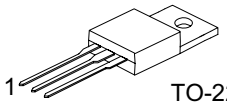
NJ6N80 POWER MOSFET

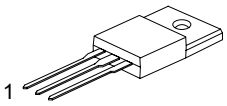
6.0A 800V N-CHANNEL POWER MOSFET

■ DESCRIPTION

The NJ6N80 is a N-channel mode power MOSFET using advanced technology to provide customers with planar stripe and DMOS technology. This technology specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.



TO-220

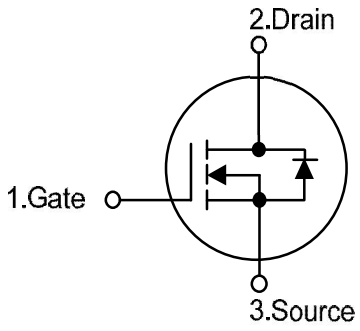


TO-220F

■ FEATURES

* V_{DS} = 800V
* I_D = 6.0A
* RDS(on) = 2.0 ohm @VGS = 10 V
* Improved dv/dt capability
*Fast switching
* 100% avalanche tested

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
NJ6N80-LI	TO-220	G	D	S	Tape Box
NJ6N80-BL	TO-220	G	D	S	Bulk
NJ6N80F-LI	TO-220F	G	D	S	Tube

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

NJ6N80 POWER MOSFET

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	800	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current (Note 1)	Continuous	I_D	6	A
	Pulsed	I_{DM}	22	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	680	mJ
	Repetitive (Note 1)	E_{AR}	15.8	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	138	W
	TO-220F		51	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55~+150	°C

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 37mH, I_{AS} = 6A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 5.5A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. 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 CHARACTERISTICS

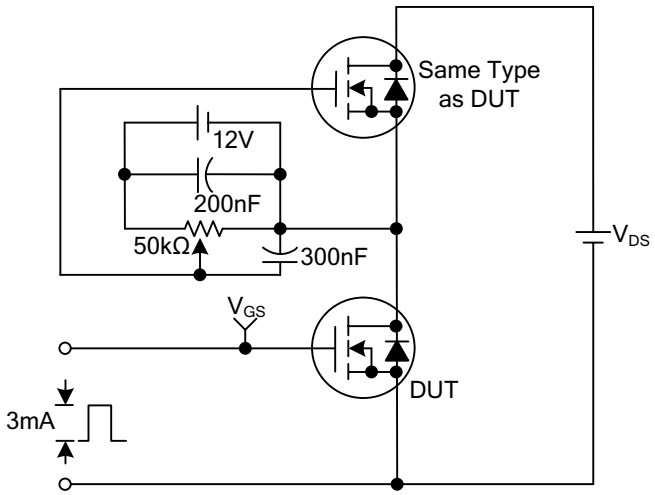
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220	θ_{JC}	0.9	°C/W
	TO-220F		2.45	°C/W

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

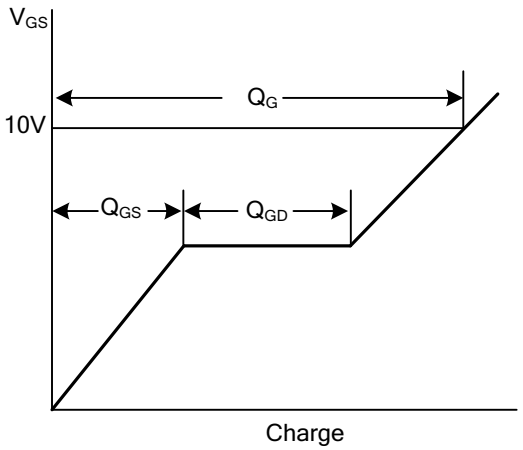
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	800			V
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=250μA		0.97		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=800V, V_{GS}=0V			10	μA
			V_{DS}=640V, T_C=125°C			100	
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	3.0		5.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=3A		1.6	2.0	Ω
Forward Transconductance		g_{FS}	V_{DS}=50V, I_D=3A (Note 1)		5.4		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1010	1310	pF
Output Capacitance		C_{OSS}			90	115	pF
Reverse Transfer Capacitance		C_{RSS}			8	11	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=640V, I_D=6A (Note 1, 2)		21	30	nC
Gate to Source Charge		Q_{GS}			6		nC
Gate to Drain Charge		Q_{GD}			9		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=400V, I_D=6A, R_G=25Ω (Note 1, 2)		26	60	ns
Rise Time		t_R			65	140	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			47	105	ns
Fall-Time		t_F			44	90	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				6	A
Maximum Body-Diode Pulsed Current		I_{SM}				22	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=6A, V_{GS}=0V			1.4	V
Reverse Recovery Time		t_{rr}	I_S=6A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		615		ns
Reverse Recovery Charge		Q_{RR}			5.4		μC

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

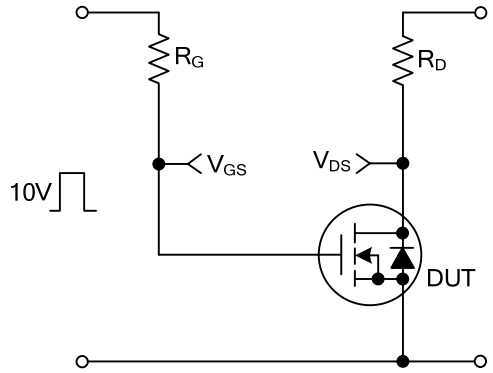
■ TEST CIRCUITS AND WAVEFORMS



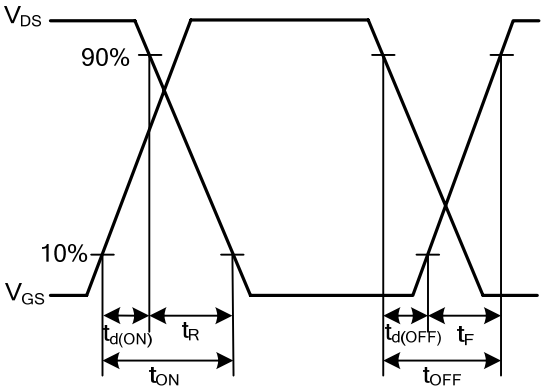
Gate Charge Test Circuit



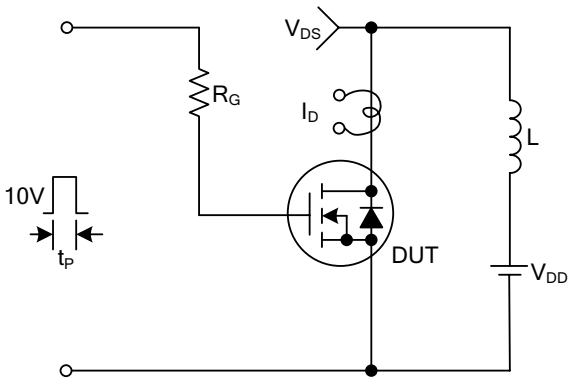
Gate Charge Waveforms



Resistive Switching Test Circuit

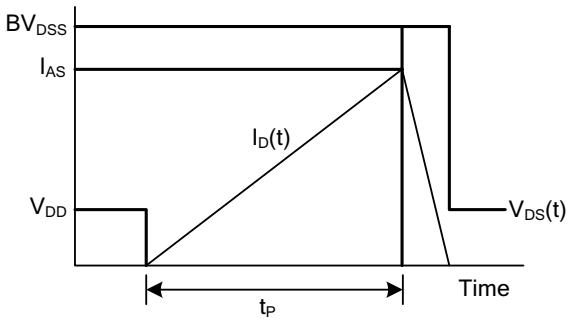


Resistive Switching Waveforms



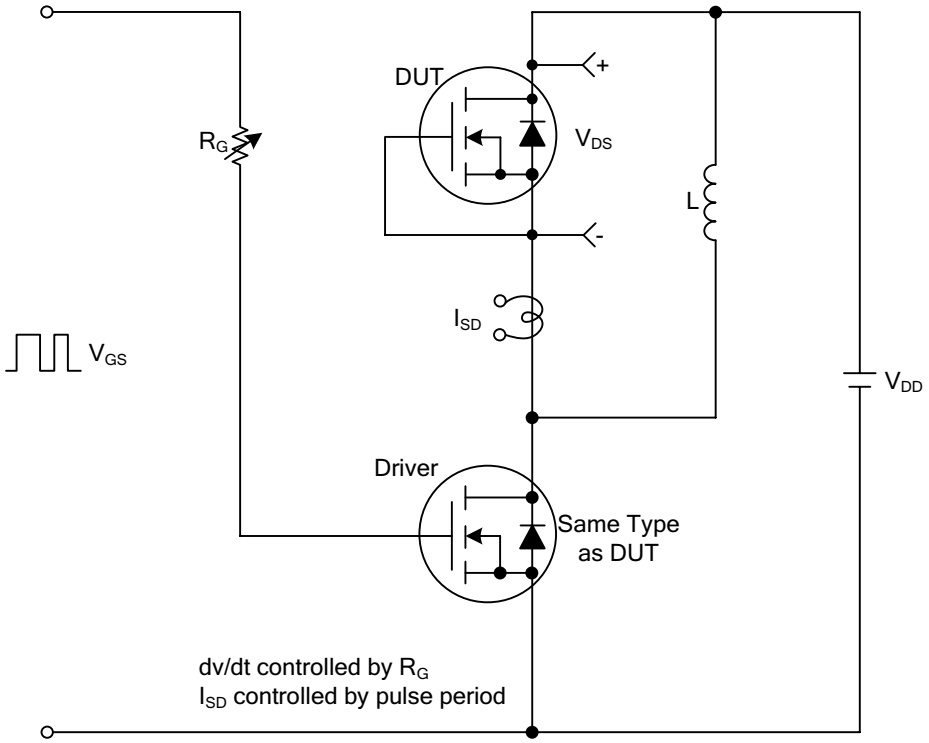
Unclamped Inductive Switching Test Circuit

$$E_{AS}=\frac{1}{2}LI_{AS}^2\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

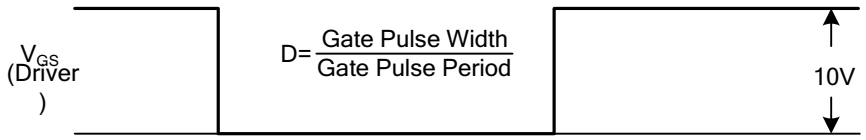


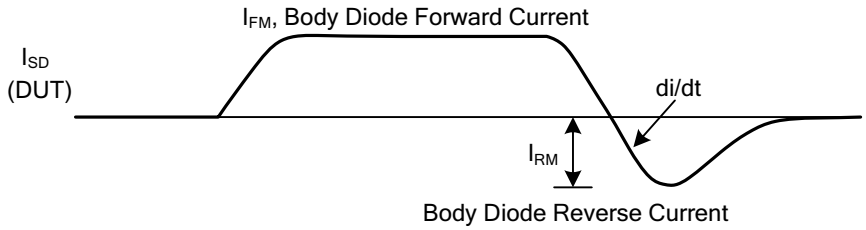
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit & Waveforms





Body Diode Reverse Current