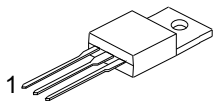
NJ6N60 POWER MOSFET

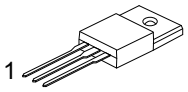
6.2A 600V N-CHANNEL POWER MOSFET

■ DESCRIPTION

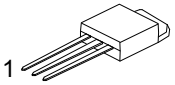
The NJ6**N60** is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.



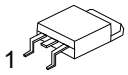
TO-220



TO-220F



TO-251

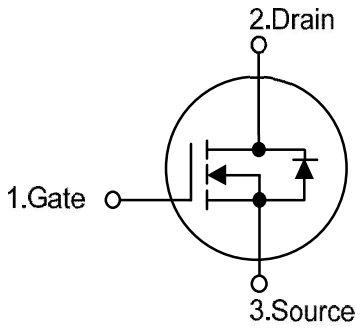


TO-252

■ FEATURES

* V_{DS} = 600V
* I_D = 6.2A
* RDS(ON) = 1.5 ohm@VGS = 10V
* Ultra low gate charge (typical 20 nC)
* Low reverse transfer Capacitance (CRSS = 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

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	600	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)	6N60	E_{AS}	440	mJ
		6N60-P		260	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			40	W
	TO-251			55	W
	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		62.5	
	TO-251/TO-252		110	
Junction to Case	TO-220	θ_{JC}	1.0	°C/W
	TO-220F		3.2	
	TO-251		2.27	
	TO-252		2.27	

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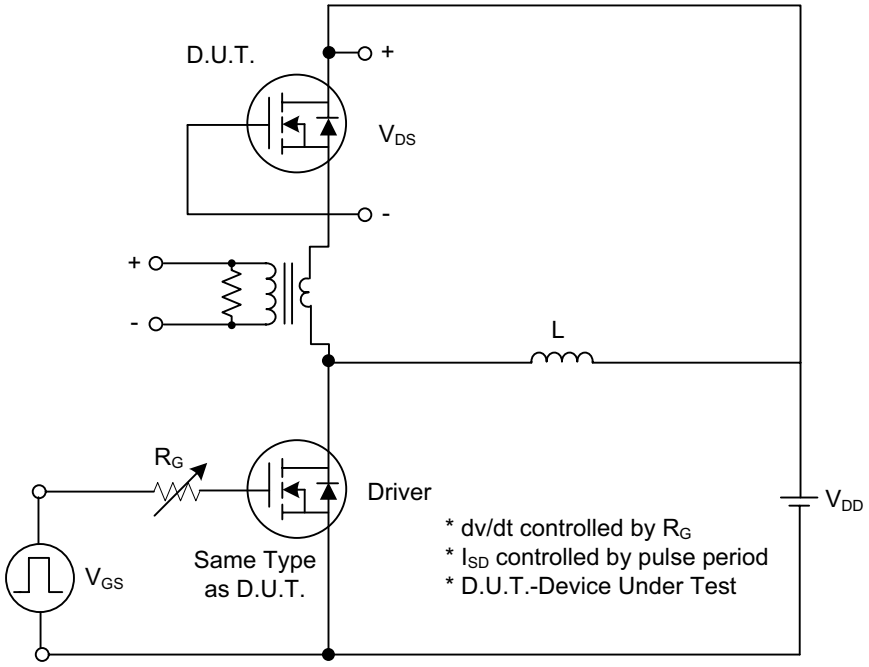
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

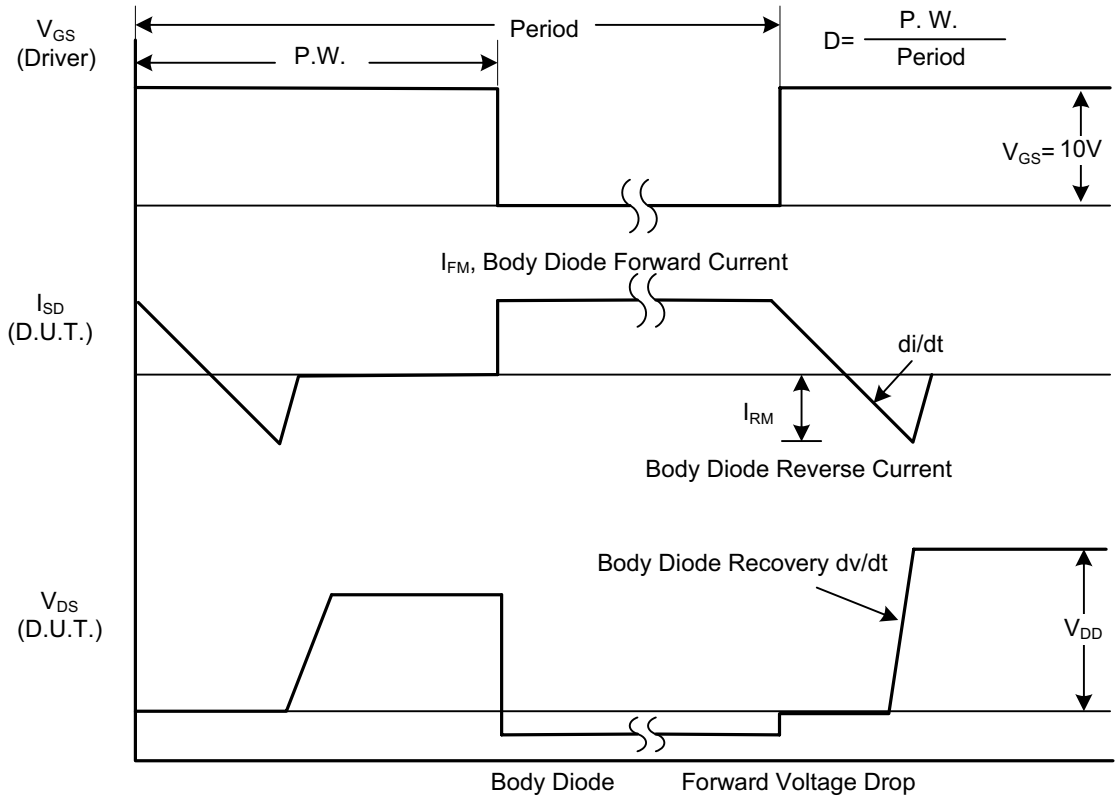
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS} = 0V, I_D = 250μA	600			V
Drain-Source Leakage Current		I_{DSS}	V_{DS} = 600V, V_{GS} = 0V			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS} = 30V, V_{DS} = 0V			100	nA
	Reverse		V_{GS} = -30V, V_{DS} = 0V			-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA, 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	6N60	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 3.1A		1.0	1.5	Ω
	6N60-P				1.0	1.5	
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
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD}=300V, I_D =6.2A, R_G =25Ω (Note 1, 2)		20	50	ns
Turn-On Rise Time	6N60	t_R			70	150	ns
	6N60-P				60	100	ns
Turn-Off Delay Time		$t_{D(OFF)}$			40	90	ns
Turn-Off Fall Time	6N60	t_F			80	100	ns
	6N60-P				70	100	ns
Total Gate Charge		Q_G	V_{DS}=480V, I_D=6.2A, V_{GS}=10 V (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} = 0 V, I_S = 6.2 A			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} = 0 V, I_S = 6.2 A, dI_F/dt = 100 A/μs (Note 1)		290		ns
Reverse Recovery Charge		Q_{RR}			2.35		μC

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

■ TEST CIRCUITS AND WAVEFORMS

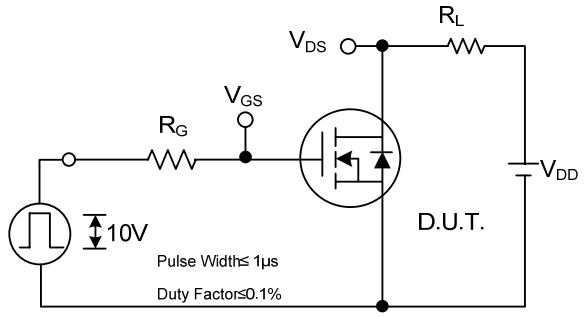


Peak Diode Recovery dv/dt Test Circuit

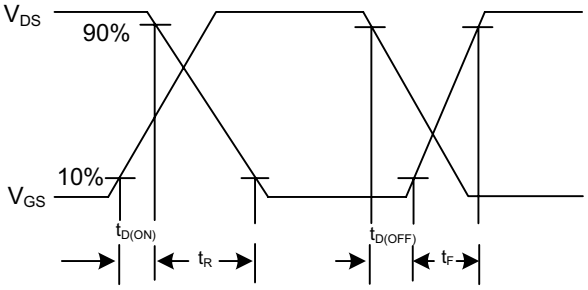


Peak Diode Recovery dv/dt Waveforms

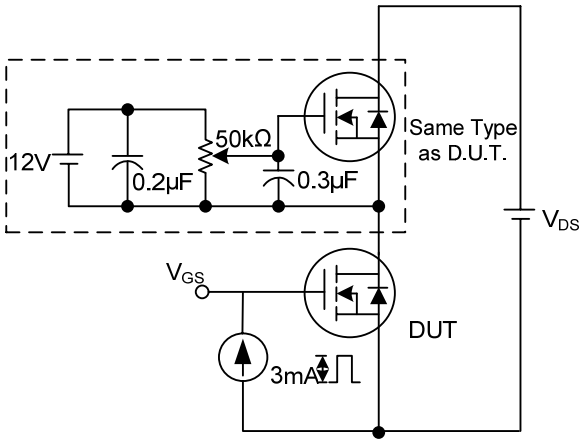
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



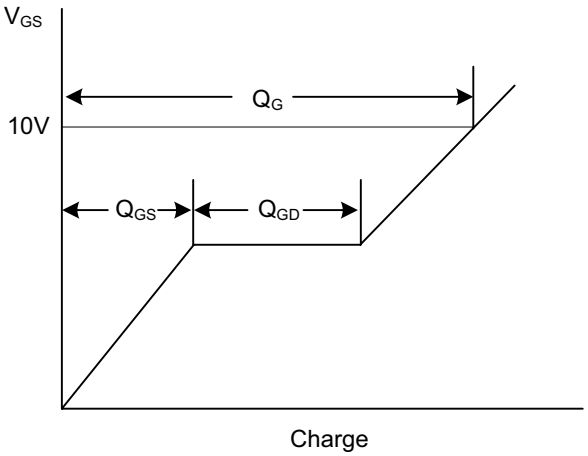
Switching Test Circuit



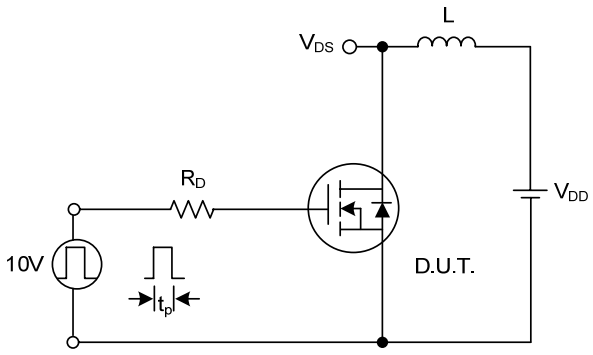
Switching Waveforms



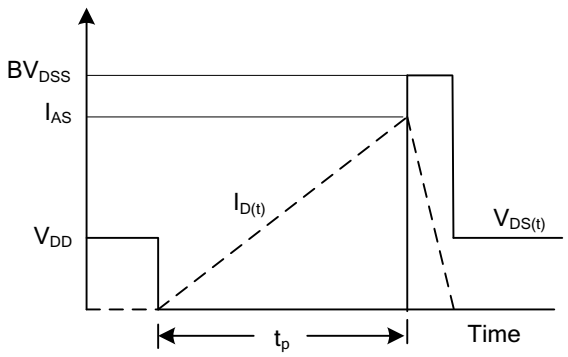
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS