

6.2 Amps, 600/650 Volts N-CHANNEL MOSFET

■ Description

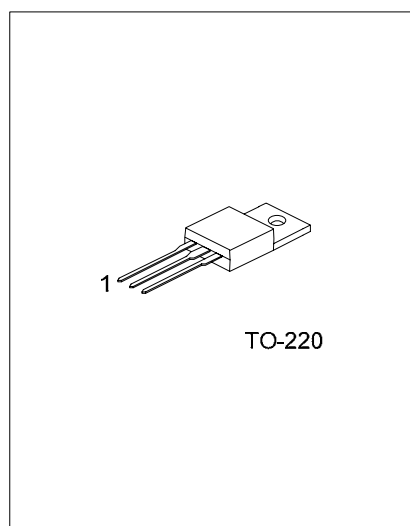
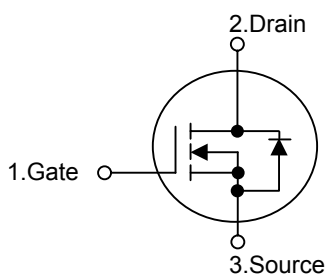
The XT6N60 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

■ Features

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

■ Package

- TO-220



*Pb-free plating product number: 6N60L

■ Ordering Information

XT6N60 ①②③④

Designator	Represents	Symbol	Description
①	Lead Planting	L	L:Lead Free Planting, Blank : Pb/Sn
②	Drain-Source Voltage	A/B	A:600V,B:650V
③	Package Type	T	TO-220
④	Packing Type	T	Tube
		R	Tape Reel

■ Absolute Maximum Ratings

(TA=25°C unless otherwise noted)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage	XT6N60-A	V_{DSS}	600	V
	XT6N60-B		650	
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Current(Note 1)		I_{AR}	6.2	A
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	6.2	A
	$T_C=100^{\circ}\text{C}$		3.9	A
Pulsed drain current(Note 1)		I_{DM}	24.8	A
Avalanche Energy	Single Pulsed(Note 2)	E_{AS}	440	mJ
	Repetitive(Note 1)	E_{AR}	13	mJ
Power dissipation		PD	62.5	W
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-55—150	°C
storage Temperature range		T_{STG}	-55—150	°C

Note: 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.

■ Thermal Data

Parameter	Symbol	Ratings	Unit
Junction – to - Ambient	θ_{JA}	62	°C/W
Junction – to - Case	θ_{JC}	2	°C/W

Electrical Characteristics

(TA=25°C unless otherwise noted)

Parameter		Symbol	Test Condition	Min	Typ	Max	Unit
OFF Characteristics							
Drain-source breakdown voltage	XT6N60-A	BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V
	XT6N60-B			650			
Zero gate voltage drain current		I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	μA
Gate-body leakage		I _{GSS}	V _{GS} =30V, V _{DS} =0V			100	nA
			V _{GS} =-30V, V _{DS} =0V			-100	nA
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D =250μA, Reference 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=1.0MHz		770	1000	pF
Output Capacitance		C _{OSS}			95	120	pF
Reverse Transfer Capacitance		C _{RSS}			10	13	pF
Switching Characteristics							
Turn-on delay time		t _{D(ON)}	V _{DD} =300V,I _D =6.2A, R _G =25Ω(Note 4,5)		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 4,5)		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 Pulse Drain-Source Diode Forward Current		I _{SM}				24.8	A
Reverse Recovery Time		t _{RR}	VS=0V,IS=6.2A, dI _F /dt=100A/μS (Note 4)		290		ns
Reverse Recovery Charge		Q _{RR}			2.35		μC

Notes:

1. Repetitive Rating : Pulse width limited by T_J
2. $L = 16.8mH, I_{AS} = 6A, V_{DD} = 90V, R_G = 25 \Omega$, Starting $T_J = 25^\circ C$
3. $I_{SD} \leq 6.2A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ C$
4. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Test Circuit And Waveforms

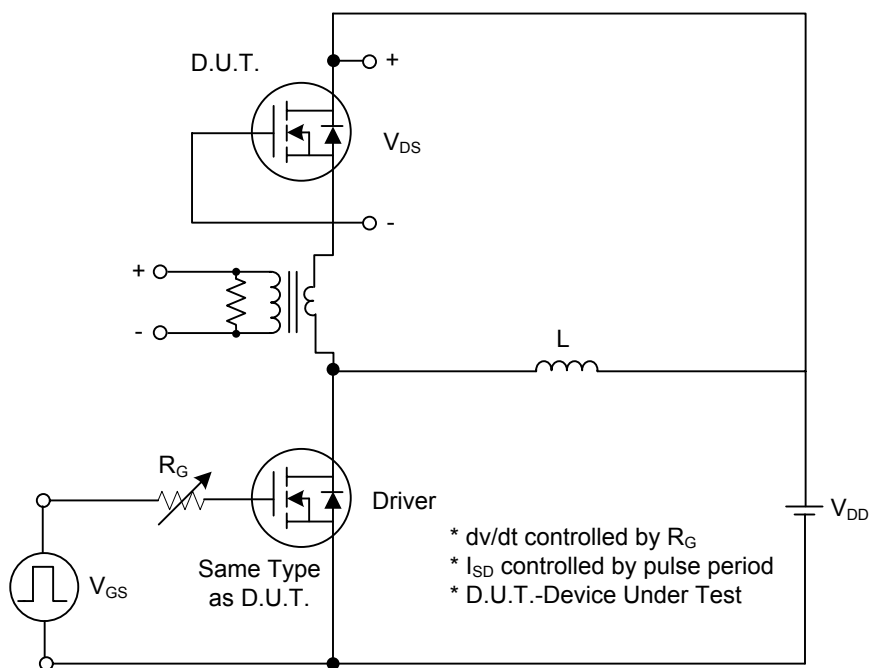


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

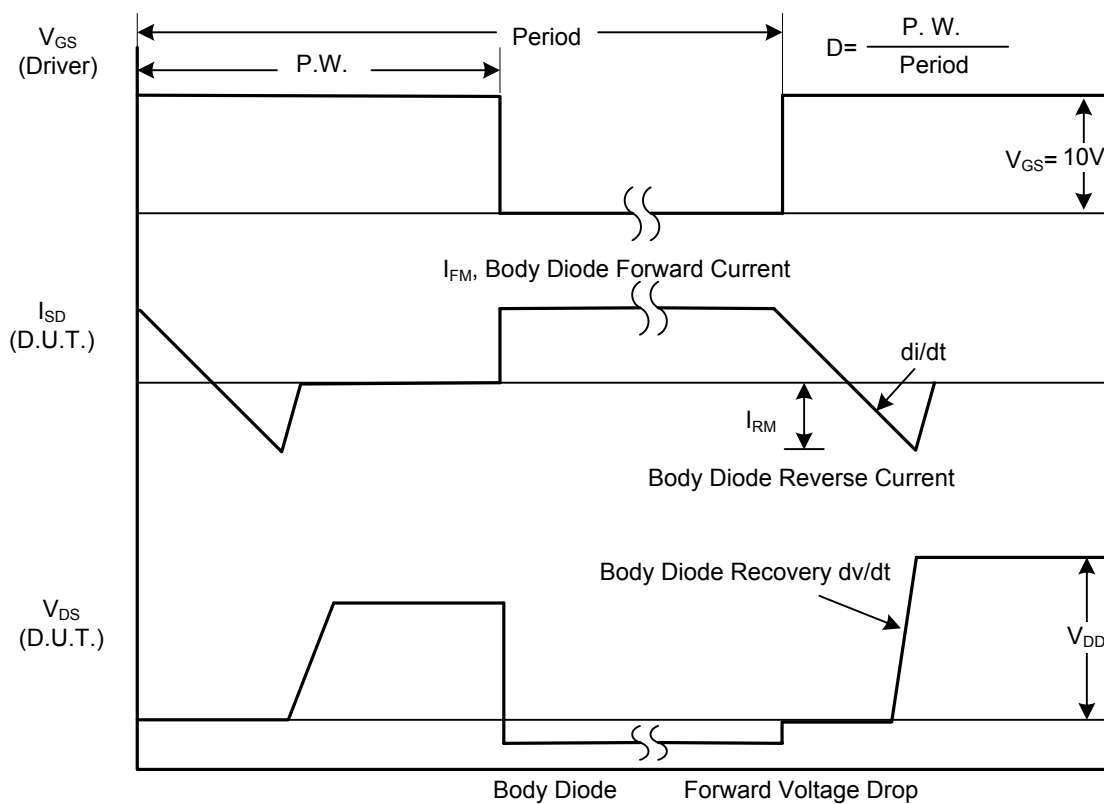


Fig. 1B Peak Diode Recovery dv/dt Waveforms

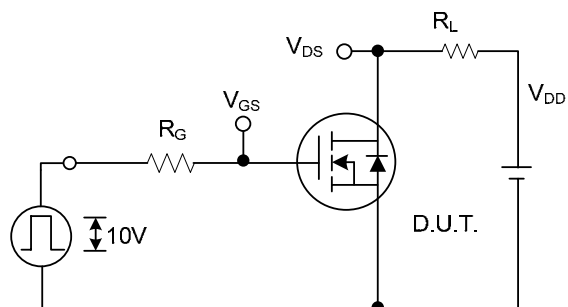


Fig. 2A Switching Test Circuit

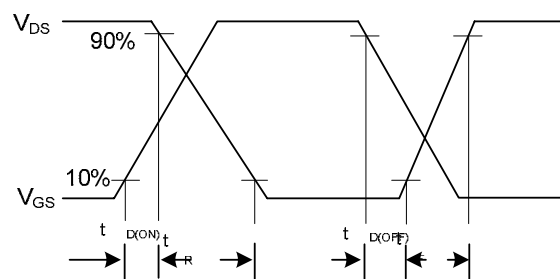


Fig. 2B Switching Waveforms

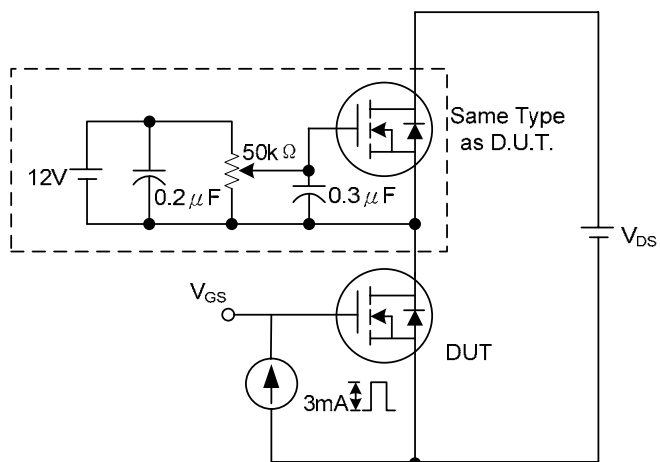


Fig. 3A Gate Charge Test Circuit

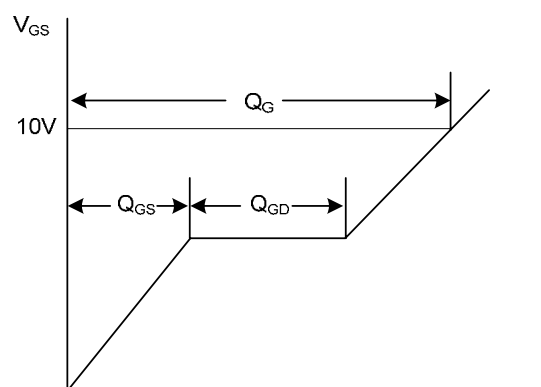


Fig. 3B Gate Charge Waveform

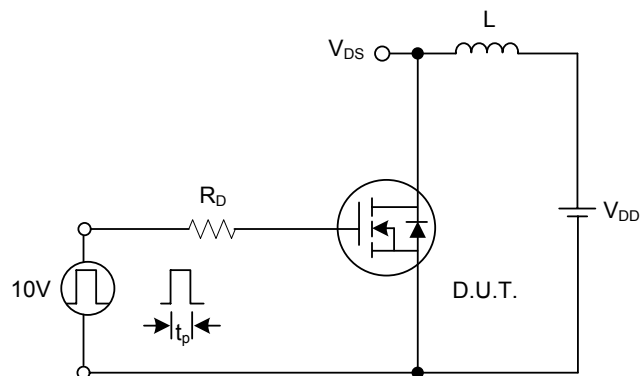


Fig. 4A Unclamped Inductive Switching Test Circuit

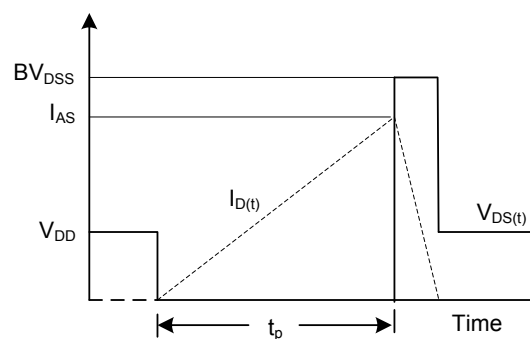
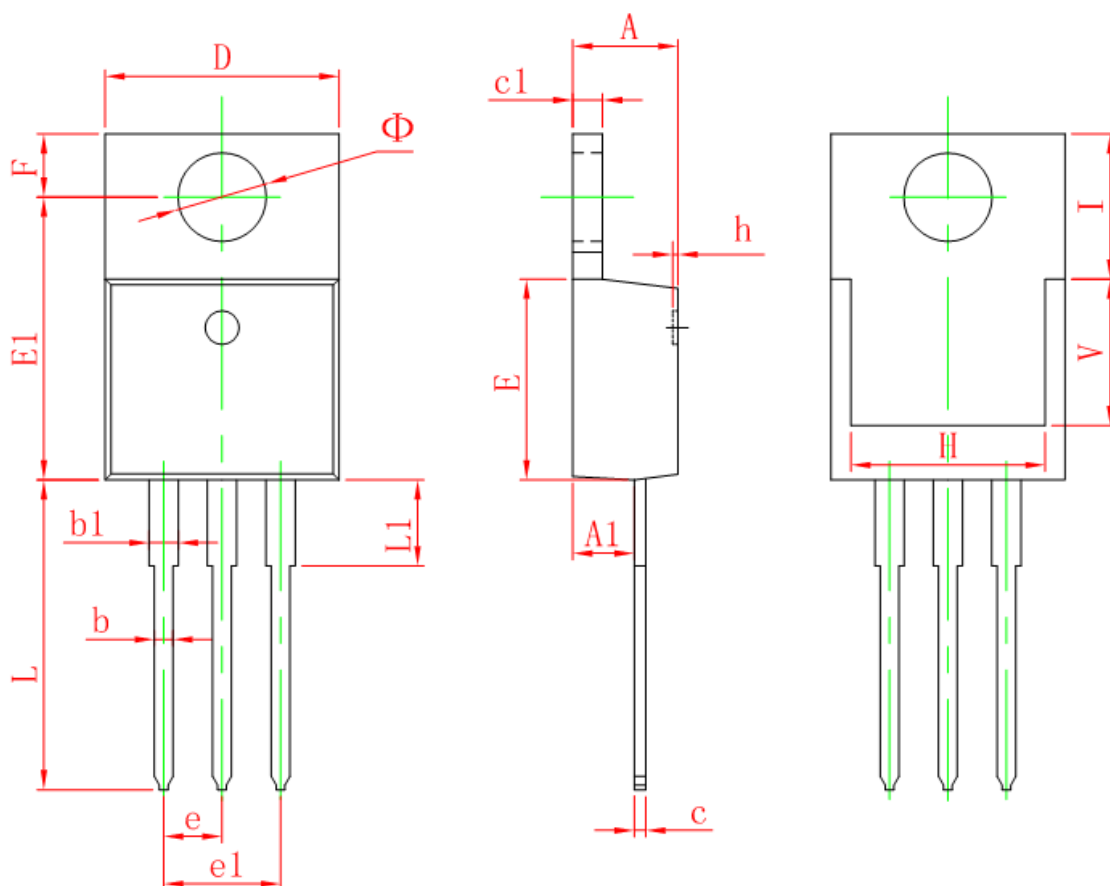


Fig. 4B Unclamped Inductive Switching Waveforms

Package Information

TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	10.010	10.350	0.394	0.407
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
H	8.440 REF.		0.332 REF.	
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
V	6.060 REF.		0.239 REF.	
I	6.600 REF.		0.260 REF.	
Φ	3.735	3.935	0.147	0.155