

# NJ6N60 POWER MOSFET



## 6.2A 600V N-CHANNEL POWER MOSFET

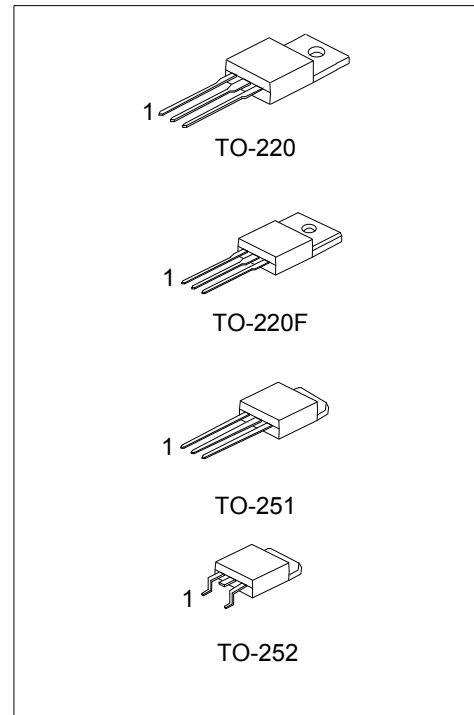
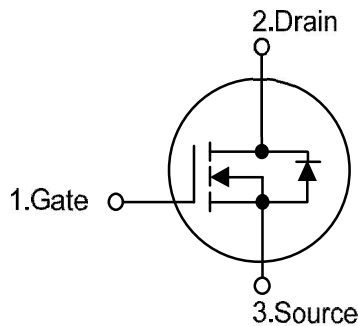
### DESCRIPTION

The NJ6N60 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

- \*  $V_{DS} = 600V$
- \*  $I_D = 6.2A$
- \*  $R_{DS(ON)} = 1.5 \text{ ohm@}V_{GS} = 10V$
- \* Ultra low gate charge (typical 20 nC )
- \* Low reverse transfer Capacitance (  $CR_{SS} = \text{typical } 10pF$  )
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

### SYMBOL



### ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
NJ6N60-LI	TO-220	G	D	S	Tape Box
NJ6N60-BL	TO-220	G	D	S	Bulk
NJ6N60F-LI	TO-220F	G	D	S	Tube
NJ6N60A-LI	TO-251	G	D	S	Tube
NJ6N60D-TR	TO-252	G	D	S	Tape Ree
NJ6N60D-LI	TO-252	G	D	S	Tube

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

# NJ6N60 POWER MOSFET

## ■ ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V <sub>DSS</sub>	600	V
Gate-Source Voltage		V <sub>GSS</sub>	±30	V
Avalanche Current (Note 2)		I <sub>AR</sub>	6.2	A
Continuous Drain Current		I <sub>D</sub>	6.2	A
Pulsed Drain Current (Note 2)		I <sub>DM</sub>	24.8	A
Avalanche Energy	Single Pulsed (Note 3)	6N60	440	mJ
		6N60-P	260	mJ
	Repetitive (Note 2)	E <sub>AR</sub>	13	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	ns
Power Dissipation	TO-220	P <sub>D</sub>	125	W
	TO-220F		40	W
	TO-251		55	W
	TO-252		55	W
Junction Temperature		T <sub>J</sub>	+150	°C
Operating Temperature		T <sub>OPR</sub>	-55 ~ +150	°C
Storage Temperature		T <sub>STG</sub>	-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<sub>J</sub>

3. L = 14mH, I<sub>AS</sub> = 6A, V<sub>DD</sub> = 90V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C

4. I<sub>SD</sub> ≤ 6.2A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C

## ■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	θ <sub>JA</sub>	62.5	°C/W
	TO-220F		62.5	
	TO-251/TO-252		110	
Junction to Case	TO-220	θ <sub>JC</sub>	1.0	°C/W
	TO-220F		3.2	
	TO-251		2.27	
	TO-252		2.27	

# NJ6N60 POWER MOSFET

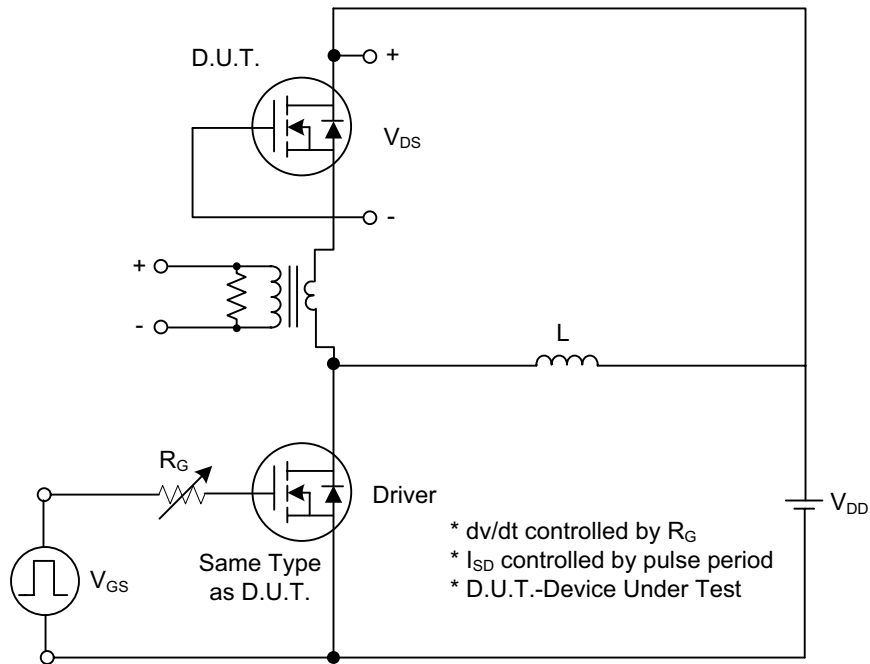
## ■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	600			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> = 600V, V <sub>GS</sub> = 0V			10	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> = 30V, V <sub>DS</sub> = 0V			100	nA
	Reverse		V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0V			-100	nA
Breakdown Voltage Temperature Coefficient		ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA, Referenced to 25°C		0.53		V/°C
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	6N60	R <sub>Ds(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.1A		1.0	1.5	Ω
	6N60-P				1.0	1.5	
<b>DYNAMIC CHARACTERISTICS</b>							
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0 MHz		770	1000	pF
Output Capacitance		C <sub>OSS</sub>			95	120	pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			10	13	pF
<b>SWITCHING CHARACTERISTICS</b>							
Turn-On Delay Time		t <sub>D(ON)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =6.2A, R <sub>G</sub> =25Ω (Note 1, 2)		20	50	ns
Turn-On Rise Time	6N60	t <sub>r</sub>			70	150	ns
	6N60-P				60	100	ns
Turn-Off Delay Time		t <sub>D(OFF)</sub>			40	90	ns
Turn-Off Fall Time	6N60	t <sub>f</sub>			80	100	ns
	6N60-P				70	100	ns
Total Gate Charge		Q <sub>G</sub>	V <sub>DS</sub> =480V, I <sub>D</sub> =6.2A, V <sub>GS</sub> =10 V (Note 1, 2)		20	25	nC
Gate-Source Charge		Q <sub>GS</sub>			4.9		nC
Gate-Drain Charge		Q <sub>GD</sub>			9.4		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>							
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 6.2 A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>				6.2	A
Maximum Pulsed Drain-Source Diode Forward Current		I <sub>SM</sub>				24.8	A
Reverse Recovery Time		t <sub>rr</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 6.2 A,		290		ns
Reverse Recovery Charge		Q <sub>RR</sub>	dI <sub>F</sub> /dt = 100 A/μs (Note 1)		2.35		μC

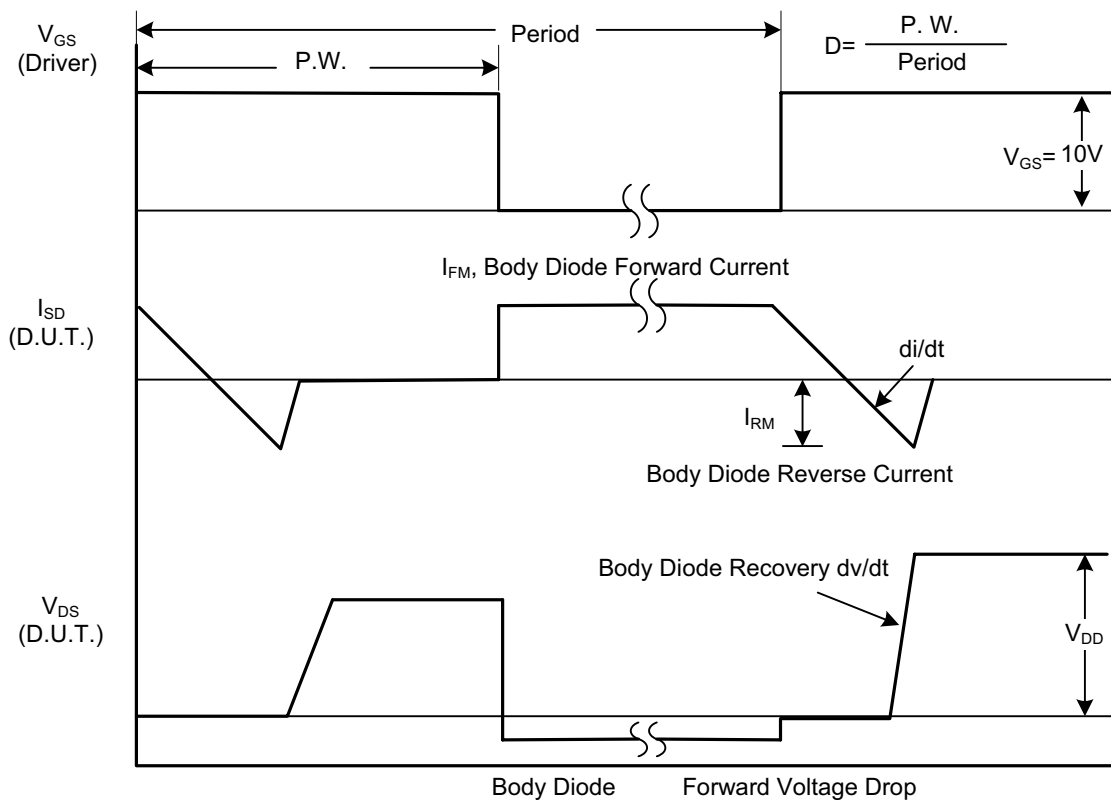
- Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%  
2. Essentially independent of operating temperature

# NJ6N60 POWER MOSFET

## ■ TEST CIRCUITS AND WAVEFORMS



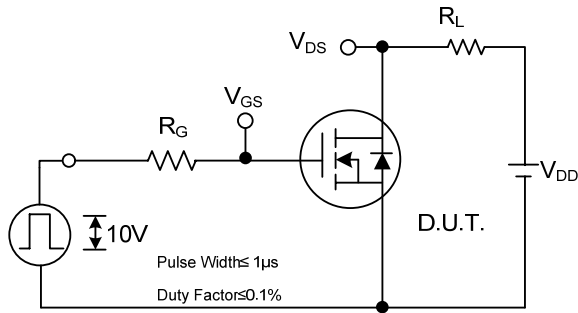
**Peak Diode Recovery  $dv/dt$  Test Circuit**



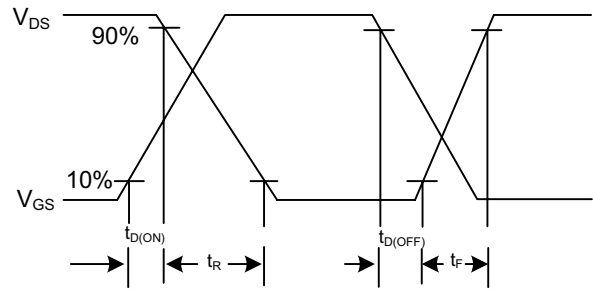
**Peak Diode Recovery  $dv/dt$  Waveforms**

# NJ6N60 POWER MOSFET

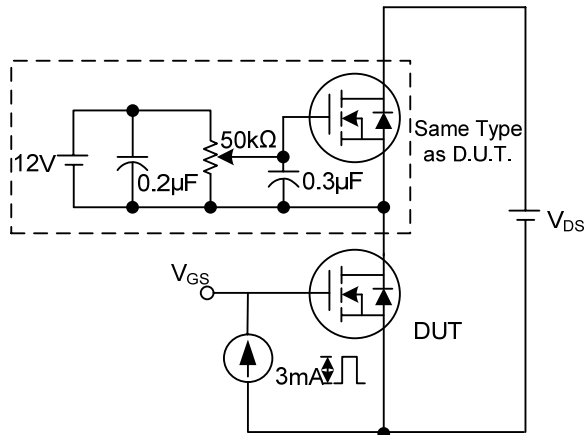
## ■ TEST CIRCUITS AND WAVEFORMS (Cont.)



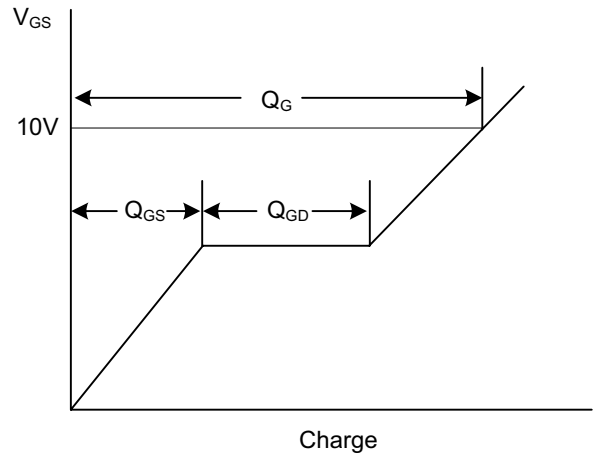
Switching Test Circuit



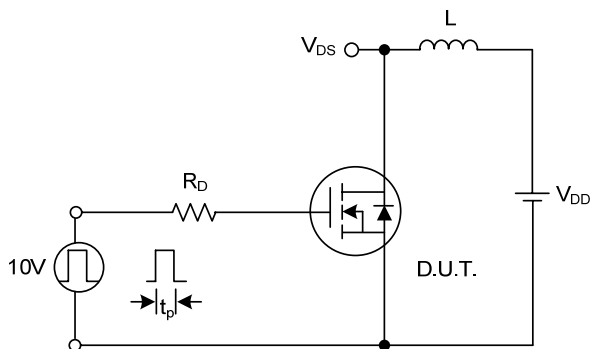
Switching Waveforms



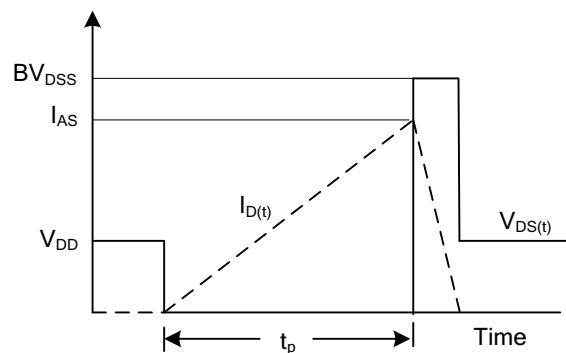
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

# NJ6N60 POWER MOSFET

## ■ TYPICAL CHARACTERISTICS

