



9N80

Power MOSFET

9A, 800V N-CHANNEL POWER MOSFET

DESCRIPTION

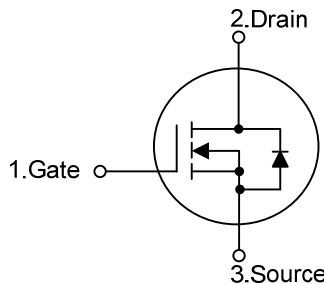
The UTC **9N80** is an N-channel mode power MOSFET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **9N80** is universally applied in high efficiency switch mode power supply.

FEATURES

- * $R_{DS(on)} = 1.3\Omega @ V_{GS} = 10V$
- * Improved Gate Charge
- * Lower Input Capacitance
- * Lower Leakage Current: $25\mu A (Max.) @ V_{DS} = 800V$

SYMBOL

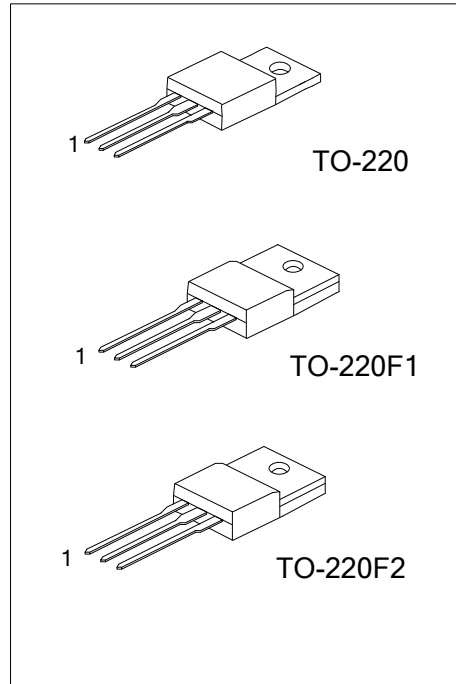


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
9N80L-TA3-T	9N80G-TA3-T	TO-220	G	D	S	Tube
9N80L-TF1-T	9N80G-TF1-T	TO-220F1	G	D	S	Tube
9N80L-TF2-T	9N80G-TF2-T	TO-220F2	G	D	S	Tube

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

<p>9N80L-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) T: Tube (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 (3) G: Halogen Free, L: Lead Free</p>
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■ 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}	± 30	V
Avalanche Current (Note 2)		I_{AR}	9	A
Drain Current (Continuous)	Continuous	I_D	9	A
	Pulsed (Note 2)	I_{DM}	36	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	900	mJ
	Repetitive (Note 2)	E_{AR}	24	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.0	V/ns
Power Dissipation	TO-220	P_D	147	W
	TO-220F1		61	
	TO-220F2		64	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55~+150	$^\circ\text{C}$

Note: 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. $L = 21\text{mH}$, $I_{AS} = 9\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 27\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 9\text{A}$, $di/dt \leq 180\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	0.85	$^\circ\text{C}/\text{W}$
	TO-220F1		2.04	
	TO-220F2		1.95	

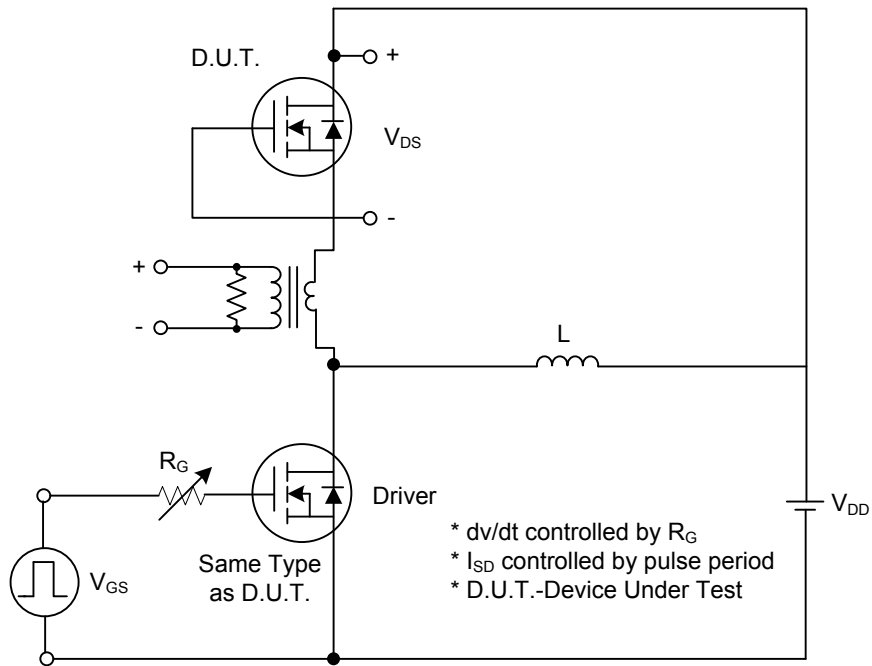
■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	800			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$		0.96		$V/^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=800\text{V}$			25	μA
Gate- Source Leakage Current	Forward	$V_{GS}=+30\text{V}$			+100	nA
	Reverse	$V_{GS}=-30\text{V}$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=5\text{V}$, $I_D=250\mu\text{A}$	3		5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=4.5\text{A}$		1.05	1.3	Ω
Forward Transconductance	g_{FS}	$V_{DS}=50\text{V}$, $I_D=4.5\text{A}$ (Note 1)		5.54		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$,		2020	2600	pF
Output Capacitance	C_{OSS}			195	230	pF
Reverse Transfer Capacitance	C_{RSS}			82	95	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{GS}=10\text{V}$, $V_{DS}=640\text{V}$, $I_D=9\text{A}$, (Note 1, 2)		93	120	nC
Gate to Source Charge	Q_{GS}			14.3		nC
Gate to Drain Charge	Q_{GD}			42.1		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=400\text{V}$, $I_D=9\text{A}$, $R_G=16\Omega$, (Note 1, 2)		25	60	ns
Rise Time	t_R			37	85	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			113	235	ns
Fall-Time	t_F			42	95	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S	Integral reverse pn-diode in the mosfet			9	A
Maximum Pulsed Drain-Source Diode Forward Current (Note 1)	I_{SM}				36	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=9\text{A}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$			1.4	V
Reverse Recovery Time	t_{rr}	$T_J=25^\circ\text{C}$, $I_F=9\text{A}$,		560		ns
Reverse Recovery Charge	Q_{RR}	$di_F/dt=100\text{A}/\mu\text{s}$, (Note 1)		8.4		μC

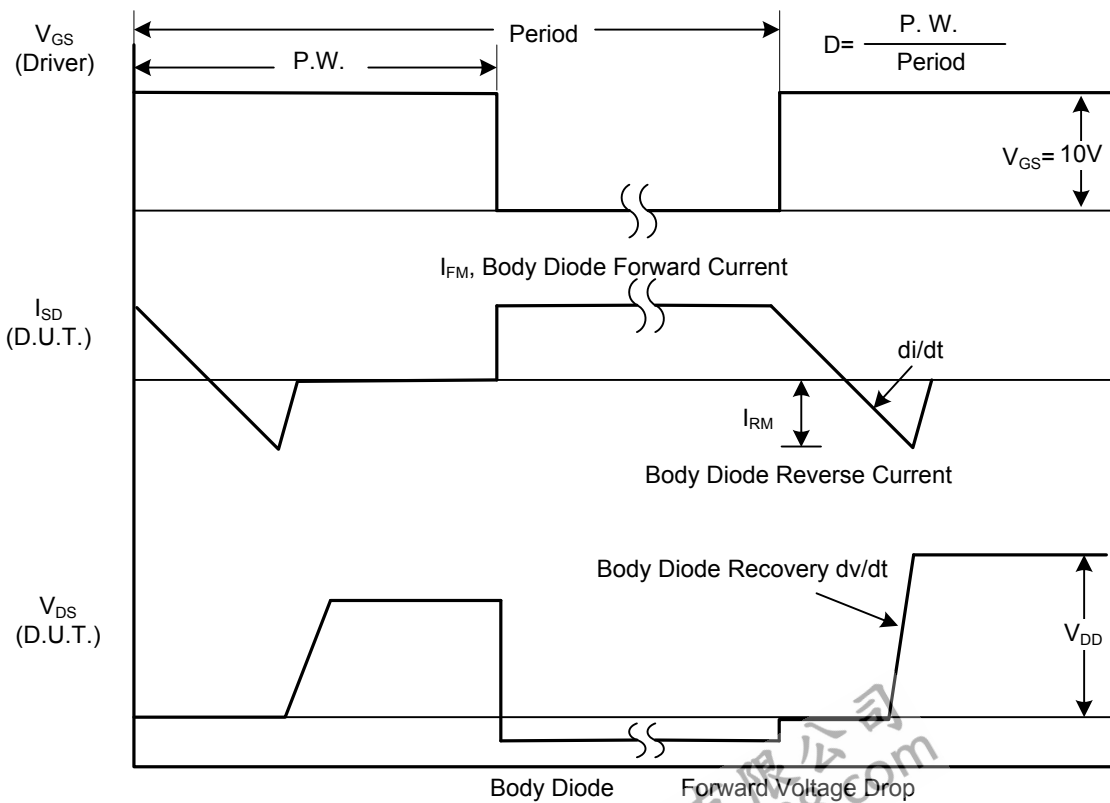
Note: 1. Pulse Test: Pulse width $\leq 250\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

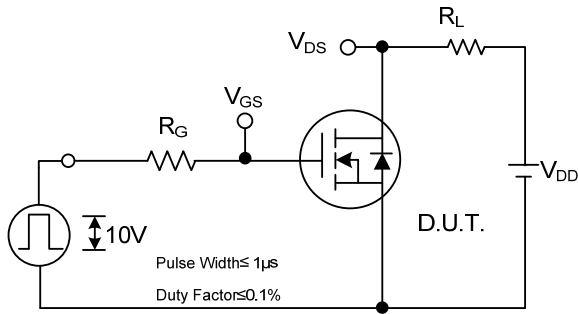


Peak Diode Recovery dv/dt Test Circuit

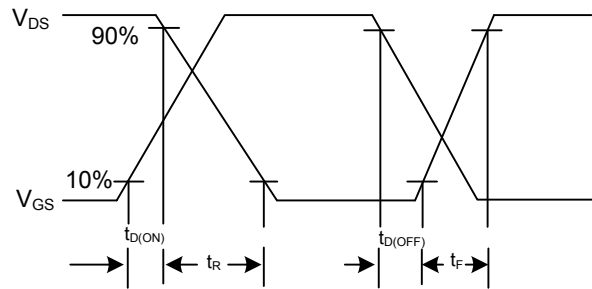


Peak Diode Recovery dv/dt Waveforms

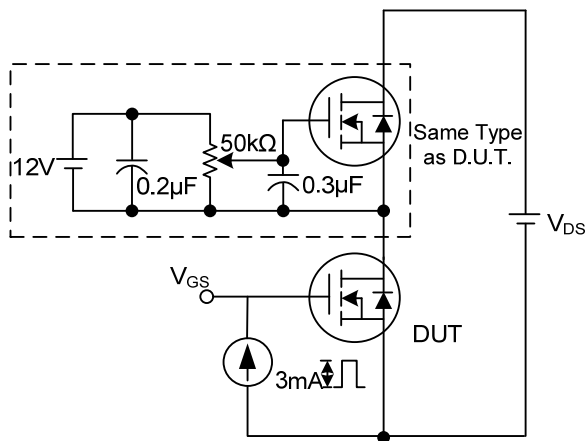
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



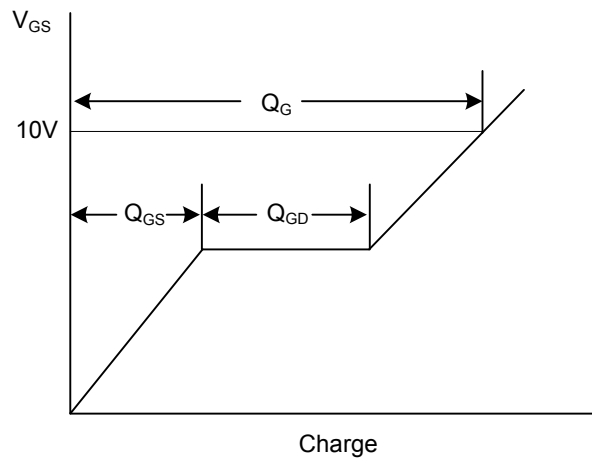
Switching Test Circuit



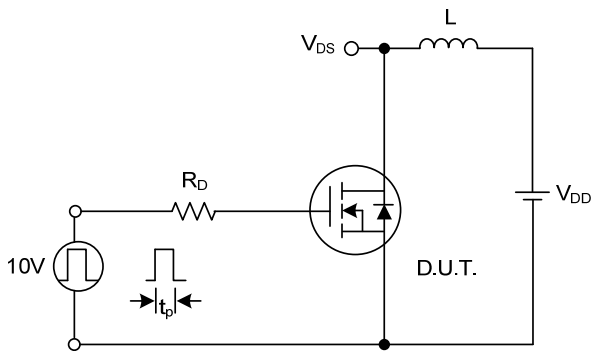
Switching Waveforms



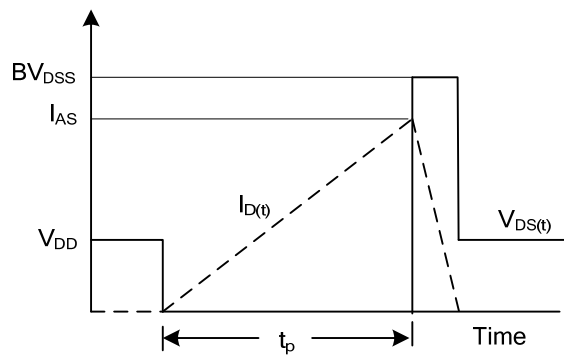
Gate Charge Test Circuit



Gate Charge Waveform

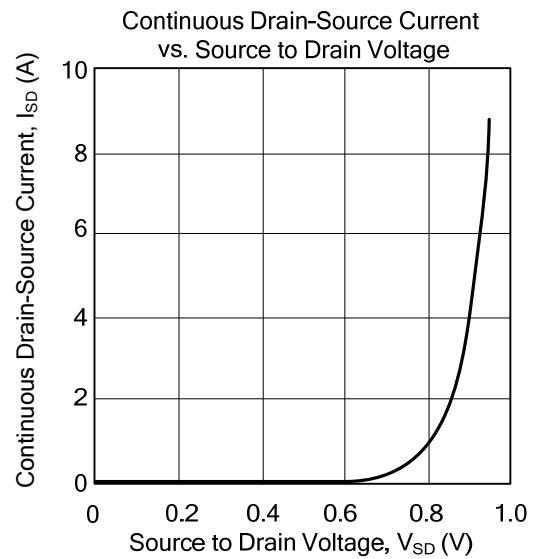
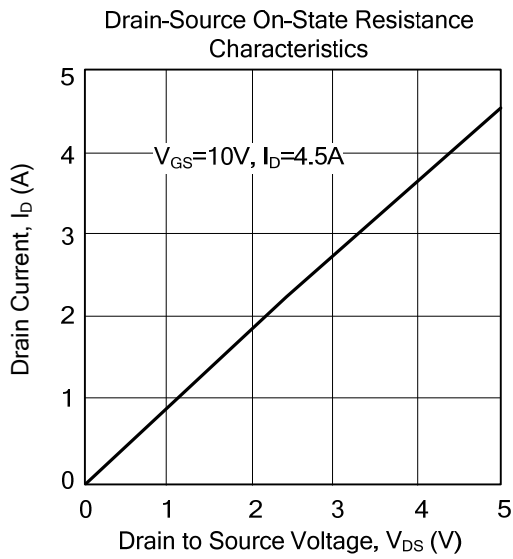
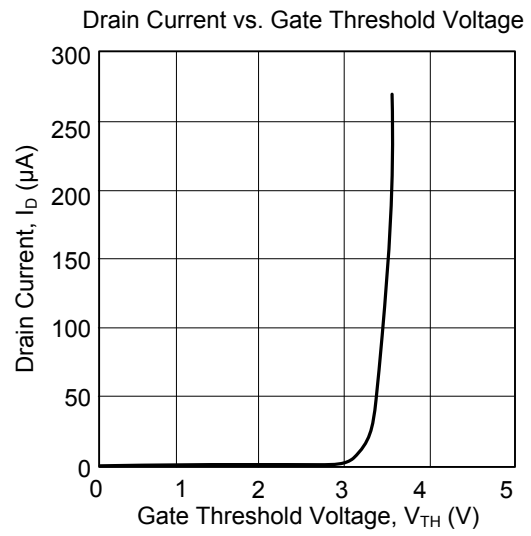
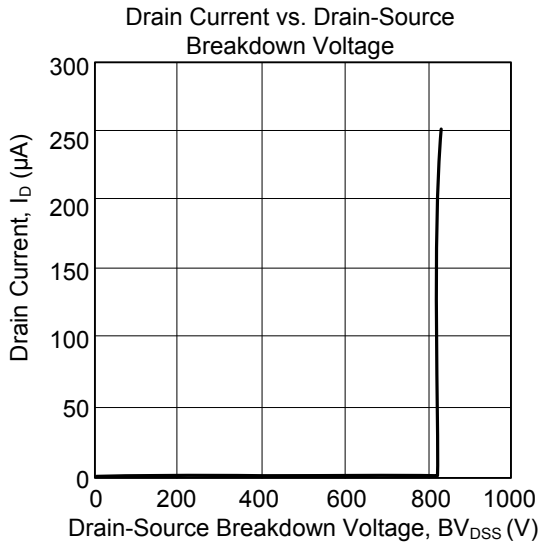


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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