



6N60K-MTQ

Power MOSFET

6A, 600V N-CHANNEL POWER MOSFET

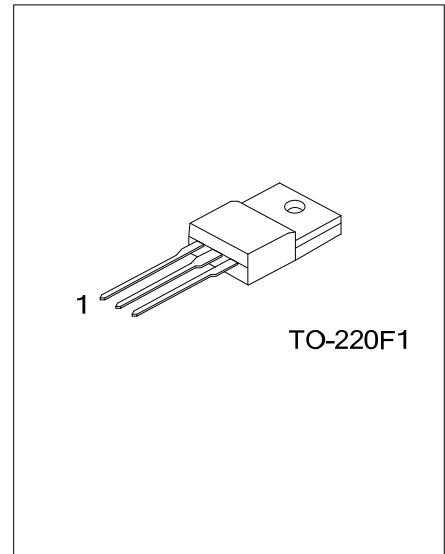
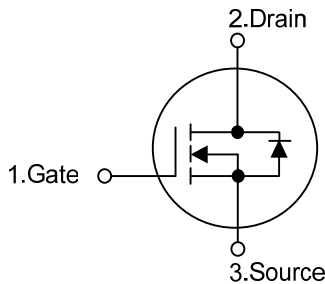
■ DESCRIPTION

The UTC **6N60K-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 at power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

■ FEATURES

- * $R_{DS(ON)} < 1.8\Omega @ V_{GS} = 10V, I_D = 3A$
- * Fast Switching Capability
- * Improved dv/dt Capability, High Ruggedness

■ SYMBOL



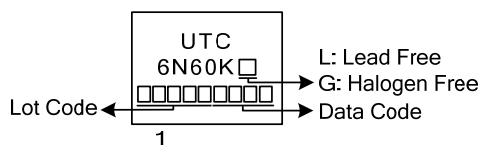
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N60KL-TF1-T	6N60KG-TF1-T	TO-220F1	G	D	S	Tube

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

<p>6N60KL-TF1-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube</p> <p>(2) TF1: TO-220F1</p> <p>(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}	600	V
Gate-Source Voltage	V_{GSS}	± 30	V
Avalanche Current (Note 2)	I_{AR}	6	A
Continuous Drain Current	I_D	6	A
Pulsed Drain Current (Note 2)	I_{DM}	24	A
Avalanche Energy	Single Pulsed (Note 3) E_{AS}	181	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	3.2	V/ns
Power Dissipation	P_D	36	W
Junction Temperature	T_J	+150	$^\circ\text{C}$
Operation 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. Pulse width limited by $T_{J(MAX)}$

3. $L=11.6\text{mH}$, $I_{AS}=5.6\text{A}$, $V_{DD}=90\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 6\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

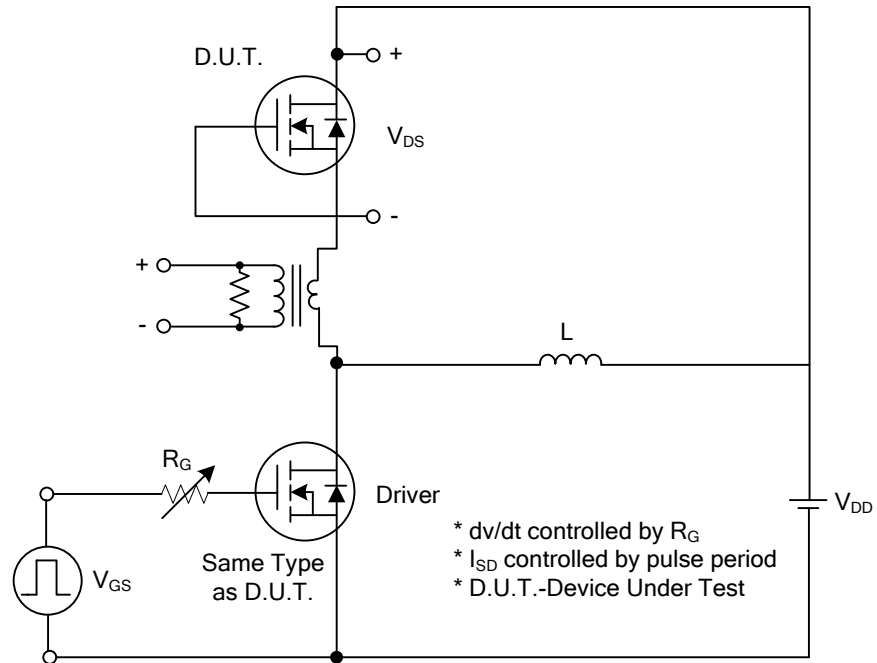
PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	3.47	$^\circ\text{C}/\text{W}$

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

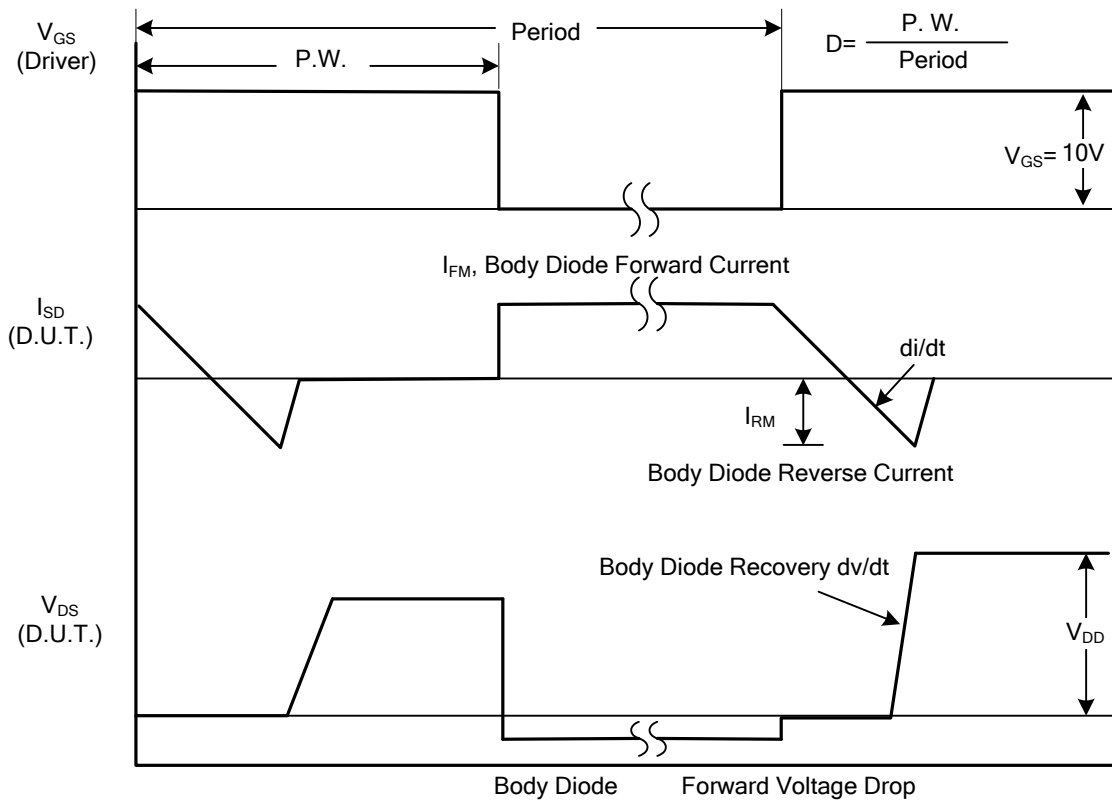
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V	
Drain-Source Leakage Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V			1	μA	
Gate-Source Leakage Current	Forward	V _{GS} =30V, V _{DS} =0V			100	nA	
	Reverse		V _{GS} =-30V, V _{DS} =0V				-100
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T}$ _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 =3A			1.8	Ω	
DYNAMIC CHARACTERISTICS							
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		720		pF	
Output Capacitance	C _{OSS}				70		pF
Reverse Transfer Capacitance	C _{RSS}				6.6		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge	Q _G	V _{DS} =50V, V _{GS} =10V, I _D =1.3A, I _G =100μA (Note 1, 2)		48		nC	
Gate-Source Charge	Q _{GS}				4.8		nC
Gate-Drain Charge	Q _{GD}				5.2		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =0.5A, R _G =25Ω (Note 1, 2)		30		ns	
Turn-On Rise Time	t _R				25		ns
Turn-Off Delay Time	t _{D(OFF)}				140		ns
Turn-Off Fall Time	t _F				30		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current	I _S				6	A	
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				24	A	
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 6A			1.4	V	
Reverse Recovery Time	t _{RR}	V _{GS} =0V, I _S =6A, dI _F /dt = 100 A/μs		450		ns	
Reverse Recovery Charge	Q _{RR}				3.0		μC

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

■ TEST CIRCUITS AND WAVEFORMS

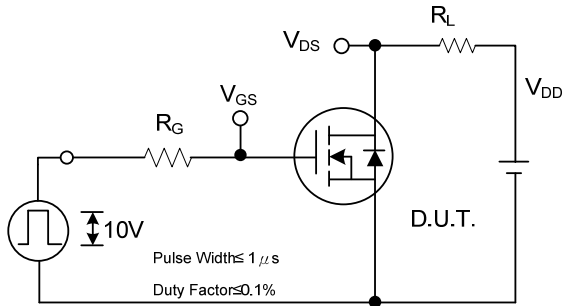


Peak Diode Recovery dv/dt Test Circuit

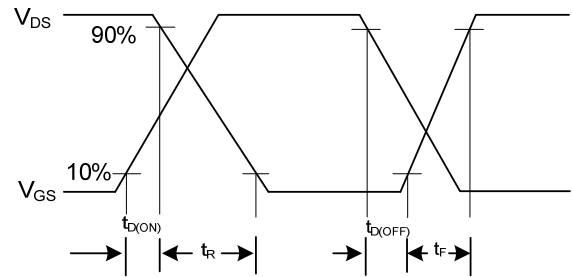


Peak Diode Recovery dv/dt Waveforms

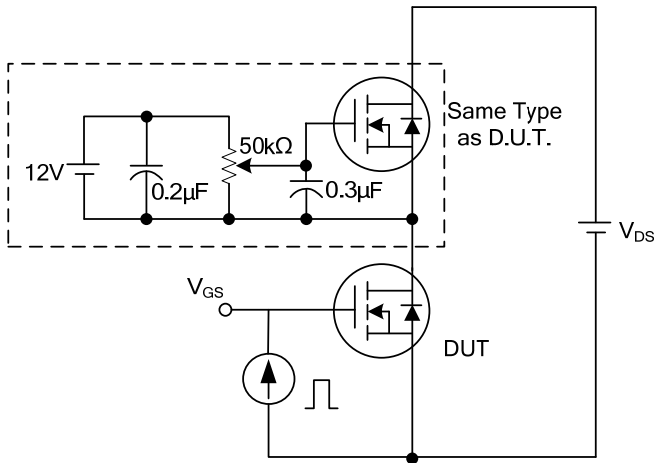
TEST CIRCUITS AND WAVEFORMS (Cont.)



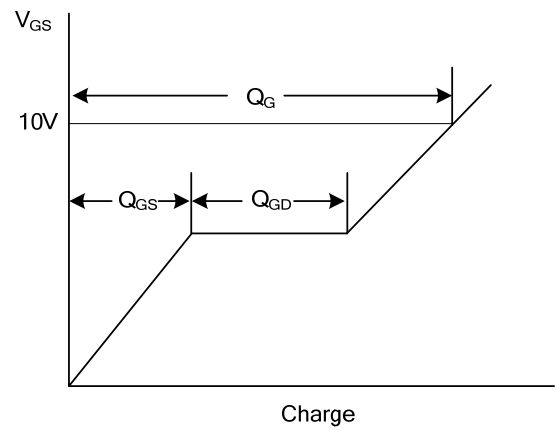
Switching Test Circuit



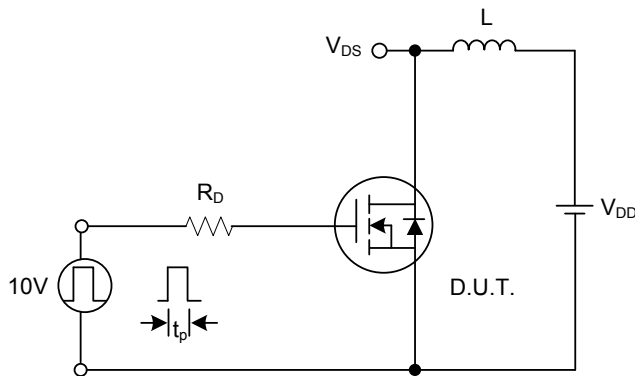
Switching Waveforms



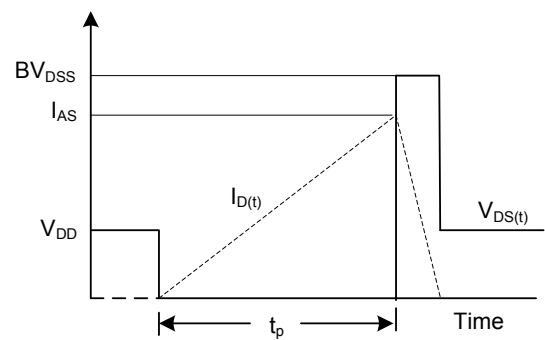
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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