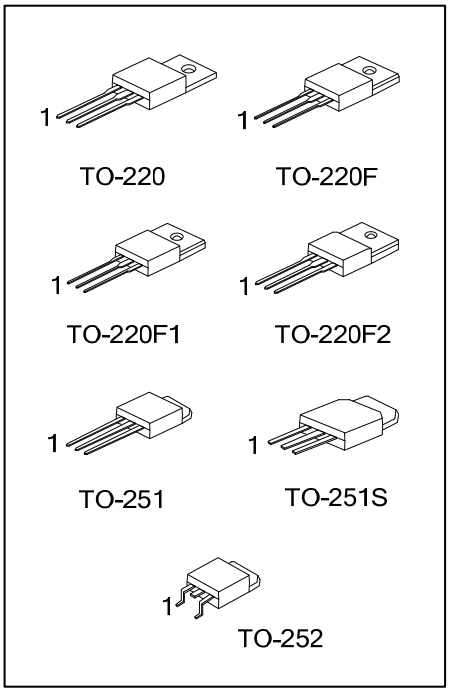
8.0A, 700V N-CHANNEL POWER MOSFET



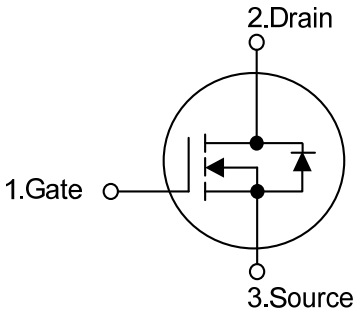
■ DESCRIPTION

The UTC **8N70K-MTQ** is a 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

* $R_{DS(ON)}$ < 1.6 Ω @ V_{GS}=10V, I_D=4.0A
* High switching speed

■ SYMBOL



■ ORDERING INFORMATION

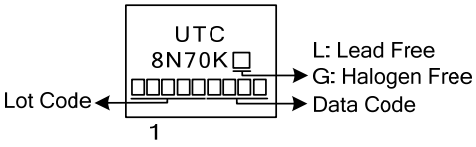
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8N70KL-TA3-T	8N70KG-TA3-T	TO-220	G	D	S	Tube
8N70KL-TF1-T	8N70KG-TF1-T	TO-220F1	G	D	S	Tube
8N70KL-TF2-T	8N70KG-TF2-T	TO-220F2	G	D	S	Tube
8N70KL-TF3-T	8N70KG-TF3-T	TO-220F	G	D	S	Tube
8N70KL-TM3-T	8N70KG-TM3-T	TO-251	G	D	S	Tube
8N70KL-TMS-T	8N70KG-TMS-T	TO-251S	G	D	S	Tube
8N70KL-TN3-R	8N70KG-TN3-R	TO-252	G	D	S	Tape Reel

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

8N70KL-TA3-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TMS: TO-251S TN3: TO-252
(3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°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	T_C=25°C	I_D	8	A
		T_C=100°C		4.8	A
	Pulsed		I_{DM}	32	A
Avalanche Current	Repetitive (Note 3)		I_{AS}	8	A
Avalanche Energy	Single Pulsed (Note 3)		E_{AS}	256	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	2.4	V/ns
Power Dissipation (T_C=25°C)	TO-220		P_D	148	W
	TO-220F/TO-220F1 TO-220F2			49	W
	TO-251/TO-251S TO-252			63	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 = 8.0 mH, I_{AS} = 8.0A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤8.0A, di/dt ≤200A/μs, V_{DD}≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

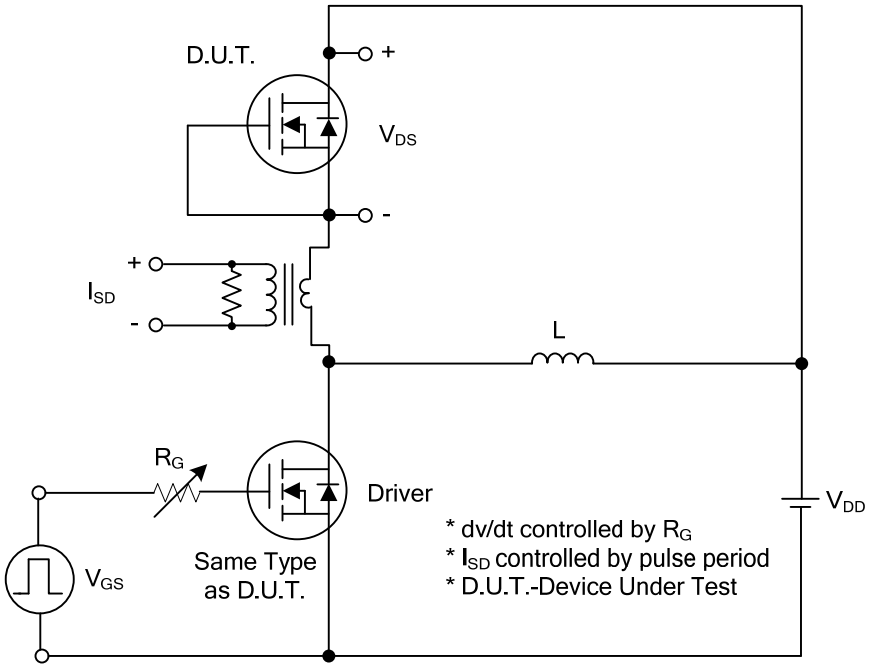
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	°C/W
	TO-251/TO-251S TO-252		110	°C/W
Junction to Case	TO-220	θ_{JC}	0.84	°C/W
	TO-220F/TO-220F1 TO-220F2		2.55	°C/W
	TO-251/TO-251S TO-252		1.98	°C/W

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

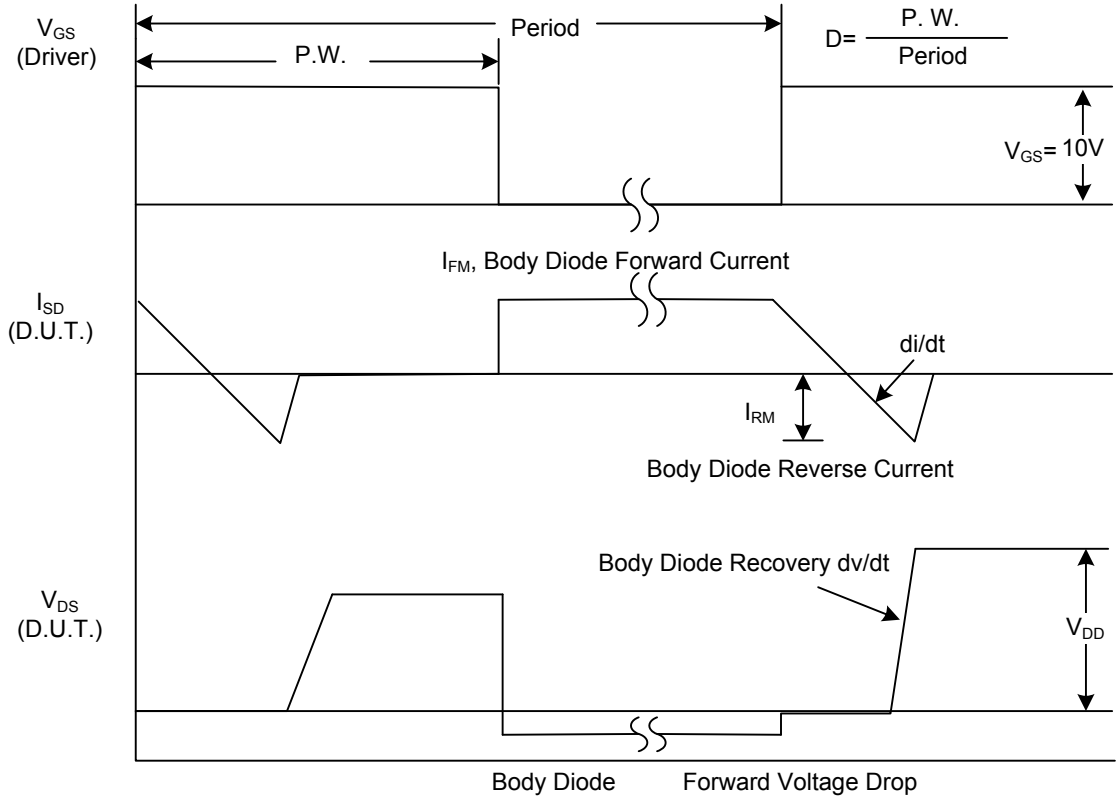
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	700			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=700V, V_{GS}=0V			1	μA
			V_{DS}=560V, T_C=125°C			100	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+10	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-10	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=4.0A			1.6	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		860		pF
Output Capacitance		C_{OSS}			85		pF
Reverse Transfer Capacitance		C_{RSS}			5		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=50V, V_{GS}=10V, I_D=1.3A I_G=100 μA (Note 1, 2)		56		nC
Gate to Source Charge		Q_{GS}			8		nC
Gate to Drain Charge		Q_{GD}			10		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G=25Ω (Note 1, 2)		62		ns
Rise Time		t_R			48		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			120		ns
Fall-Time		t_F			36		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
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 (Note 1)		V_{SD}	I_S=8A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	V_{GS}=0V, I_S = 8A, di/dt = 100A/μs		530		ns
Reverse Recovery Charge		Q_{rr}			4		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

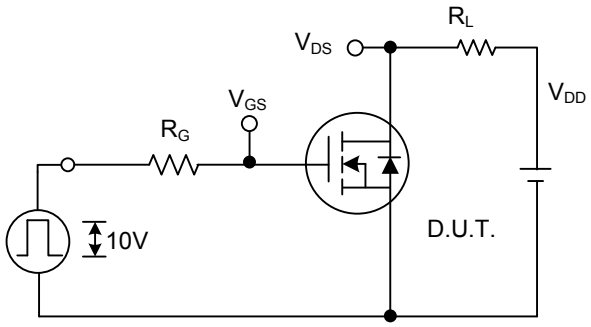


Peak Diode Recovery dv/dt Test Circuit

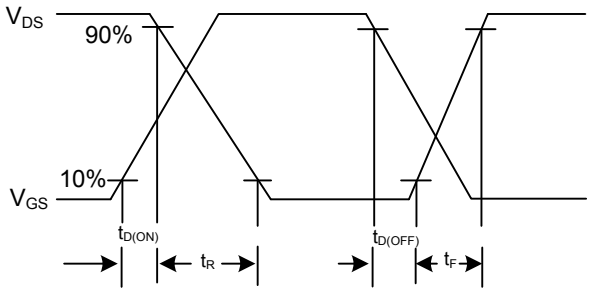


Peak Diode Recovery dv/dt Waveforms

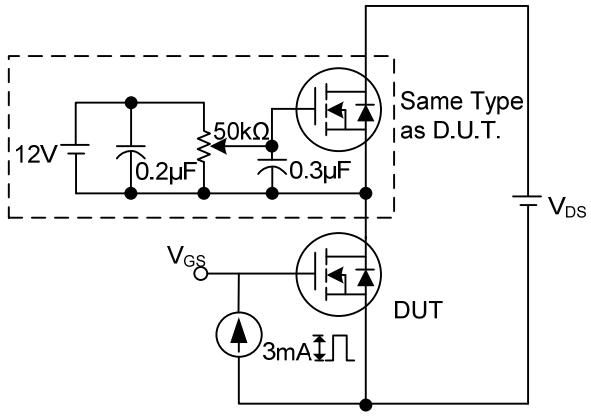
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



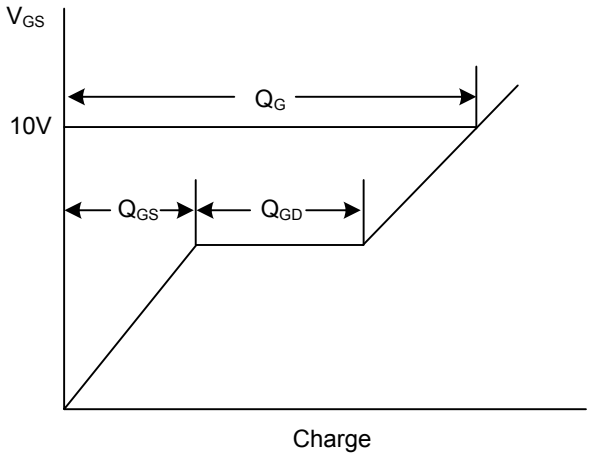
Switching Test Circuit



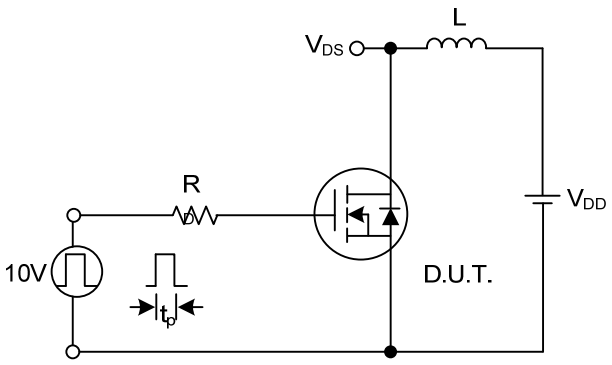
Switching Waveforms



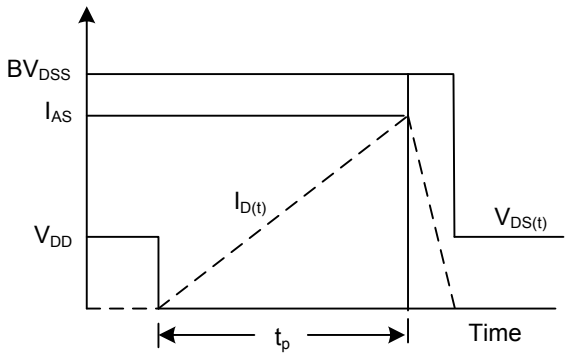
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms