

# NJ10N80 POWER MOSFET



## 10A 800V N-CHANNEL POWER MOSFET

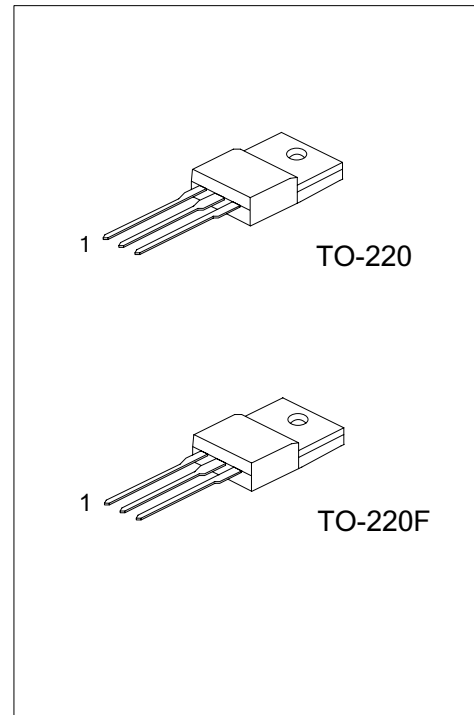
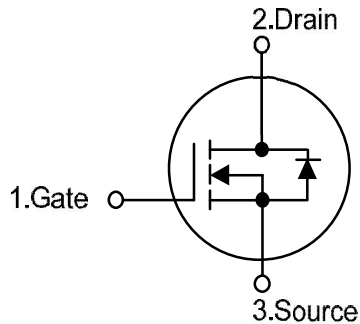
### ■ DESCRIPTION

The NJ10N80 uses advanced proprietary, planar stripe, DMOS technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

### ■ FEATURES

- \*  $V_{DS} = 800V$
- \*  $I_D = 10A$
- \*  $R_{DS(ON)} = 1.1\Omega @ V_{GS} = 10V$ .
- \* Ultra Low Gate Charge ( Typical 45nC )
- \* Low Reverse Transfer Capacitance (  $CR_{SS} = \text{Typical } 15pF$  )
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

### ■ SYMBOL



### ■ ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
NJ10N80-LI	TO-220	G	D	S	Tape Box
NJ10N80-BL	TO-220	G	D	S	Bulk
NJ10N80F-LI	TO-220F	G	D	S	Tube

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

■ **ABSOLUTE MAXIMUM RATINGS** ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	800	V	
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V	
Continuous Drain Current ( $T_C = 25^\circ\text{C}$ )		$I_D$	10	A	
Pulsed Drain Current (Note 2)		$I_{DM}$	40	A	
Avalanche Current (Note 2)		$I_{AR}$	10	A	
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	920	mJ	
	Repetitive (Note 2)	$E_{AR}$	24	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns	
Power Dissipation	TO-220	$P_D$	156	W	
	TO-220F		63		
Linear Derating Factor above $T_C = 25^\circ\text{C}$	TO-220		1.25	W/ $^\circ\text{C}$	
	TO-220F		0.504		
Junction Temperature			$T_J$	150	$^\circ\text{C}$
Storage Temperature			$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

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 maximum junction temperature.

3.  $L=17.3\text{mH}$ ,  $I_{AS}=10\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$

4.  $I_{SD} \leq 10\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$ .

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-220			
Junction to Case	TO-220	$\theta_{JC}$	0.8	$^\circ\text{C}/\text{W}$
	TO-220F		1.98	

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

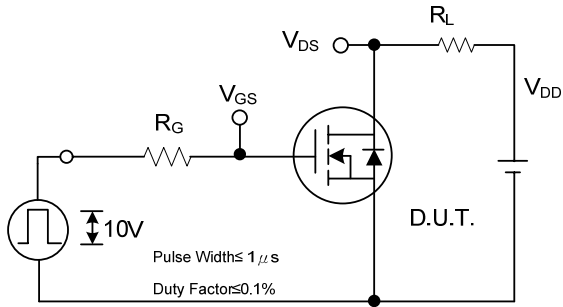
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	800			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 800V, V <sub>GS</sub> = 0 V			10	μA
		V <sub>DS</sub> = 640V, T <sub>C</sub> = 125°C			100	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±30 V			±100	nA
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> = 250 μA, Referenced to 25°C		0.98		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> = 250 μA	3.0		5.0	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 5.0A		0.9	1.1	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1MHz		2150	2800	pF
Output Capacitance	C <sub>OSS</sub>			180	230	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			15	20	pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> = 400V, I <sub>D</sub> = 10.0A, R <sub>G</sub> = 25Ω (Note 1,2)		50	110	ns
Turn-ON Rise Time	t <sub>R</sub>			130	270	
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			90	190	
Turn-OFF Fall-Time	t <sub>F</sub>			80	170	
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> = 640V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 10.0A (Note 1,2)		45	58	nC
Gate Source Charge	Q <sub>GS</sub>			13.5		
Gate Drain Charge	Q <sub>GD</sub>			17		
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 10.0 A, V <sub>GS</sub> = 0V			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				10.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				40.0	
Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> = 0V, dI <sub>F</sub> /dt = 100 A/μs,		730		ns
Reverse Recovery Charge	Q <sub>RR</sub>	I <sub>S</sub> = 10.0A (Note 1)		10.9		nC

Notes: 1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

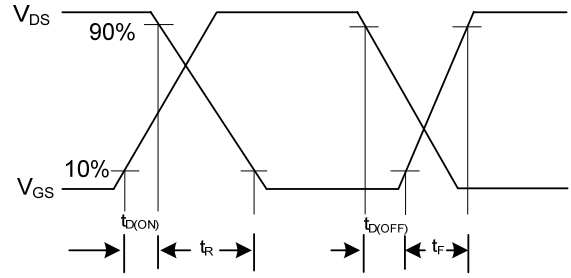
2. Independent of operating temperature.

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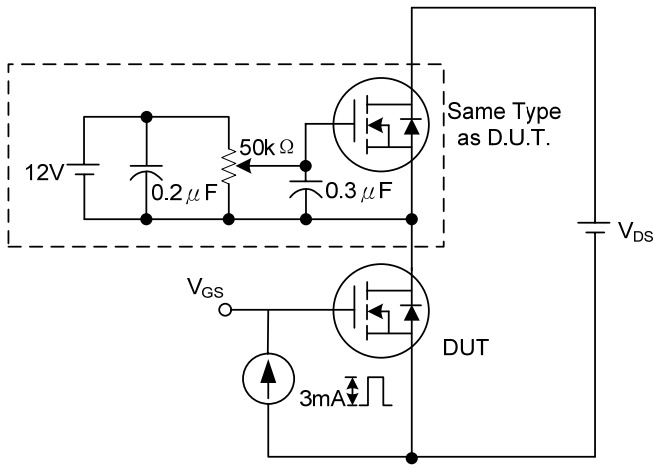
## TEST CIRCUIT



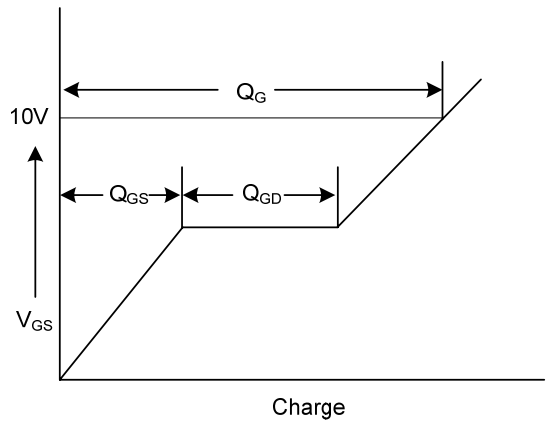
Switching Test Circuit



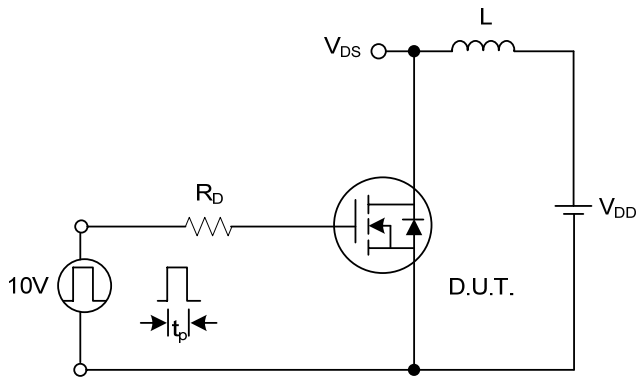
Switching Waveforms



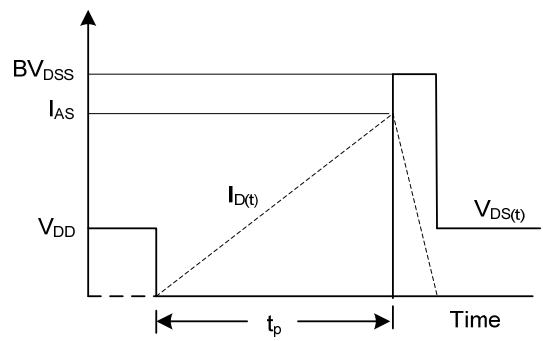
Gate Charge Test Circuit



Gate Charge Waveform



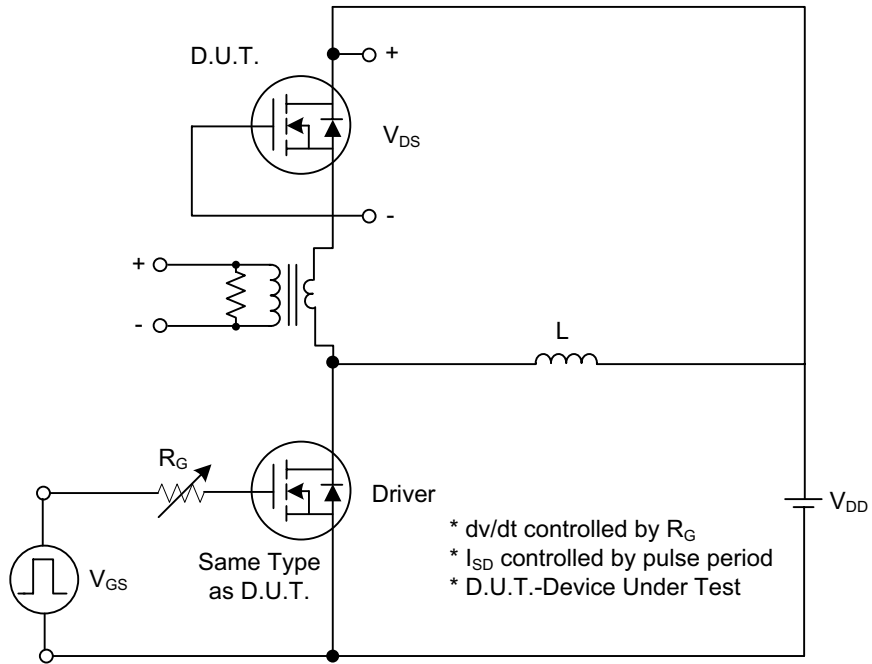
Unclamped Inductive Switching Test Circuit



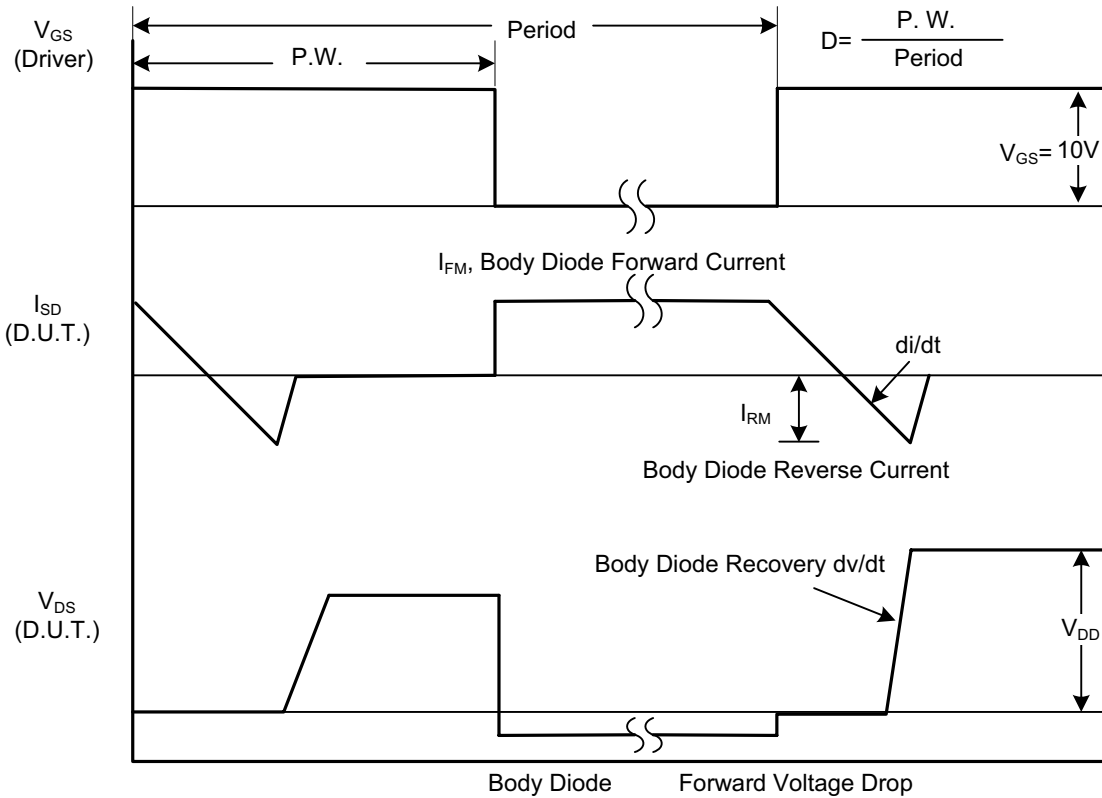
Unclamped Inductive Switching Waveforms

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## ■ TEST CIRCUIT(Cont.)



Peak Diode Recovery  $dv/dt$  Test Circuit



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## ■ TYPICAL CHARACTERISTICS

