



10N60K

Preliminary

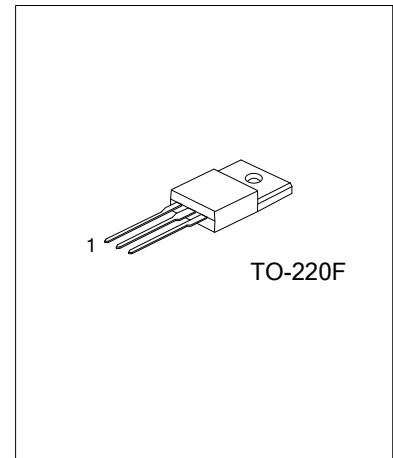
Power MOSFET

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.

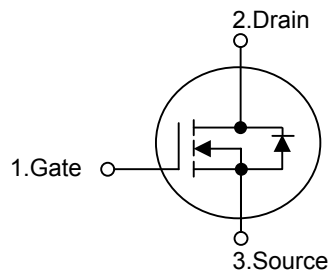
The UTC **10N60K** is generally applied in high efficient DC to DC converters, PWM motor controls and bridge circuits, etc.



FEATURES

- * $R_{DS(ON)}=0.72\Omega$ @ $V_{GS}=10V$, $I_D=4.75A$
- * 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

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 (3) G: Halogen Free, L: Lead 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_{DS}	600	V
Gate-Source Voltage		V_{GS}	± 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	156	W
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 maximum junction temperature

3. $L = 14.2\text{mH}$, $I_{AS} = 10\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$ 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}	$V_{GS} = 0\text{V}$, $I_D = 250\mu\text{A}$	600			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 600\text{V}$, $V_{GS} = 0\text{V}$			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	$V_{GS} = 30\text{V}$, $V_{DS} = 0\text{V}$			100	nA
	Reverse		$V_{GS} = -30\text{V}$, $V_{DS} = 0\text{V}$			-100	nA
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\mu\text{A}$, Referenced to 25°C		0.7		$\text{V}/^\circ\text{C}$
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{V}$, $I_D = 5\text{A}$	0.5	0.72	1.2	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$		1570	2040	pF
Output Capacitance		C_{OSS}			166	215	pF
Reverse Transfer Capacitance		C_{RSS}			18	24	pF

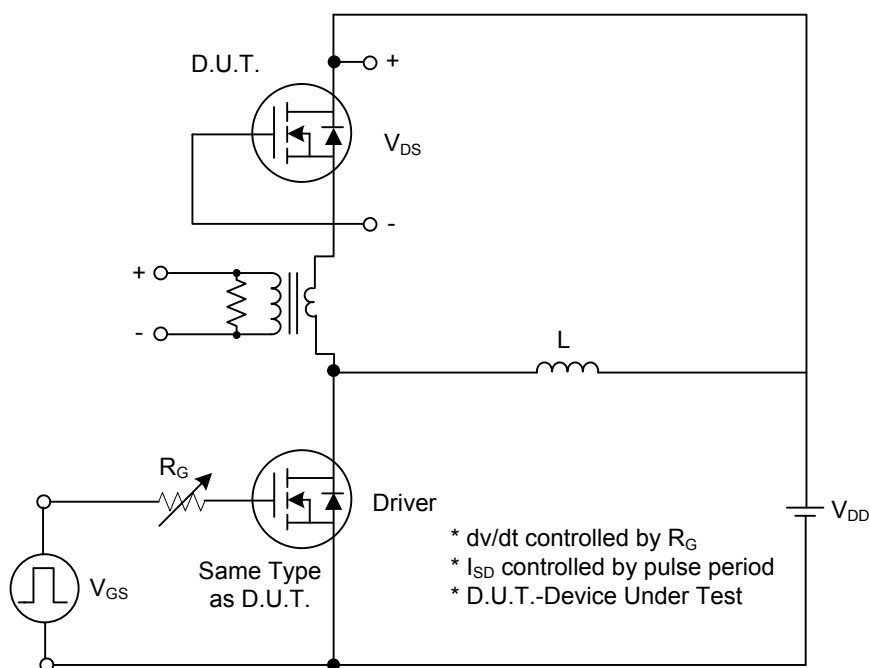
■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{D(ON)}	V _{DD} =300V, I _D =10A, R _G =25Ω (Note 1, 2)		23	55	ns
Turn-On Rise Time	t _R			69	150	ns
Turn-Off Delay Time	t _{D(OFF)}			144	260	ns
Turn-Off Fall Time	t _F			77	105	ns
Total Gate Charge	Q _G	V _{DS} =480V, I _D =10A, V _{GS} =10 V (Note 1, 2)		44	57	nC
Gate-Source Charge	Q _{GS}			6.7		nC
Gate-Drain Charge	Q _{GD}			18.5		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} = 0 V, 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} = 0 V, I _S = 10A,		420		ns
Reverse Recovery Charge	Q _{RR}	dI _F / dt = 100 A/μs (Note 1)		4.2		μC

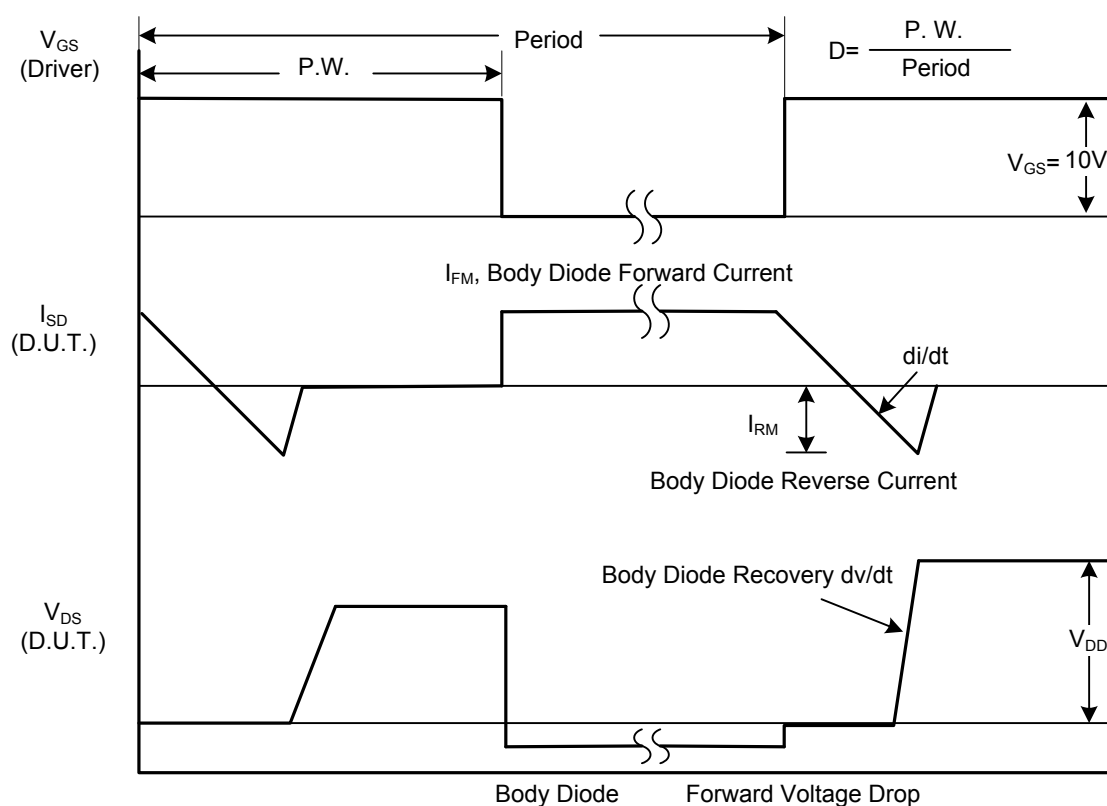
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

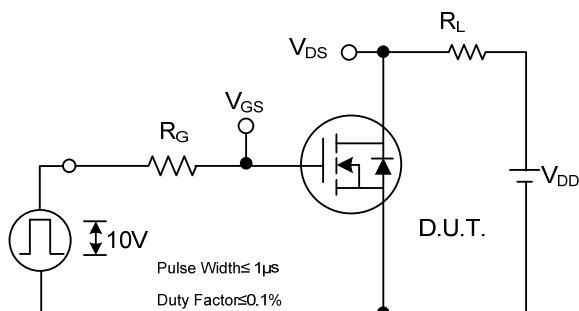


Peak Diode Recovery dv/dt Test Circuit

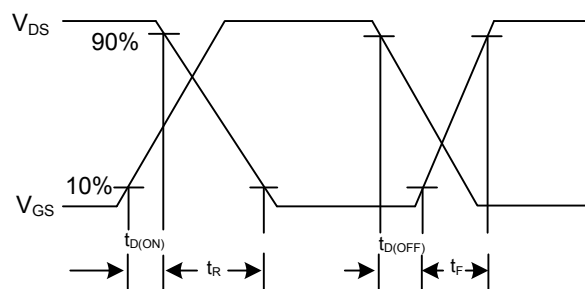


Peak Diode Recovery dv/dt Waveforms

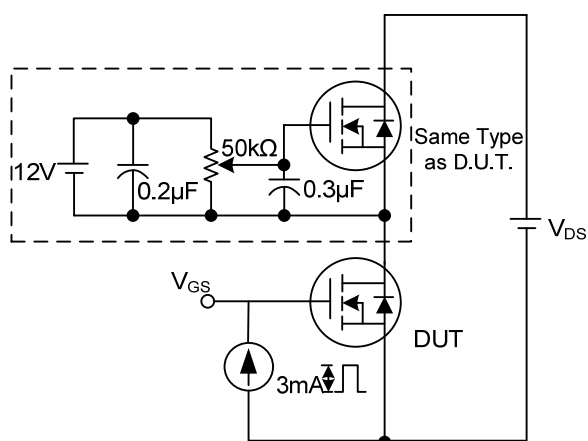
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



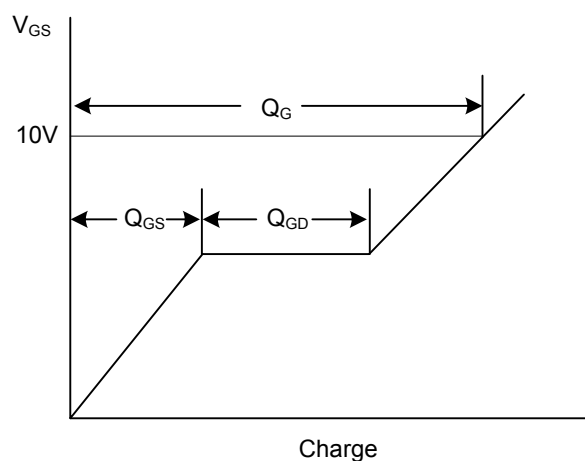
Switching Test Circuit



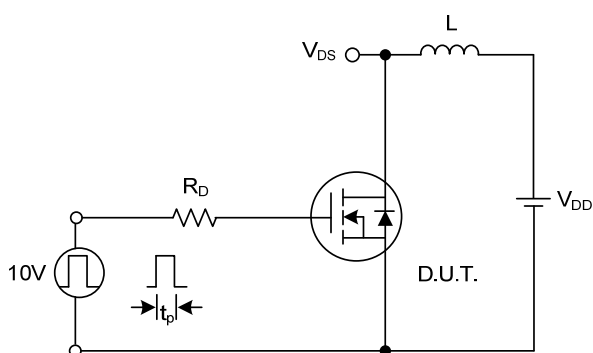
Switching Waveforms



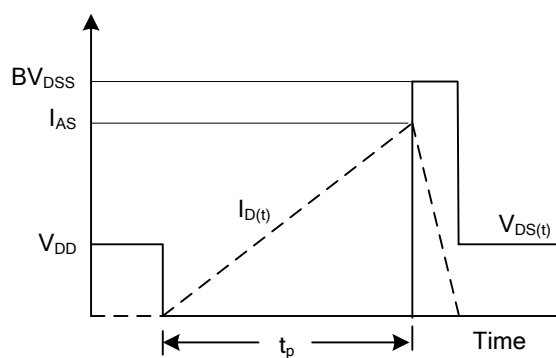
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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