



## 7N80

Preliminary

Power MOSFET

### 7.0 Amps, 800 Volts N-CHANNEL POWER MOSFET

#### DESCRIPTION

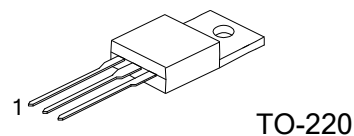
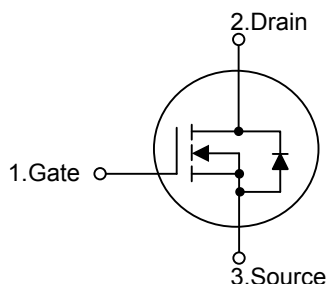
The UTC **7N80** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology specializes in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **7N80** is universally applied in high efficiency switch mode power supply.

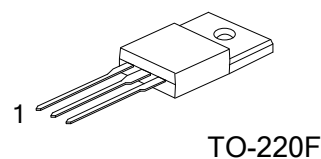
#### FEATURES

- \* 7A, 800V,  $R_{DS(on)}=1.9\Omega@V_{GS}=10V$
- \* High switching speed
- \* 100% avalanche tested

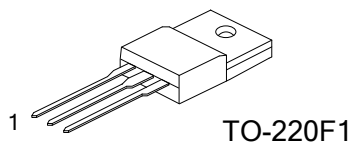
#### SYMBOL



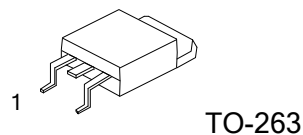
TO-220



TO-220F



TO-220F1



TO-263

#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N80L-TA3-T	7N80G-TA3-T	TO-220	G	D	S	Tube
7N80L-TF3-T	7N80G-TF3-T	TO-220F	G	D	S	Tube
7N80L-TF1-T	7N80G-TF1-T	TO-220F1	G	D	S	Tube
7N80L-TQ2-R	7N80G-TQ2-R	TO-263	G	D	S	Tape Reel
7N80L-TQ2-T	7N80G-TQ2-T	TO-263	G	D	S	Tube

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

<p>7N80L - TA3 - T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Free</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F, TQ2: TO-263</p> <p>(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
Drain Current	Continuous	$I_D$	7	A
	Pulsed (Note 1)	$I_{DM}$	26.4	A
Avalanche Energy	Single Pulsed (Note 2)	$E_{AS}$	580	mJ
	Repetitive (Note 1)	$E_{AR}$	16.7	mJ
Peak Diode Recovery $dv/dt$ (Note 3)		$dv/dt$	4.5	V/ns
Power Dissipation	TO-220 /TO-263	$P_D$	142	W
	TO-220F/ TO-220F1		48	W
Junction Temperature		$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature		$T_{STG}$	-55~+150	$^{\circ}\text{C}$

Note: 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.

\* Drain current limited by maximum junction temperature.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-263	$\theta_{JA}$	62.5	$^{\circ}\text{C/W}$
	TO-220F /TO-220F1		62.5	$^{\circ}\text{C/W}$
Junction to Case	TO-220/TO-263	$\theta_{JC}$	0.88	$^{\circ}\text{C/W}$
	TO-220F / TO-220F1		2.6	$^{\circ}\text{C/W}$

■ 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 <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	800			V
Breakdown Voltage Temperature Coefficient		ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA, Referenced to 25°C		0.93		V/°C
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =800V, V <sub>GS</sub> =0V V <sub>DS</sub> =640V, T <sub>C</sub> =125°C			10 100	μA μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>DS</sub> =0V ,V <sub>GS</sub> =30V			100	nA
	Reverse		V <sub>DS</sub> =0V ,V <sub>GS</sub> =-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	3.0		5.0	V
Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.3A		1.4	1.9	Ω
Forward Transconductance		g <sub>FS</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =3.3A (Note 4)		5.5		S
DYNAMIC PARAMETERS							
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =25V,V <sub>GS</sub> =0V,f=1.0MHz		1290	1680	pF
Output Capacitance		C <sub>OSS</sub>			120	155	pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			10	13	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q <sub>G</sub>	V <sub>DS</sub> =640V, V <sub>GS</sub> =10V, I <sub>D</sub> =6.6A (Note 4,5)		27	35	nC
Gate-Source Charge		Q <sub>GS</sub>			8.2		nC
Gate-Drain Charge		Q <sub>GD</sub>			11		nC
Turn-ON Delay Time		t <sub>D(ON)</sub>	V <sub>DD</sub> =400V, I <sub>D</sub> =6.6A, R <sub>G</sub> =25Ω (Note 4,5)		35	80	ns
Turn-ON Rise Time		t <sub>R</sub>			100	210	ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			50	110	ns
Turn-OFF Fall Time		t <sub>F</sub>			60	130	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I <sub>S</sub>				6.6	A
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>				26.4	A
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	I <sub>S</sub> =6.6A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time		t <sub>RR</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =6.6A,		650		ns
Body Diode Reverse Recovery Charge		Q <sub>RR</sub>	dl <sub>F</sub> /dt=100A/μs (Note 4)		7.0		μC

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

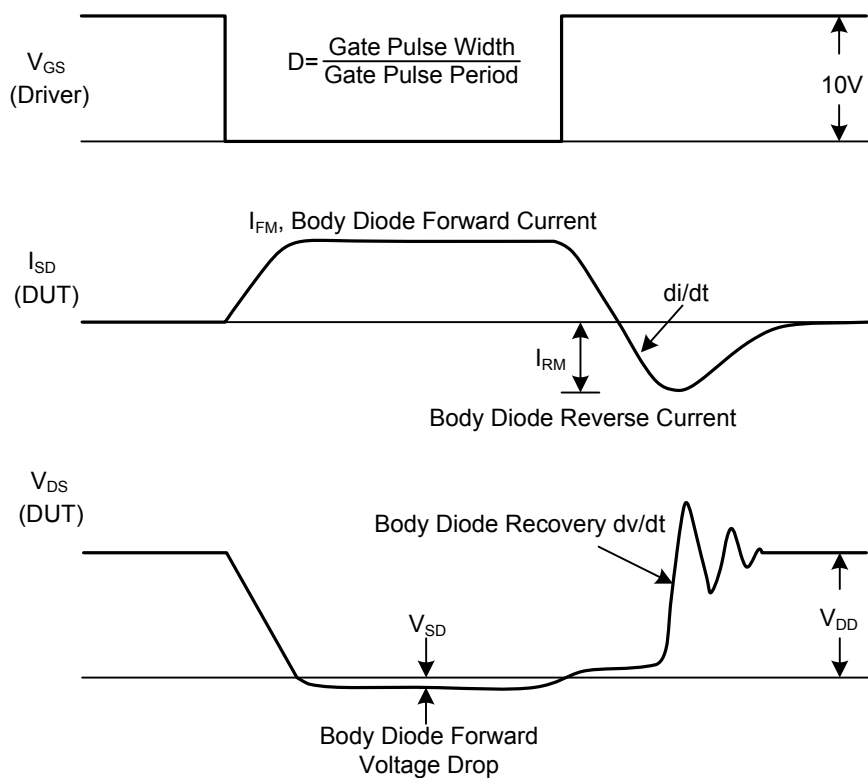
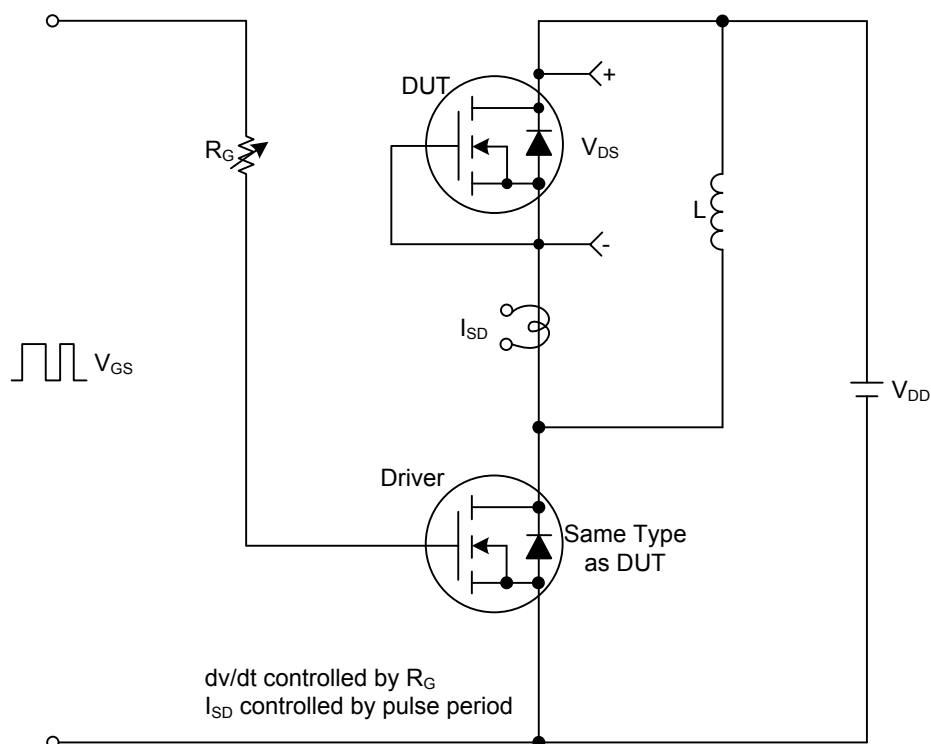
2.  $L=25\text{mH}$ ,  $I_{AS}=6.6A$ ,  $V_{DD}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$

3.  $I_{SD} \leq 8A$ ,  $dI/dt \leq 200A/\mu s$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$

4. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

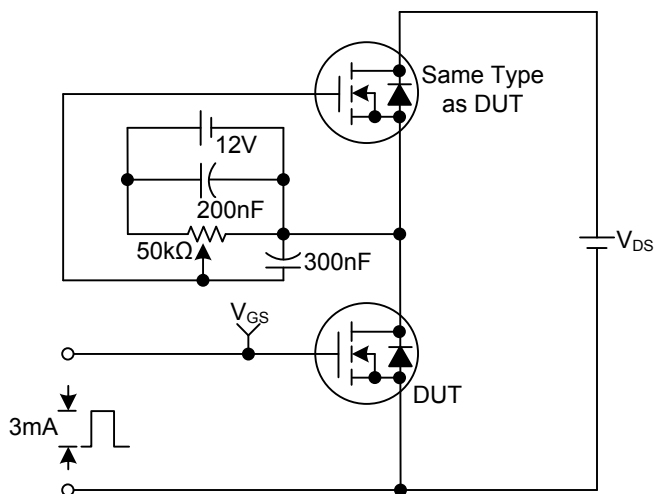
5. Essentially independent of operating temperature

# ■ TEST CIRCUITS AND WAVEFORMS

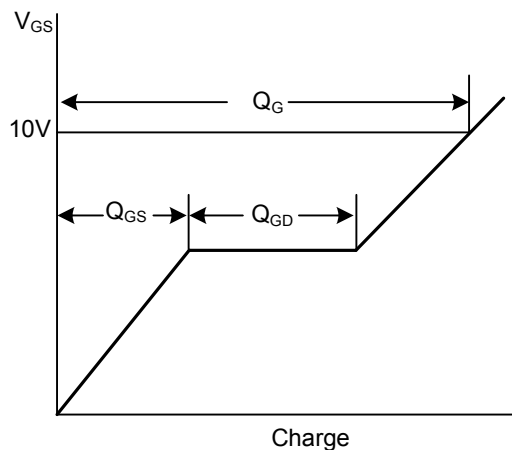
Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

# ■ TEST CIRCUITS AND WAVEFORMS(Cont.)

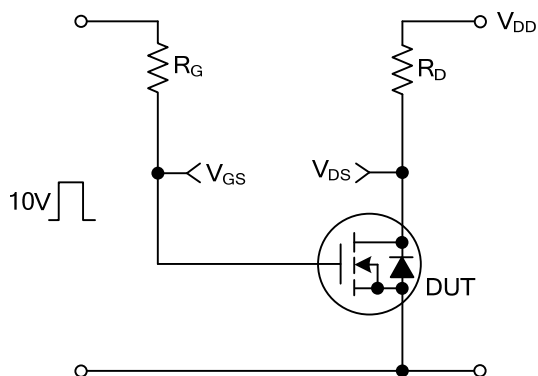
Gate Charge Test Circuit



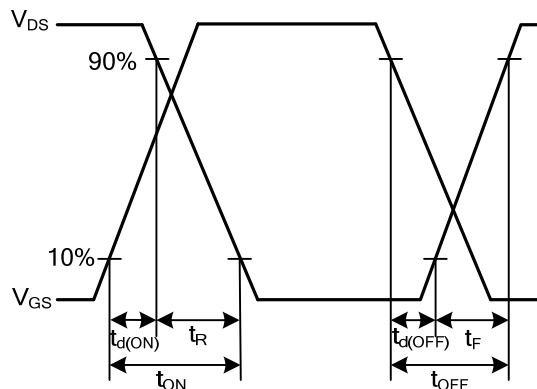
Gate Charge Waveforms



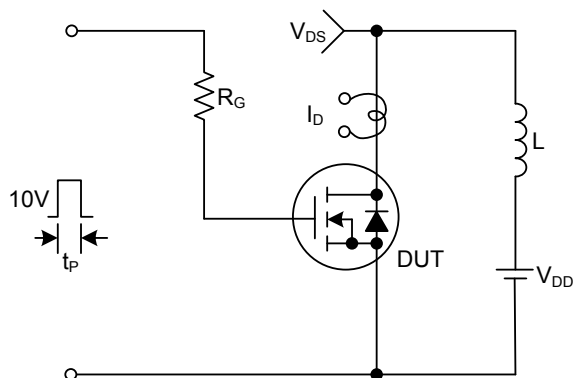
Resistive Switching Test Circuit



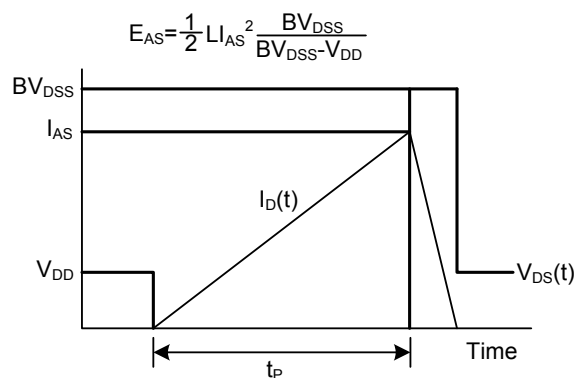
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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