



7N65K-MTQ

Power MOSFET

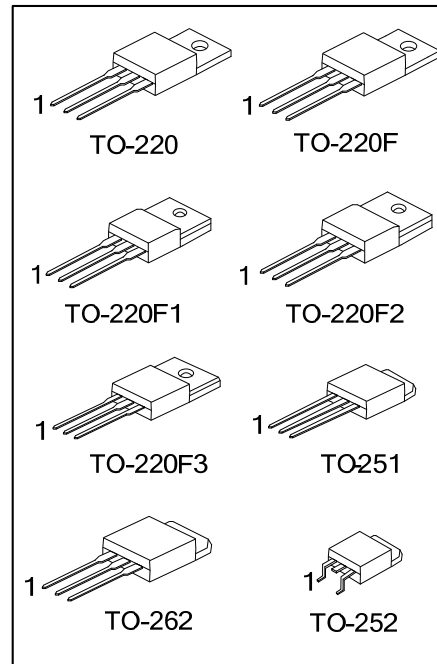
7.0A, 650V N-CHANNEL POWER MOSFET

■ DESCRIPTION

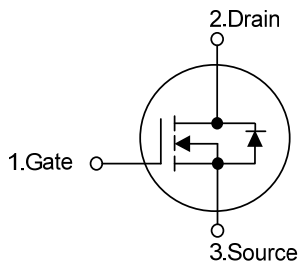
The UTC **7N65K-MTQ** is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications of switching power supplies and adaptors.

■ FEATURES

- * $R_{DS(ON)} < 1.6 \Omega @ V_{GS} = 10 V, I_D = 3.5 A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness



■ SYMBOL



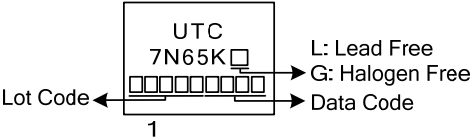
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N65KL-TA3-T	7N65KG-TA3-T	TO-220	G	D	S	Tube
7N65KL-TF3-T	7N65KG-TF3-T	TO-220F	G	D	S	Tube
7N65KL-TF1-T	7N65KG-TF1-T	TO-220F1	G	D	S	Tube
7N65KL-TF2-T	7N65KG-TF2-T	TO-220F2	G	D	S	Tube
7N65KL-TF3T-T	7N65KG-TF3T-T	TO-220F3	G	D	S	Tube
7N65KL-TM3-T	7N65KG-TM3-T	TO-251	G	D	S	Tube
7N65KL-TN3-R	7N65KG-TN3-R	TO-252	G	D	S	Tape Reel
7N65KL-T2Q-T	7N65KG-T2Q-T	TO-262	G	D	S	Tube

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

<p>7N65KL-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220F, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TF3T: TO-220F3, TM3: TO-251, TN3: TO-252, T2Q: TO-262 (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}	650	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	7	A
Continuous Drain Current		I_D	7	A
Pulsed Drain Current (Note 2)		I_{DM}	24	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	350	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	ns
Power Dissipation	TO-220/TO-262	P_D	125	W
	TO-220F/TO-220F1		40	W
	TO-220F3			
	TO-220F2			
	TO-251/TO-252			55
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +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 T_J

3. $L = 14.28\text{mH}$, $I_{AS} = 7\text{A}$, $V_{DD} = 90\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 7\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, 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-220F3/TO-262			
	TO-251/TO-252			
Junction to Case	TO-220/TO-262	θ_{JC}	1.0	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		3.2	
	TO-220F3		2.97	
	TO-220F2			
	TO-251/TO-252			

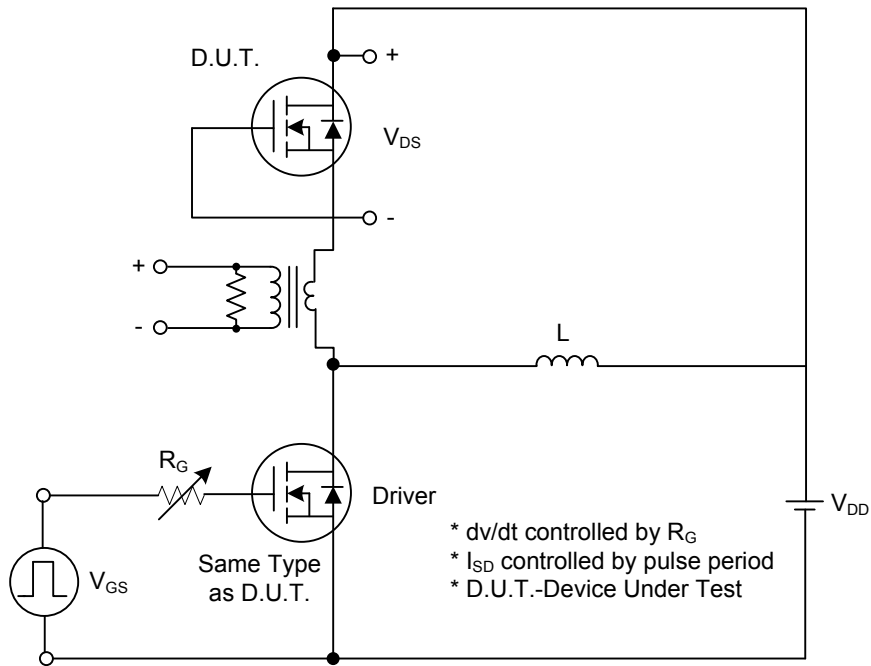
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	650			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V			10	μA
Gate- Source Leakage Current	Forward	I _{GSS}			100	nA
	Reverse				-100	nA
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		0.53		V/°C
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 = 3.5A			1.6	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz		875	1000	pF
Output Capacitance	C _{OSS}			88	120	pF
Reverse Transfer Capacitance	C _{RSS}			8	25	pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =50V, I _D =1.3A, V _{GS} =10V (Note 1, 2)		22.5	40	nC
Gate-Source Charge	Q _{GS}			7.5		nC
Gate-Drain Charge	Q _{GD}			5		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =30V, I _D =0.5A, R _G =25Ω (Note 1, 2)		50	60	ns
Turn-On Rise Time	t _R			65	80	ns
Turn-Off Delay Time	t _{D(OFF)}			110	130	ns
Turn-Off Fall Time	t _F			55	70	ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				7	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				28	A
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 7 A			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =7A, di/dt=100A/μs		320		ns
Body Diode Reverse Recovery Charge	Q _{rr}				2.4	

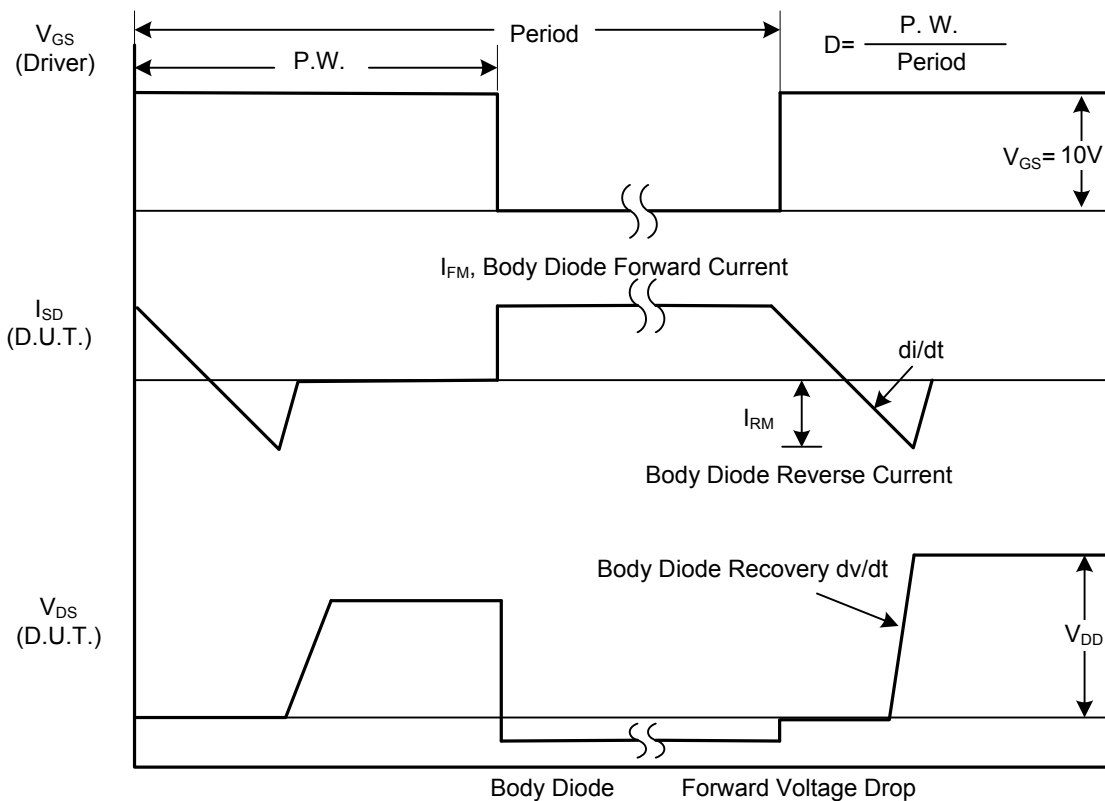
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

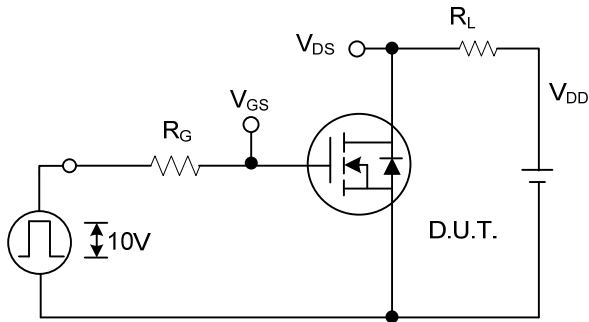


Peak Diode Recovery dv/dt Test Circuit

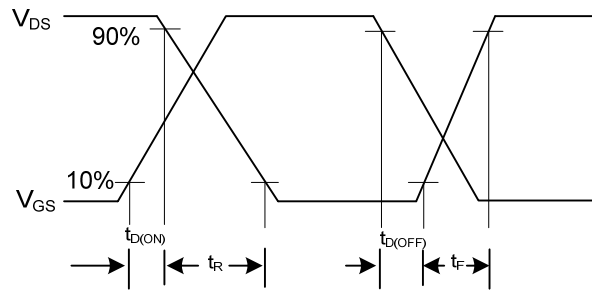


Peak Diode Recovery dv/dt Waveforms

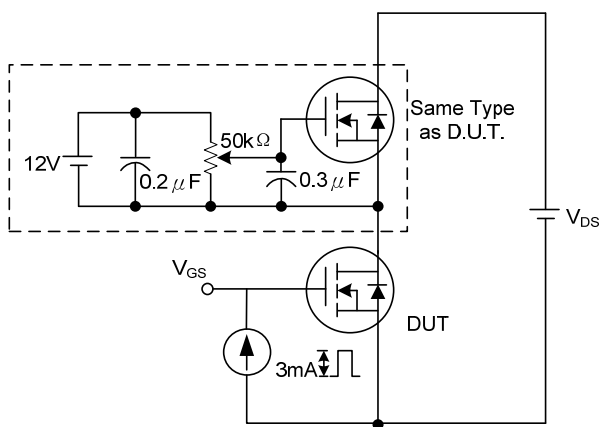
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



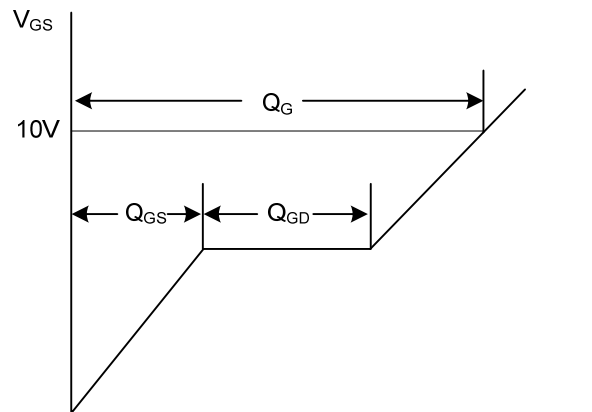
Switching Test Circuit



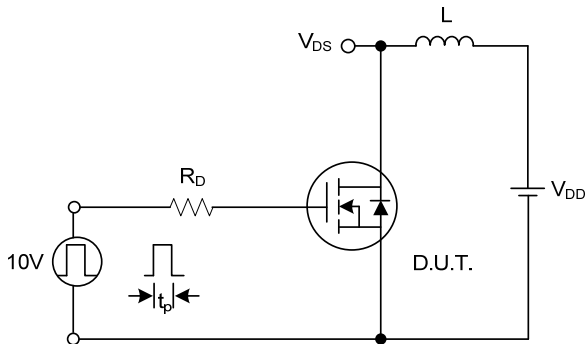
Switching Waveforms



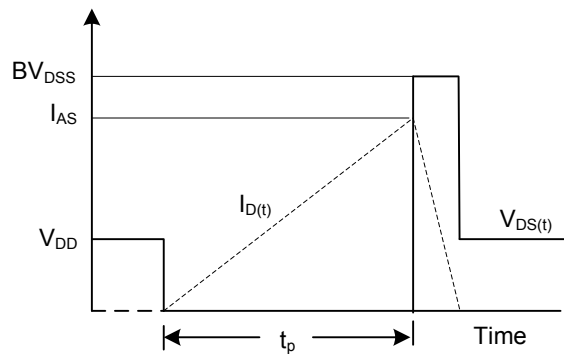
Gate Charge Test Circuit



Charge
Gate Charge Waveform

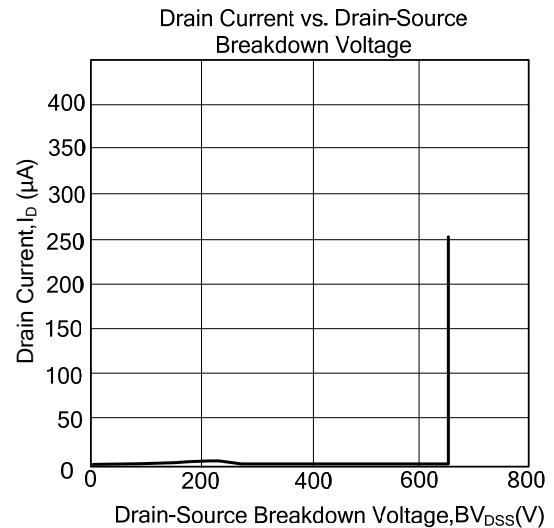
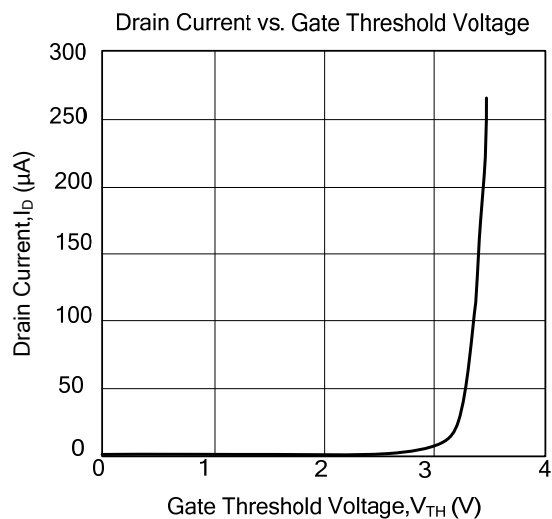
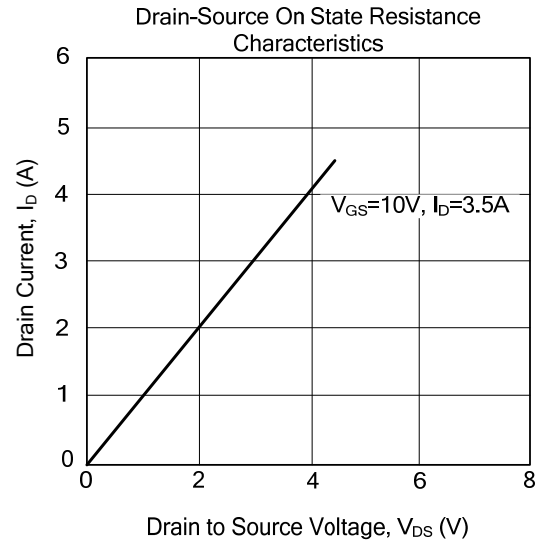
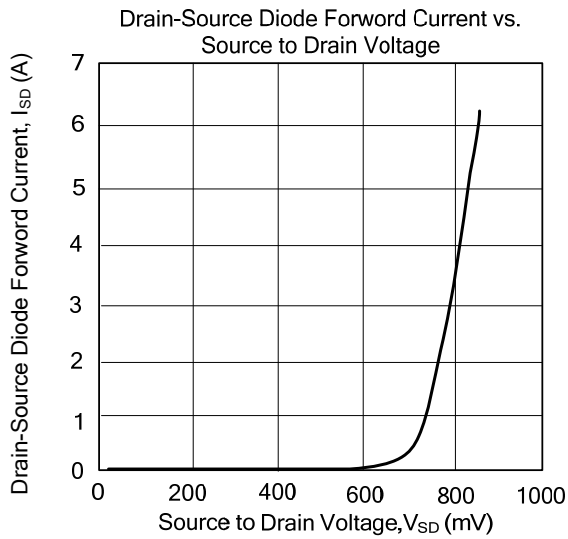


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



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