



## 10N80

Power MOSFET

### 10A, 800V N-CHANNEL POWER MOSFET

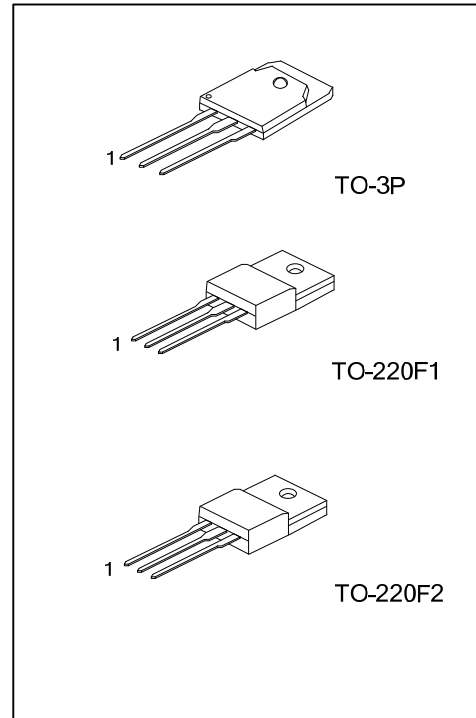
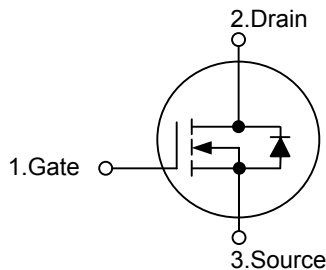
#### DESCRIPTION

The UTC **10N80** uses UTC's 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

- \*  $R_{DS(ON)} = 1.1\Omega @ V_{GS} = 10V$
- \* Ultra Low Gate Charge ( Typical 45nC )
- \* Low Reverse Transfer Capacitance (  $C_{RSS} = \text{Typical } 15pF$  )
- \* Fast Switching Capability
- \* Avalanche Energy Specified
- \* Improved dv/dt Capability, High Ruggedness

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10N80L-T3P-T	10N80G-T3P-T	TO-3P	G	D	S	Tube
10N80L-TF1-T	10N80G-TF1-T	TO-220F1	G	D	S	Tube
10N80L-TF2-T	10N80G-TF2-T	TO-220F2	G	D	S	Tube

<p>10N80L-T3P-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) T: Tube (2) T3P: TO-3P, 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		$V_{GSS}$	$\pm 30$	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-3P	$P_D$	240	W
	TO-220F1		36	
	TO-220F2		37	
Linear Derating Factor above $T_C = 25^\circ\text{C}$	TO-3P		1.92	$^\circ\text{C/W}$
	TO-220F1		0.288	
	TO-220F2		0.296	
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-3P	$\theta_{JA}$	40	$^\circ\text{C/W}$
	TO-220F1/ TO-220F2		62.5	
Junction to Case	TO-3P	$\theta_{JC}$	0.52	$^\circ\text{C/W}$
	TO-220F1		3.47	
	TO-220F2		3.37	

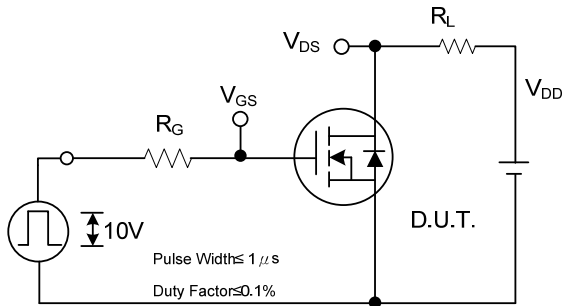
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$	800			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=800\text{ V}, V_{GS}=0\text{ V}$			10	$\mu\text{A}$
		$V_{DS}=640\text{ V}, T_C=125^\circ\text{C}$			100	
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS}=0\text{ V}, V_{GS}=\pm 30\text{ V}$			$\pm 100$	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		980		$\text{V}/^\circ\text{C}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$	3.0		5.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{ V}, I_D=5.0\text{ A}$		0.9	1.1	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25\text{ V}, V_{GS}=0\text{ V},$ $f=1\text{ MHz}$		2150	2800	$\text{pF}$
Output Capacitance	$C_{OSS}$		180	230	$\text{pF}$	
Reverse Transfer Capacitance	$C_{RSS}$		15	20		
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=400\text{ V}, I_D=10.0\text{ A},$ $R_G=25\ \Omega$ (Note 1,2)		50	110	ns
Turn-ON Rise Time	$t_R$		130	270		
Turn-OFF Delay Time	$t_{D(OFF)}$		90	190		
Turn-OFF Fall-Time	$t_F$		80	170		
Total Gate Charge	$Q_G$	$V_{DS}=640\text{ V}, V_{GS}=10\text{ V},$ $I_D=10.0\text{ A}$ (Note 1,2)		45	58	nC
Gate Source Charge	$Q_{GS}$		13.5			
Gate Drain Charge	$Q_{GD}$		17			
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=10.0\text{ A}, V_{GS}=0\text{ V}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				10.0	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				40.0	
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0\text{ V}, di_F/dt=100\text{ A}/\mu\text{s},$		730		ns
Reverse Recovery Charge	$Q_{RR}$	$I_S=10.0\text{ A}$ (Note 1)		10.9		nC

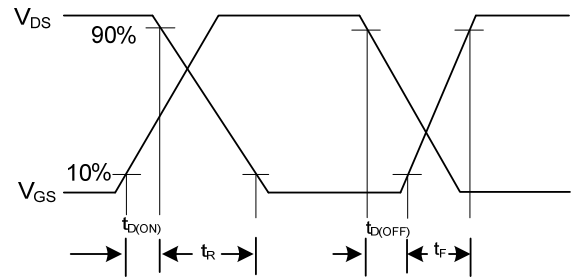
Notes: 1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

2. Independent of operating temperature.

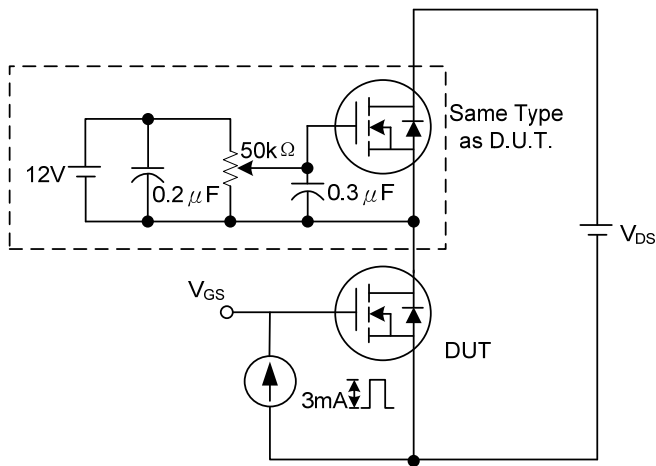
## ■ TEST CIRCUIT



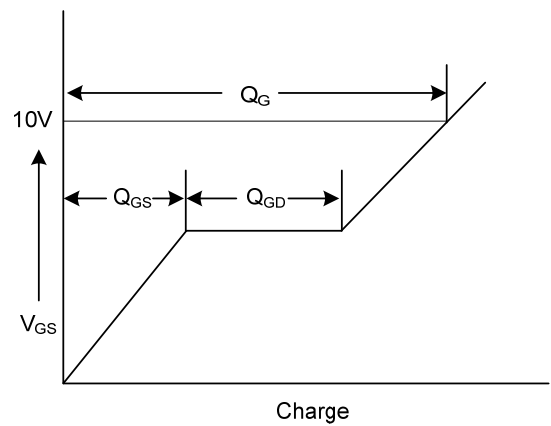
**Switching Test Circuit**



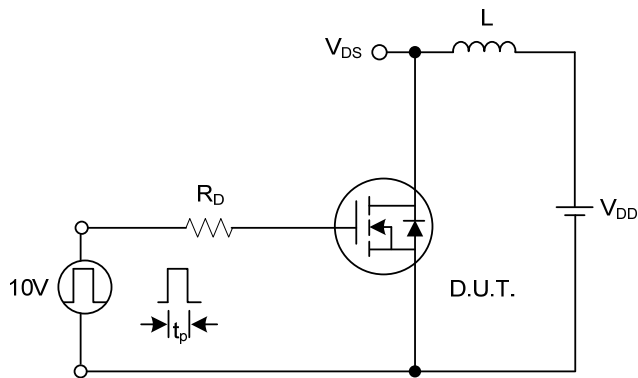
**Switching Waveforms**



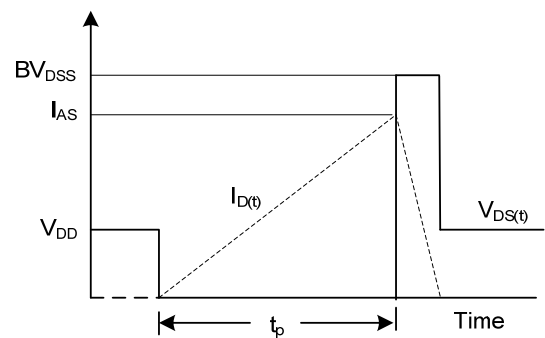
**Gate Charge Test Circuit**



**Gate Charge Waveform**

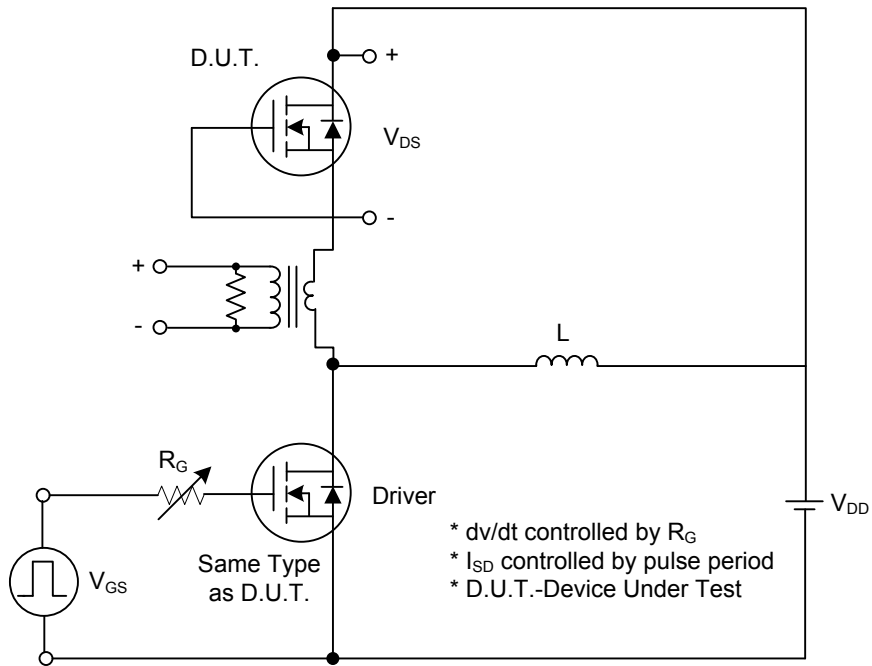


**Unclamped Inductive Switching Test Circuit**

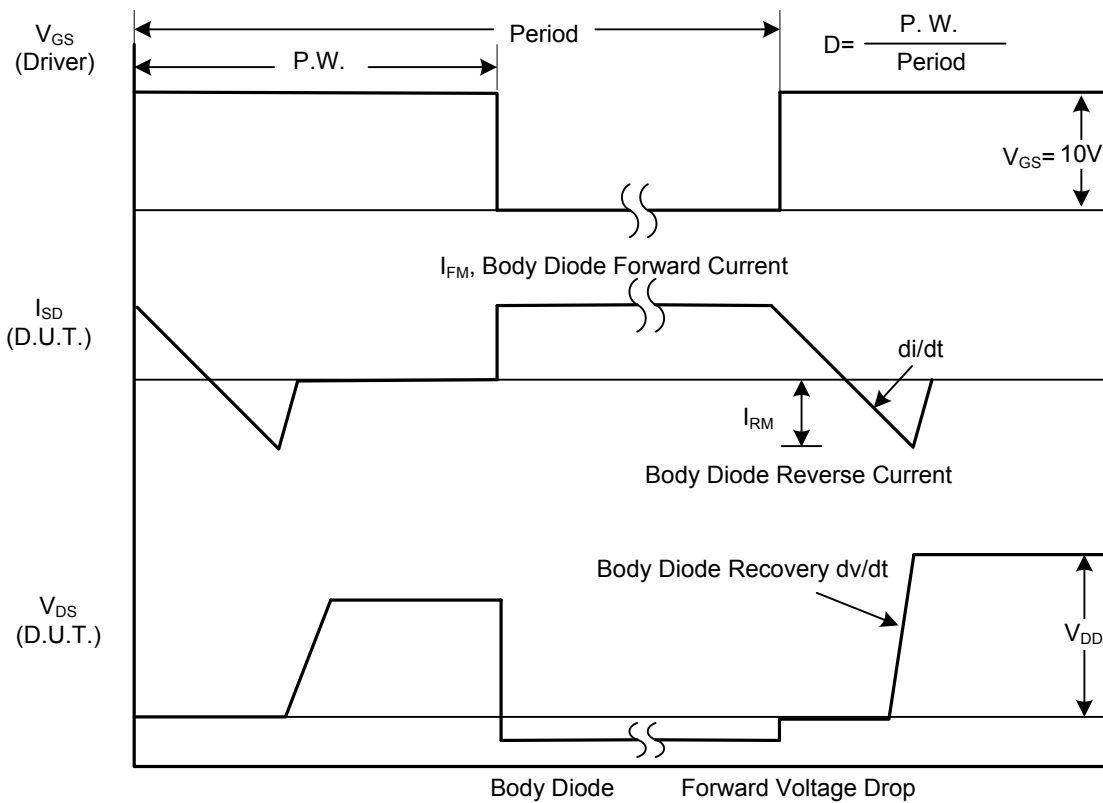


**Unclamped Inductive Switching Waveforms**

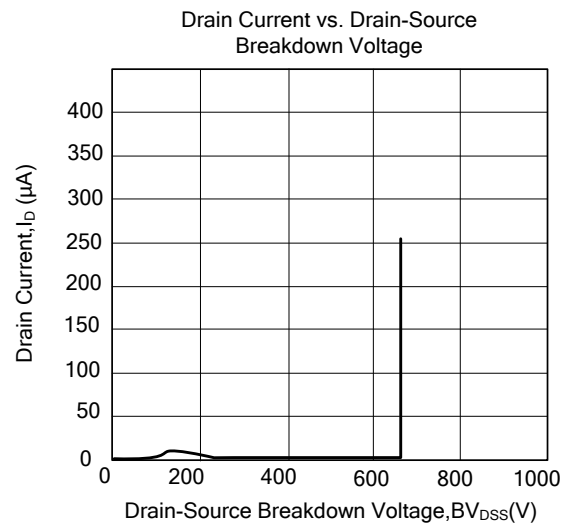
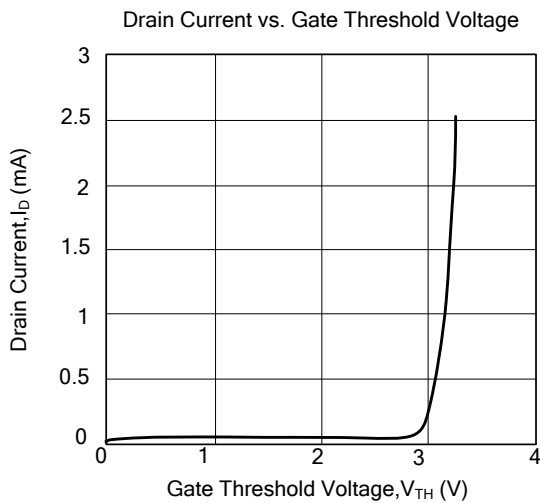
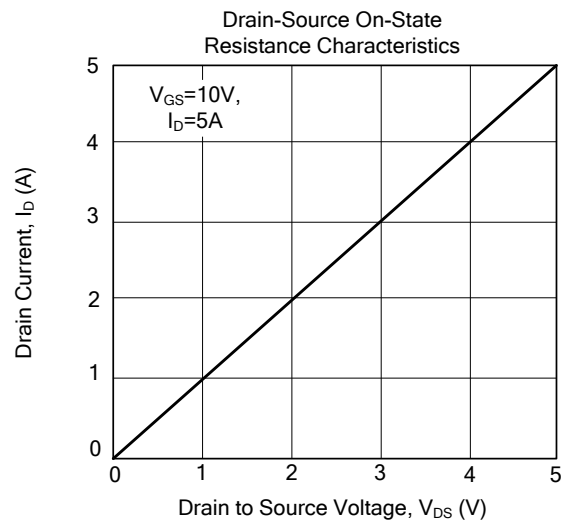
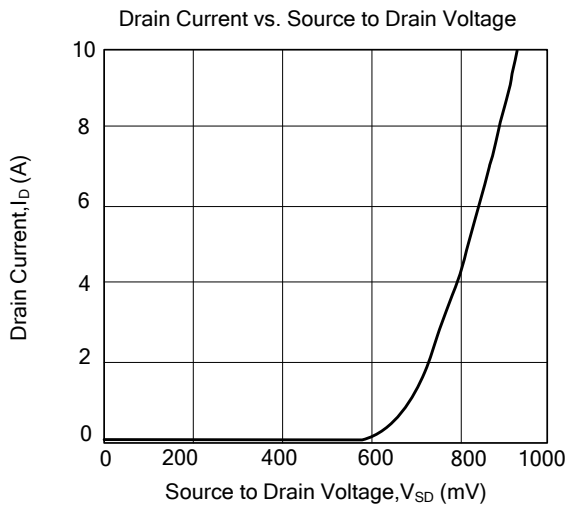
■ TEST CIRCUIT(Cont.)



Peak Diode Recovery  $dv/dt$  Test Circuit



## TYPICAL CHARACTERISTICS



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