



6N60

Power MOSFET

6.2 Amps, 600/650 Volts N-CHANNEL MOSFET

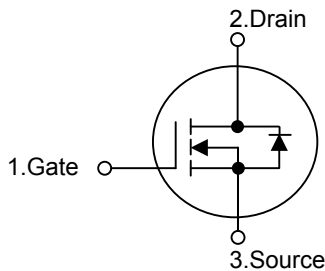
■ DESCRIPTION

The UTC **6N60** is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

■ FEATURES

- * $R_{DS(ON)} = 1.5\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 20 nC)
- * Low reverse transfer Capacitance ($C_{RSS} =$ typical 10pF)
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

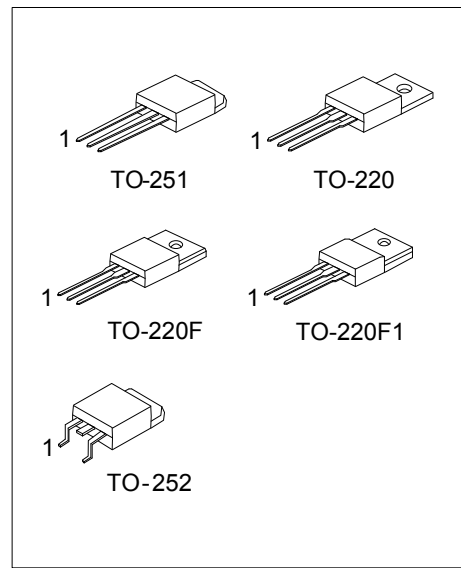
■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N60L-x-TA3-T	6N60G-x-TA3-T	TO-220	G	D	S	Tube
6N60L-x-TF1-T	6N60G-x-TF1-T	TO-220F1	G	D	S	Tube
6N60L-x-TF3-T	6N60G-x-TF3-T	TO-220F	G	D	S	Tube
6N60L-x-TM3-T	6N60G-x-TM3-T	TO-251	G	D	S	Tube
6N60L-x-TN3-R	6N60G-x-TN3-R	TO-252	G	D	S	Tape Reel

<p>6N60L-x-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Drain-Source Voltage (4)Lead Plating</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F TM3: TO-251, TN3: TO-252 (3) A: 600V, B: 650V (4) G: Halogen Free, L: Lead Free</p>
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Lead-free: 6N60L
Halogen-free:6N60G

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage	6N60-A	V _{DSS}	600	V
	6N60-B		650	V
Gate-Source Voltage		V _{GSS}	±30	V
Avalanche Current (Note 2)		I _{AR}	6.2	A
Continuous Drain Current		I _D	6.2	A
Pulsed Drain Current (Note 2)		I _{DM}	24.8	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	440	mJ
	Repetitive (Note 2)	E _{AR}	13	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	ns
Power Dissipation	TO-220	P _D	125	W
	TO-220F/TO-220F1		40	W
	TO-251/TO-252		55	W
Junction Temperature		T _J	+150	°C
Operating Temperature		T _{OPR}	-55 ~ +150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°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 = 14mH, I_{AS} = 6A, V_{DD} = 90V, R_G = 25 Ω, Starting T_J = 25°C

4. I_{SD} ≤ 6.2A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	θ _{JA}	62.5	°C/W
	TO-220F/TO-220F1		62.5	°C/W
	TO-251/TO-252		110	°C/W
Junction to Case	TO-220	θ _{JC}	1.0	°C/W
	TO-220F/TO-220F1		3.2	°C/W
	TO-251/TO-252		2.27	°C/W

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

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	6N60-A	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	600			V
	6N60-B			650			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} = 600V, V _{GS} = 0V			10	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		ΔBV _{DSS} /ΔT _J	I _D = 250 μA, 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 = 3.1A			1.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz		770	1000		pF
Output Capacitance	C _{OSS}			95	120		pF
Reverse Transfer Capacitance	C _{RSS}			10	13		pF

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=300V, I_D=6.2A, R_G=25\Omega$ (Note 1, 2)		20	50	ns
Turn-On Rise Time	t_R			70	150	ns
Turn-Off Delay Time	$t_{D(OFF)}$			40	90	ns
Turn-Off Fall Time	t_F			45	100	ns
Total Gate Charge	Q_G	$V_{DS}=480V, I_D=6.2A, V_{GS}=10V$ (Note 1, 2)		20	25	nC
Gate-Source Charge	Q_{GS}			4.9		nC
Gate-Drain Charge	Q_{GD}			9.4		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 6.2A$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				6.2	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				24.8	A
Reverse Recovery Time	t_{RR}	$V_{GS} = 0V, I_S = 6.2A,$ $dI_F/dt = 100A/\mu s$ (Note 1)		290		ns
Reverse Recovery Charge	Q_{RR}				2.35	

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

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

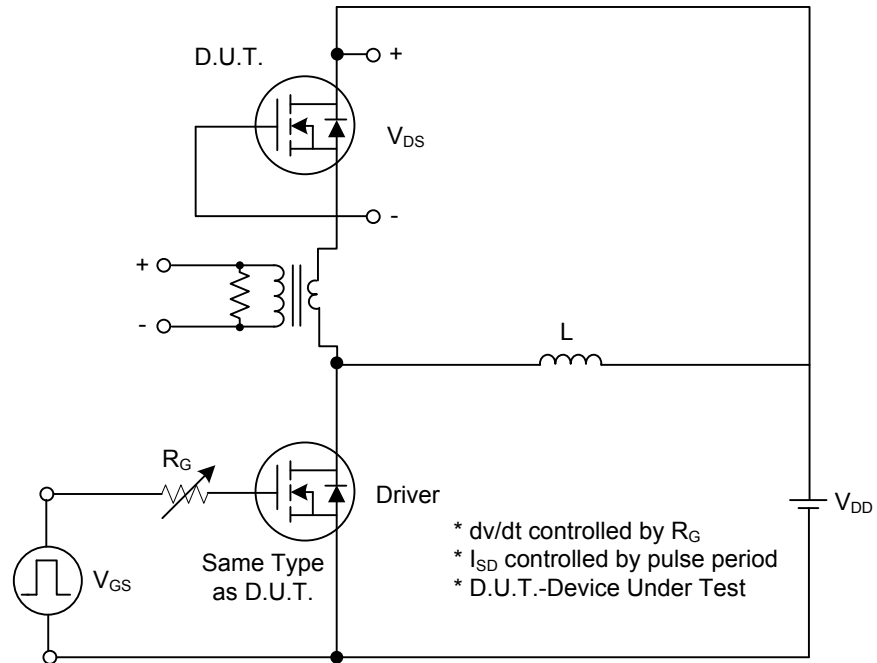


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

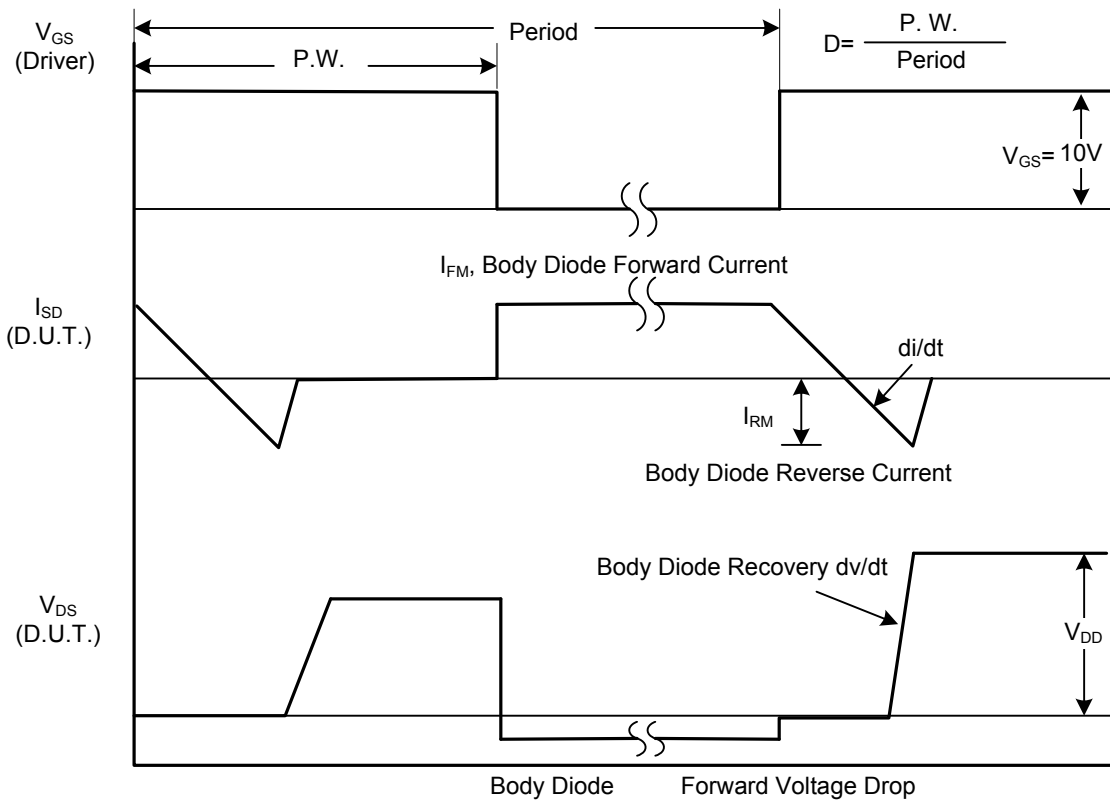


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

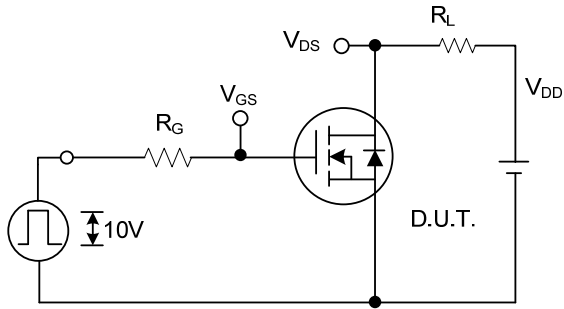


Fig. 2A Switching Test Circuit

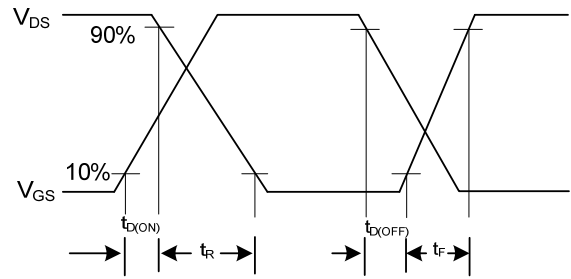


Fig. 2B Switching Waveforms

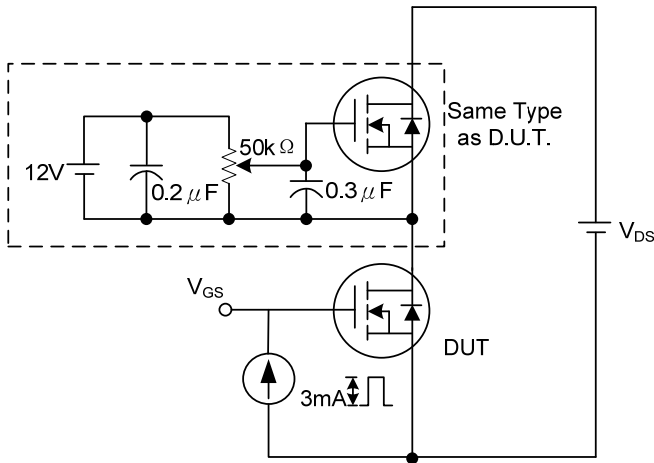


Fig. 3A Gate Charge Test Circuit

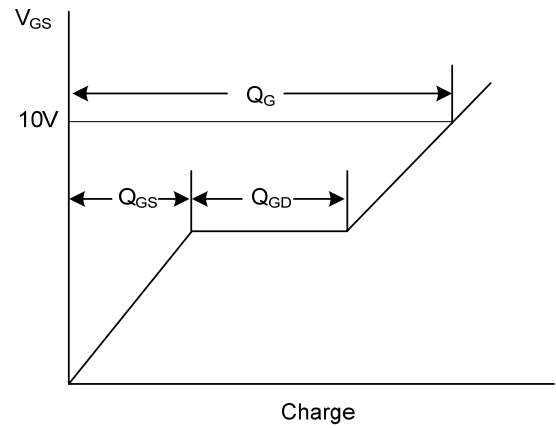


Fig. 3B Gate Charge Waveform

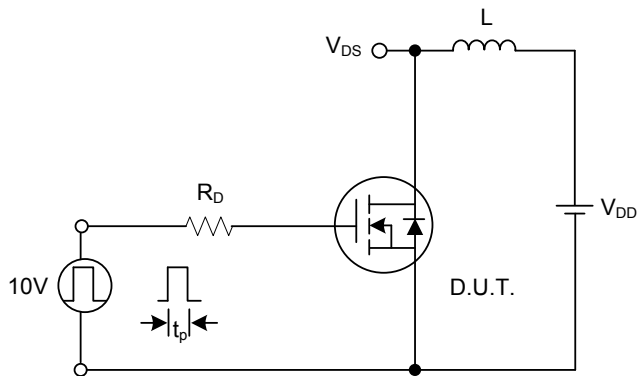


Fig. 4A Unclamped Inductive Switching Test Circuit

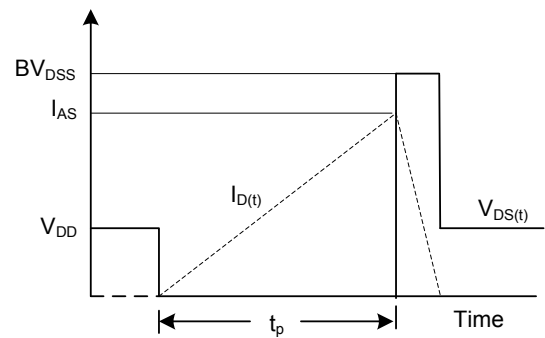
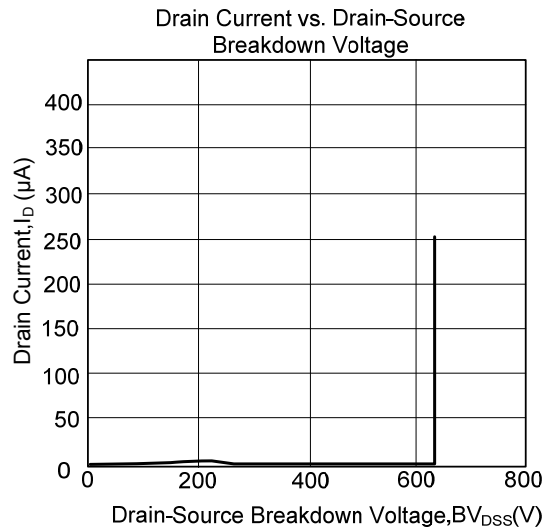
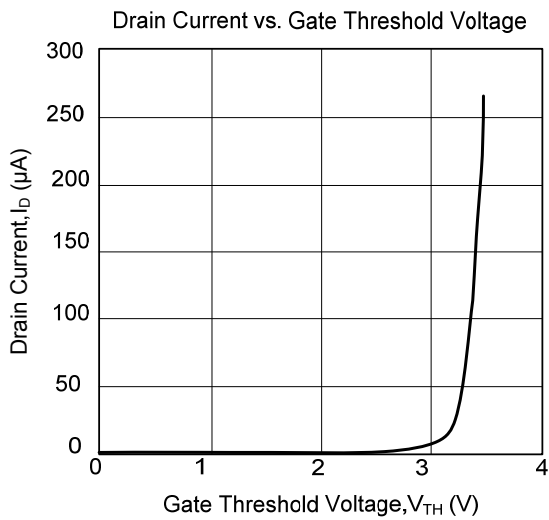
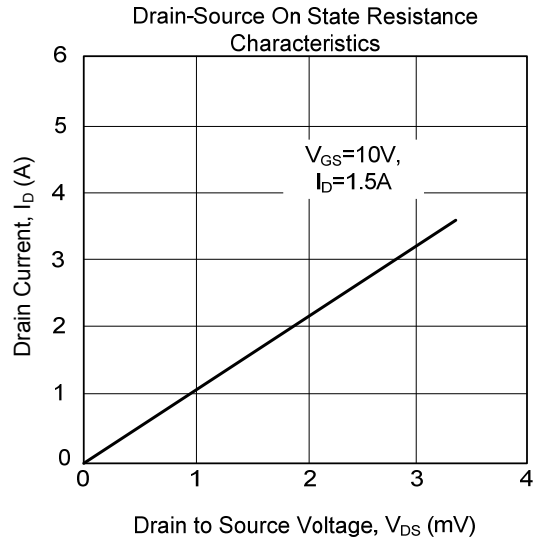
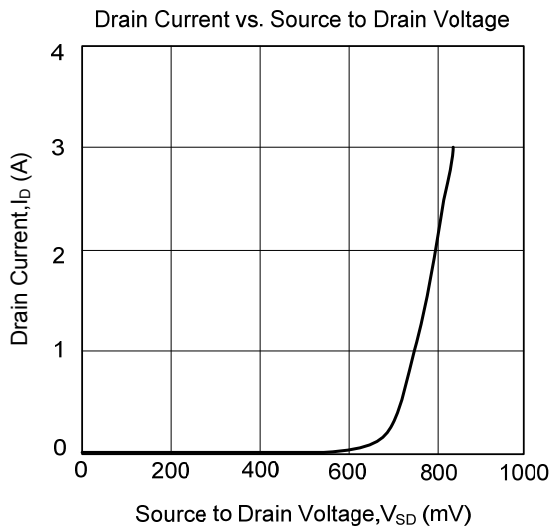


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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