



10N60K

Preliminary

Power MOSFET

10A, 600V N-CHANNEL POWER MOSFET

DESCRIPTION

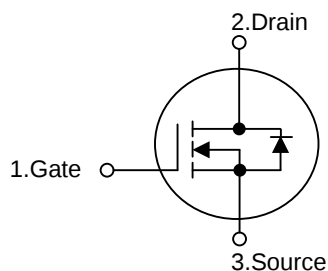
The UTC **10N60K** is an N-channel Power MOSFET using UTC's advanced technology to provide customers a minimum on-state resistance and superior switching performance, etc.

The UTC **10N60K** is generally applied in high efficient DC to DC converters, PWM motor controls and bridge circuits, etc.

FEATURES

- * $R_{DS(ON)}=1.2\Omega$ @ $V_{GS}=10V$, $I_D=5A$
- * Low Gate Charge (Typical 44nC)
- * Low C_{RSS} (typical 18 pF)
- * High Switching Speed
- * Improved dv/dt capability

SYMBOL

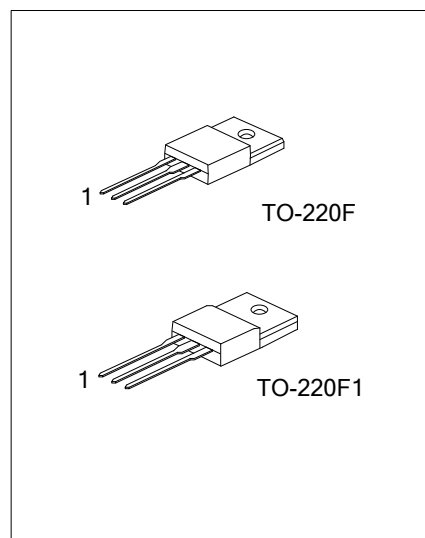


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10N60KL-TF3-T	10N60KG-TF3-T	TO-220F	G	D	S	Tube
10N60KL-TF1-T	10N60KG-TF1-T	TO-220F1	G	D	S	Tube

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

10N60KL-TA3-T	(1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube (2) TF3: TO-220F, TF1: TO-220F1 (3) L: Lead Free, G: Halogen Free
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■ **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}	10	A
Drain Current	Continuous	I _D	10	A
	Pulsed (Note 2)	I _{DM}	38	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	300	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P _D	50	W
Junction Temperature		T _J	+150	℃
Operating Temperature		T _{OPR}	-55 ~ +150	℃
Storage Temperature		T _{STG}	-55 ~ +150	℃

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. $L = 6\text{mH}$, $I_{AS} = 10\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 9.5\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, 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}	2.5	$^\circ\text{C}/\text{W}$

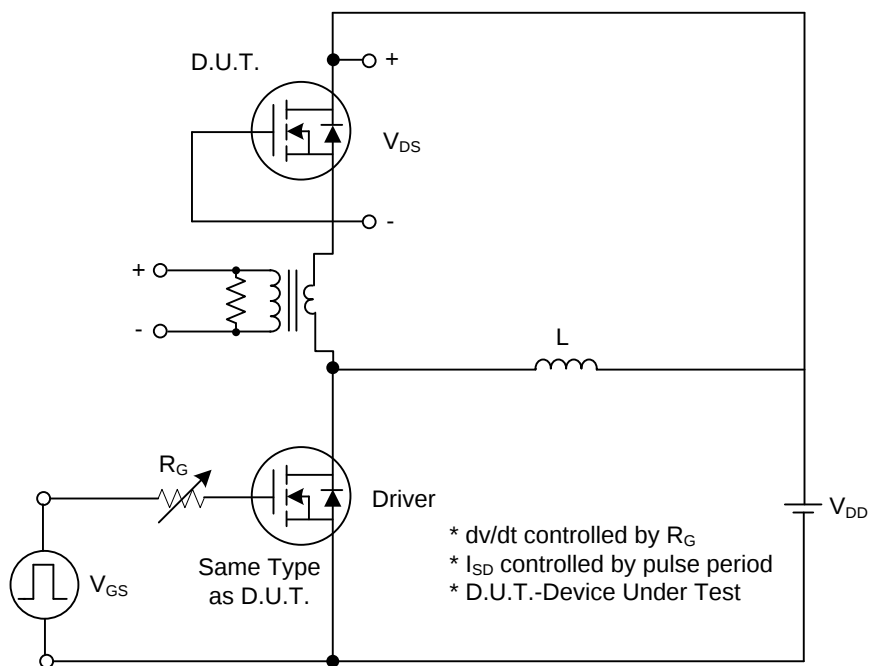
■ ELECTRICAL CHARACTERISTICS($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	600			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			1	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
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$, Referenced to 25°C		0.7		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 5A$	0.5	0.8	1.2	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{ MHz}$		1000	2040	pF
Output Capacitance		C_{OSS}			125	215	pF
Reverse Transfer Capacitance		C_{RSS}			18	24	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	$V_{DD}=300V, I_D = 10A, R_G = 25\Omega$ (Note 1, 2)		50	70	ns
Turn-On Rise Time		t_R			69	150	ns
Turn-Off Delay Time		$t_{D(OFF)}$			230	260	ns
Turn-Off Fall Time		t_F	$V_{DS}=480V, I_D=10A, V_{GS}=10V$ (Note 1, 2)		88	105	ns
Total Gate Charge		Q_G			90	120	nC
Gate-Source Charge		Q_{GS}			20		nC
Gate-Drain Charge		Q_{GD}			22		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V_{SD}	$V_{GS} = 0V, I_S = 10A$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				10	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				38	A
Reverse Recovery Time		t_{rr}	$V_{GS} = 0V, I_S = 10A,$		420		ns
Reverse Recovery Charge		Q_{RR}	$dI_F / dt = 100\text{ A}/\mu s$ (Note 1)		4.2		μC

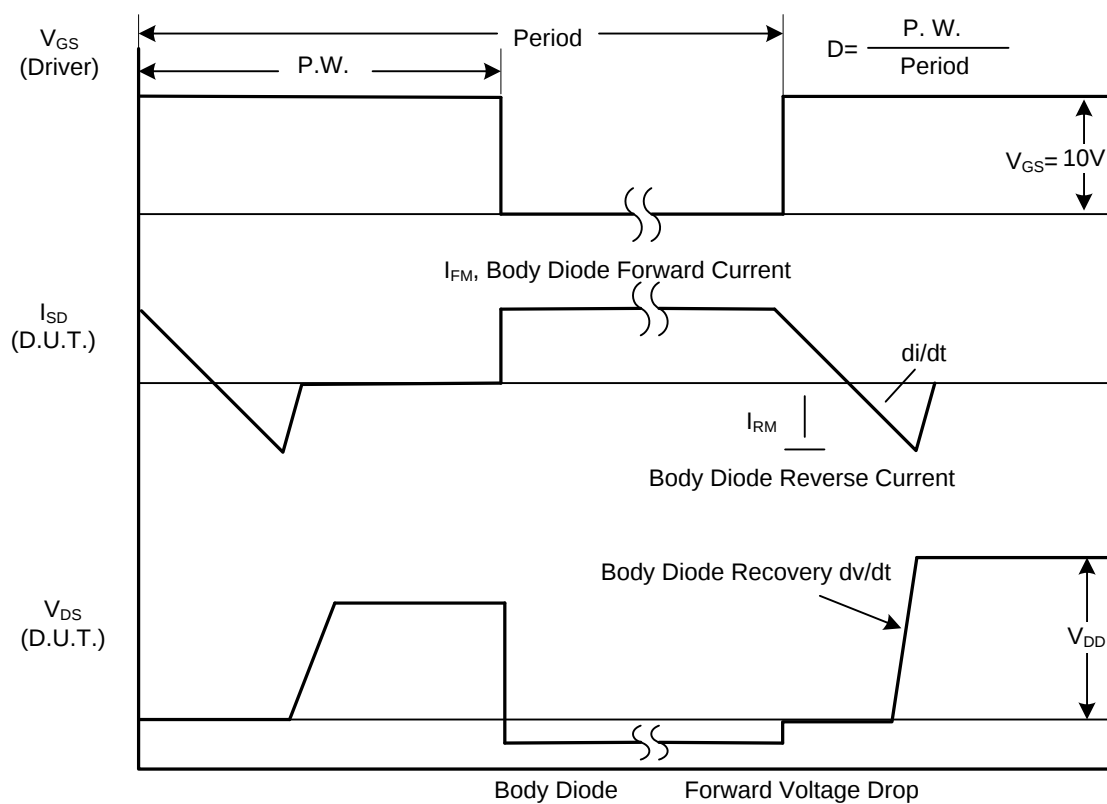
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

TEST CIRCUITS AND WAVEFORMS

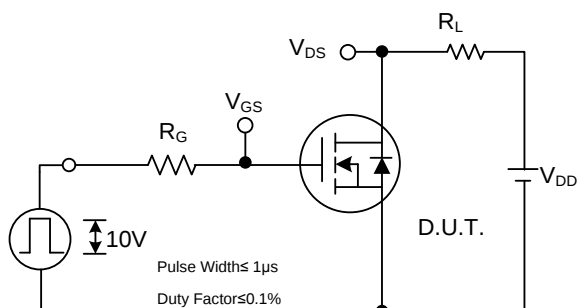


Peak Diode Recovery dv/dt Test Circuit

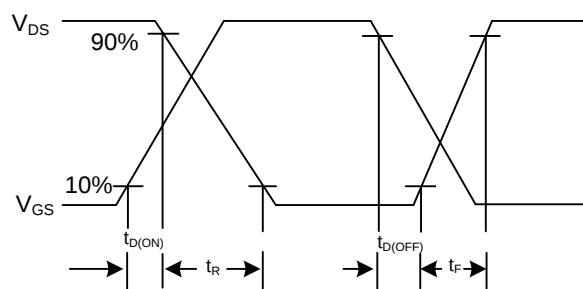


Peak Diode Recovery dv/dt Waveforms

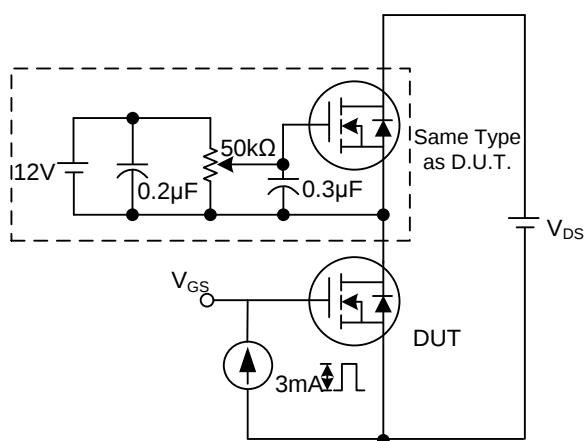
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



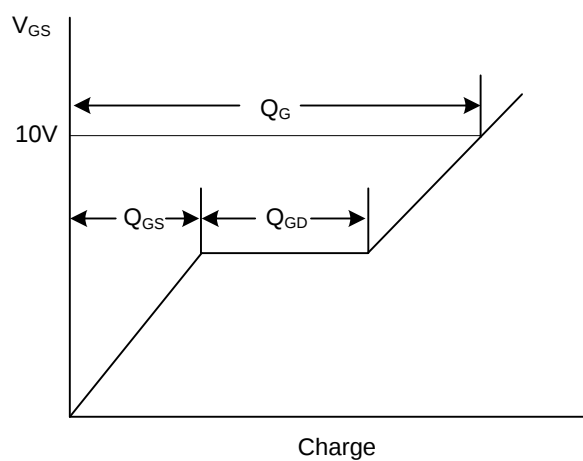
Switching Test Circuit



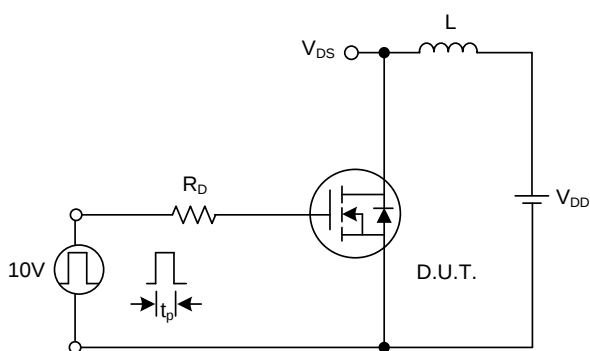
Switching Waveforms



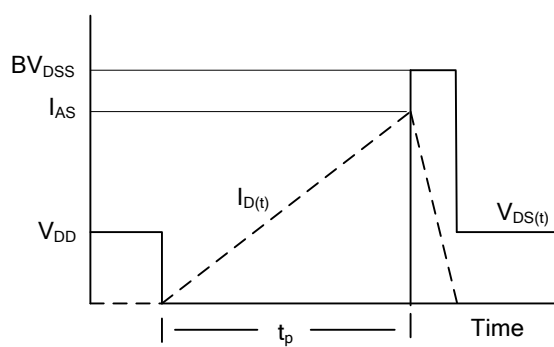
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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