

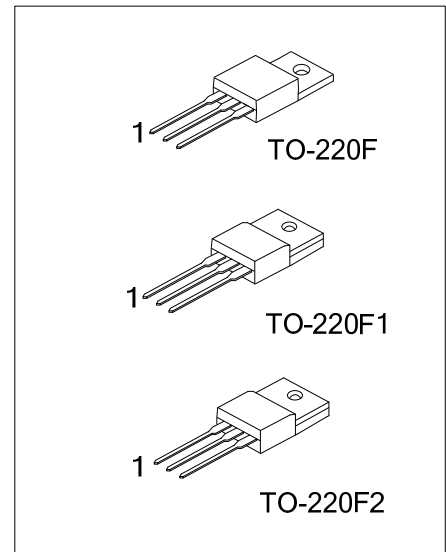


7N60-LD

Preliminary

Power MOSFET

**7A, 600V N-CHANNEL
POWER MOSFET**



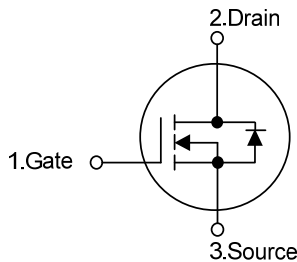
■ DESCRIPTION

The UTC **7N60-LD** is a high voltage power MOSFET combines advanced planar 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

- * $R_{DS(ON)} \leq 1.4 \Omega @ V_{GS}=10V, I_D=3.5A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

■ SYMBOL



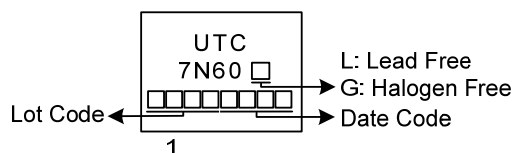
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N60L-TF1-T	7N60G-TF1-T	TO-220F1	G	D	S	Tube
7N60L-TF2-T	7N60G-TF2-T	TO-220F2	G	D	S	Tube
7N60L-TF3-T	7N60G-TF3-T	TO-220F	G	D	S	Tube

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

<p>7N60G-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, TF2: TO-220F2, TF3: TO-220F</p> <p>(3) G: Halogen Free and Lead Free, L: 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	
Continuous Drain Current	I_D	7	A	
Pulsed Drain Current (Note 2)	I_{DM}	14	A	
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	270	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	3	V/ns	
Power Dissipation	P_D	35	W	
Junction Temperature	T_J	+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. $L = 30\text{mH}$, $I_{AS} = 4.24\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 7.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, 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}	3.57	$^\circ\text{C}/\text{W}$

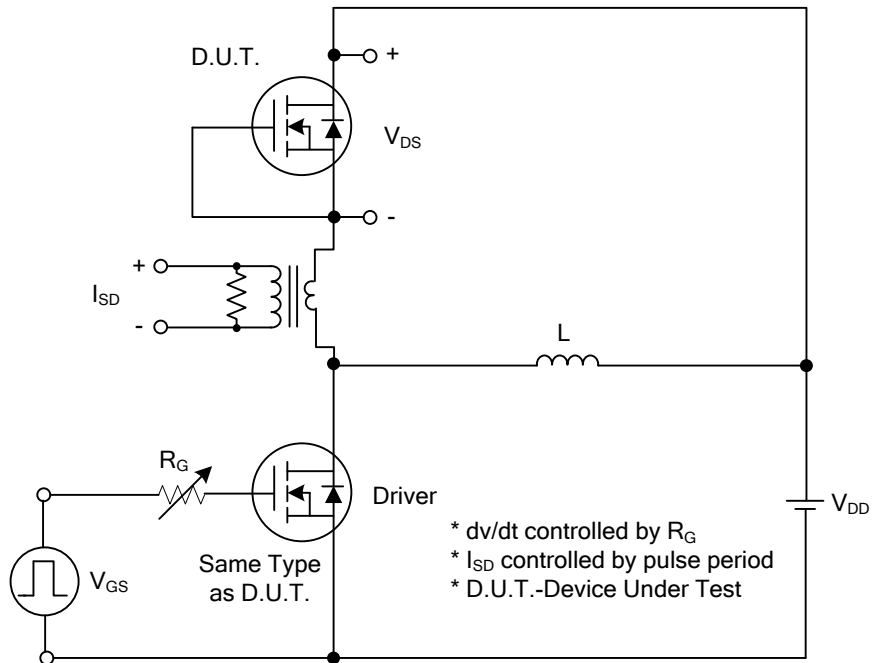
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise specified)

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}	$V_{DS}=600\text{V}$, $V_{GS}=0\text{V}$			10	μA	
Gate- Source Leakage Current	Forward	I_{GSS}			100	nA	
	Reverse						$V_{GS}=30\text{V}$, $V_{DS}=0\text{V}$
		$V_{GS}=-30\text{V}$, $V_{DS}=0\text{V}$			-100	nA	
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	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$			1.4	Ω	
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		900		pF	
Output Capacitance	C_{OSS}				95		pF
Reverse Transfer Capacitance	C_{RSS}				12		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)	Q_G	$V_{DS}=480\text{V}$, $V_{GS}=10\text{V}$, $I_D=7\text{A}$ $I_G=1\text{mA}$ (Note 1, 2)		30		nC	
Gate-Source Charge	Q_{GS}				9		nC
Gate-Drain Charge	Q_{GD}				9.4		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=100\text{V}$, $V_{GS}=10\text{V}$, $I_D=7\text{A}$, $R_G=25\ \Omega$ (Note 1, 2)		12		ns	
Turn-On Rise Time	t_R				19.7		ns
Turn-Off Delay Time	$t_{D(OFF)}$				84		ns
Turn-Off Fall Time	t_F				33		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Body-Diode Continuous Current	I_S				7	A	
Maximum Body-Diode Pulsed Current	I_{SM}				14	A	
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=7\text{A}$, $V_{GS}=0\text{V}$			1.4	V	
Reverse Recovery Time (Note 1)	t_{rr}	$I_S=7\text{A}$, $V_{GS}=0\text{V}$ $di/dt=100\text{A}/\mu\text{s}$		340		ns	
Reverse Recovery Charge	Q_{rr}				6.89		μC

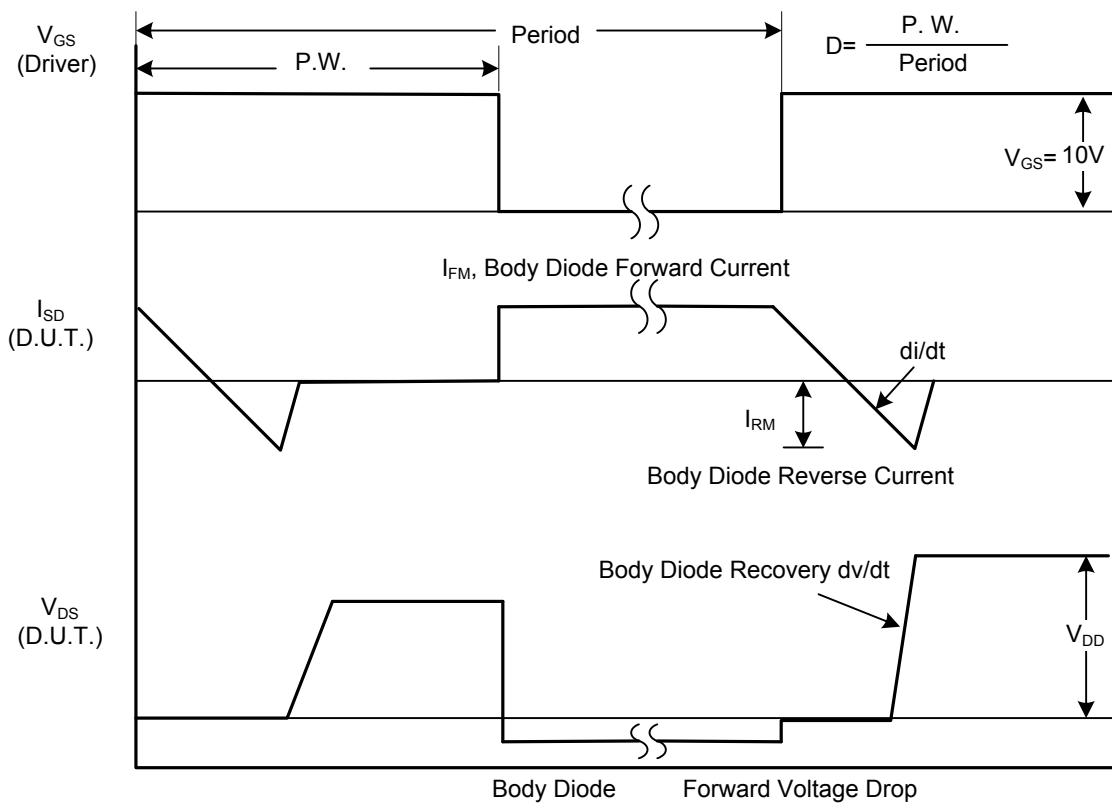
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

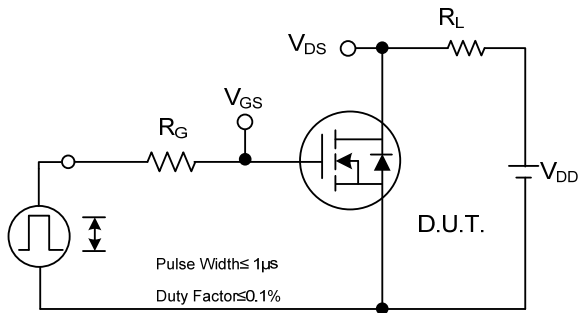


Peak Diode Recovery dv/dt Test Circuit

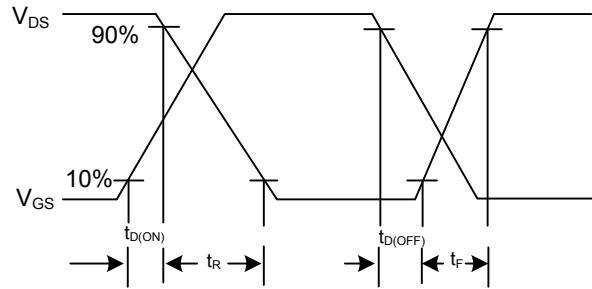


Peak Diode Recovery dv/dt Waveforms

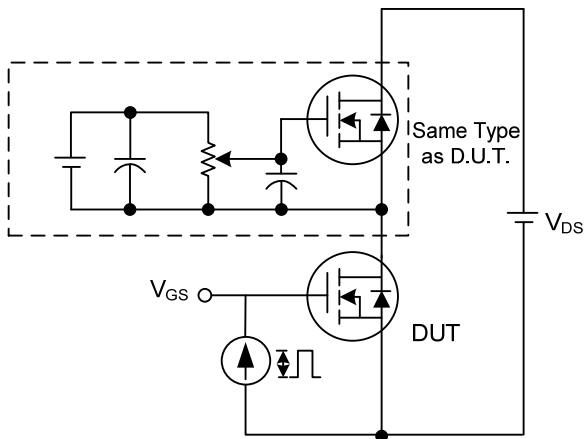
■ TEST CIRCUITS AND WAVEFORMS



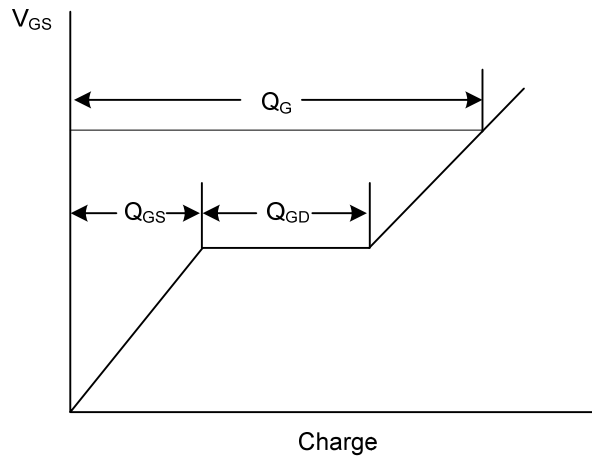
Switching Test Circuit



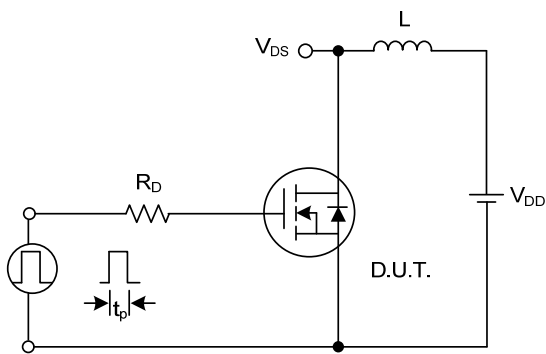
Switching Waveforms



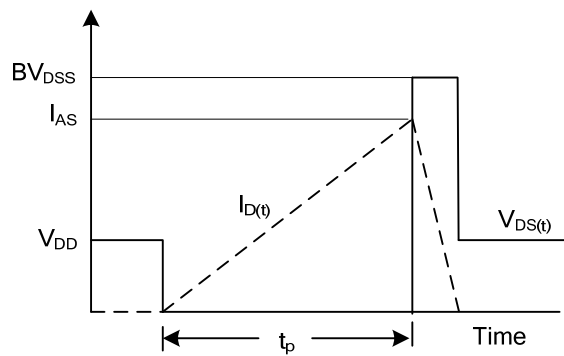
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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