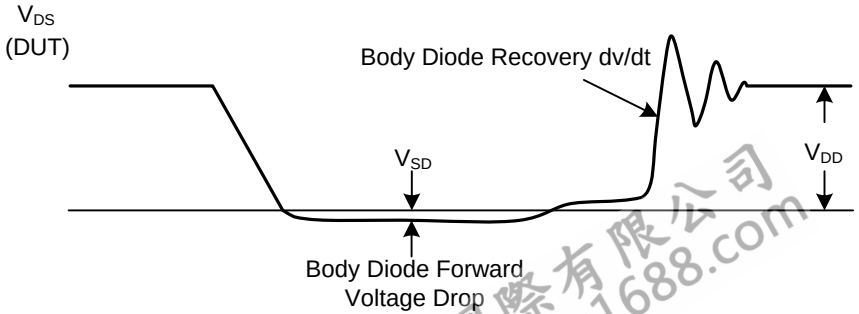
Notes: 1. Pulse Test: Pulse width ≤ 250μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



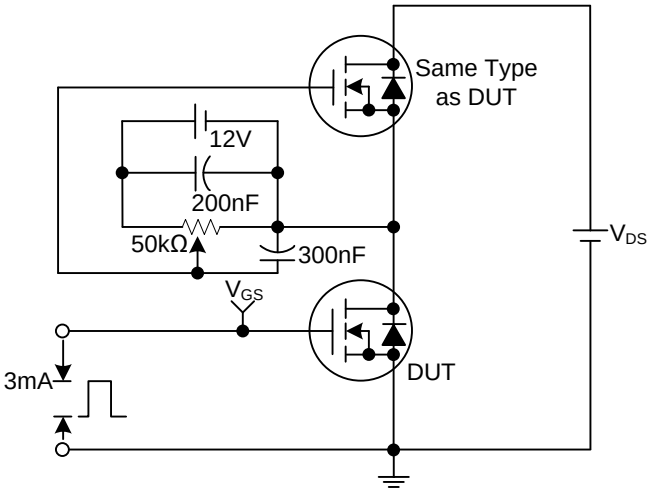




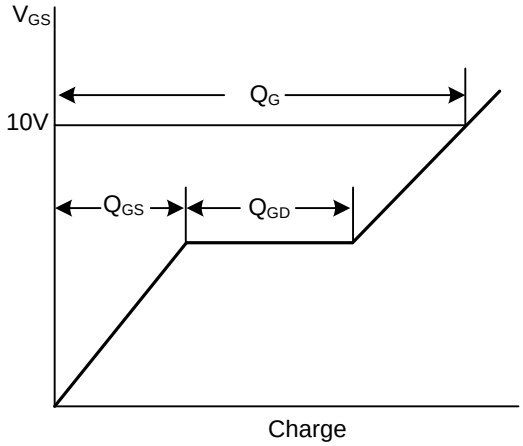


Peak Diode Recovery dv/dt Test Circuit and Waveforms

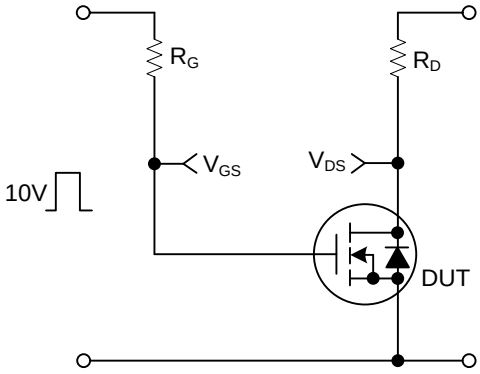
■ TEST CIRCUITS AND WAVEFORMS



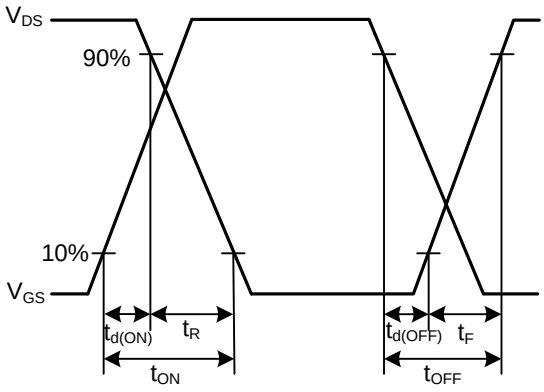
Gate Charge Test Circuit



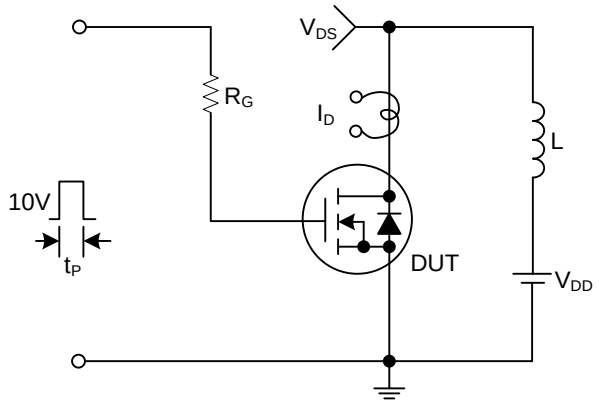
Gate Charge Waveforms



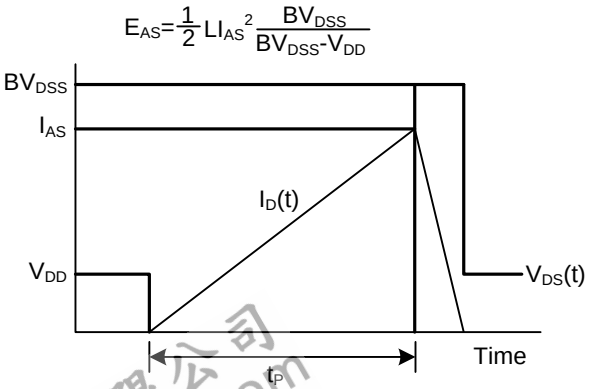
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS