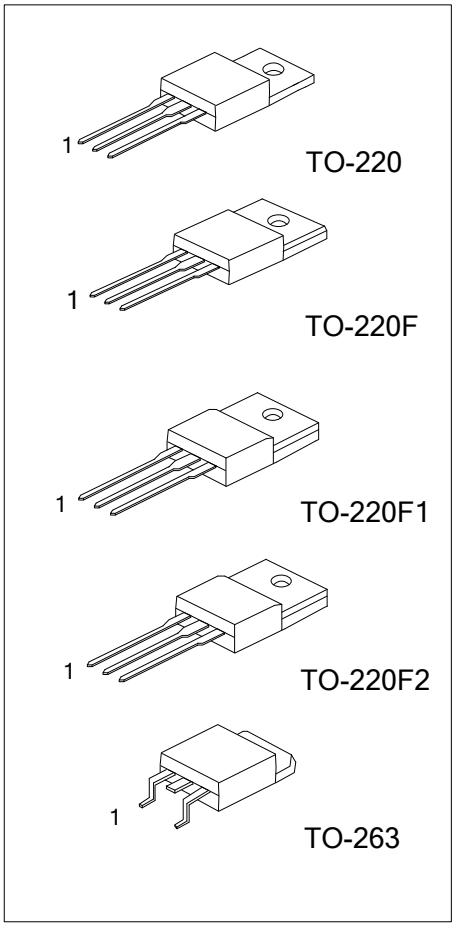
7A, 800V N-CHANNEL POWER MOSFET



■ DESCRIPTION

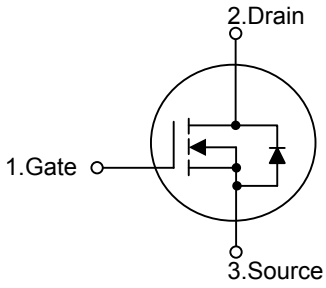
The UTC **7N80** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology specializes in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche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

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

■ FEATURES

* $R_{DS(on)}$=1.8Ω@V_{GS} =10V
* High switching speed
* 100% avalanche tested

■ SYMBOL



■ 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-TF2-T	7N80G-TF2-T	TO-220F2	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

7N80L - TA3 - T
(1) Packing Type
(2) Package Type
(3) Lead Free

(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2
TF3: TO-220F, TQ2: TO-263
(3) G: Halogen Free, L: Lead Free

■ 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	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		52	
	TO-220F2		54	
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=25mH, I_{AS}=6.6A, V_{DD}= 50V, R_G=25Ω, Starting T_J=25°C
3. I_{SD} ≤8A, 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 DATA

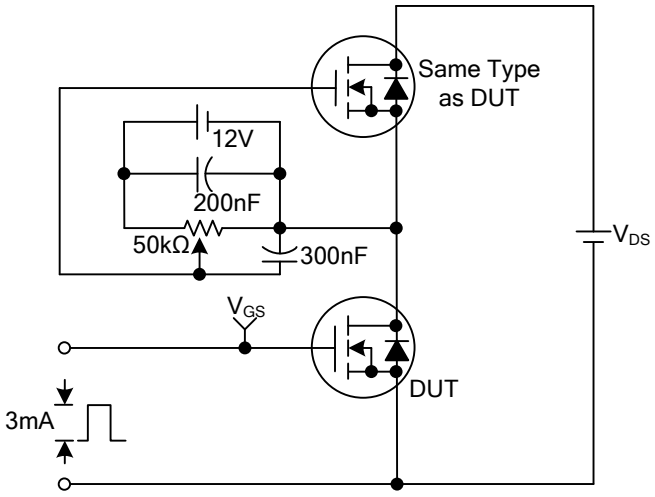
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220 /TO-263	θ_{JC}	0.88	°C/W
	TO-220F/ TO-220F1		2.4	
	TO-220F2		2.31	

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

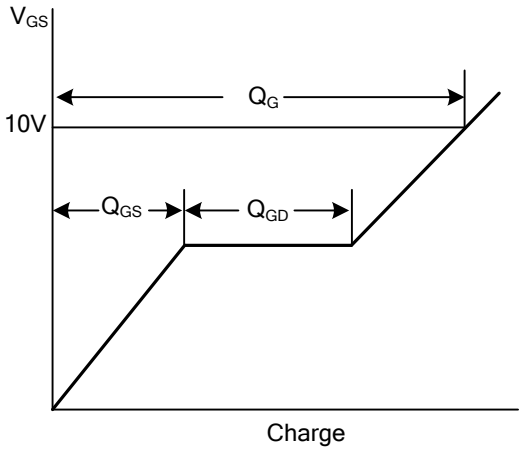
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	800			V
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA,Referenced to 25°C		0.93		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=800V, V_{GS}=0V			10	μA
			V_{DS}=640V, T_C=125°C			100	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{DS}=0V ,V_{GS}=30V			100	nA
	Reverse		V_{DS}=0V ,V_{GS}=-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	3.0		5.0	V
Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=3.3A		1.4	1.8	Ω
Forward Transconductance		g_{FS}	V_{DS}=50V, I_D=3.3A (Note 1)		5.5		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V,V_{GS}=0V,f=1.0MHz		1290	1680	pF
Output Capacitance		C_{OSS}			120	155	pF
Reverse Transfer Capacitance		C_{RSS}			10	13	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=640V, V_{GS}=10V, I_D=6.6A (Note 1,2)		27	35	nC
Gate-Source Charge		Q_{GS}			8.2		nC
Gate-Drain Charge		Q_{GD}			11		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=400V, I_D=6.6A, R_G=25Ω (Note 1,2)		35	80	ns
Turn-ON Rise Time		t_R			100	210	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			50	110	ns
Turn-OFF Fall Time		t_F			60	130	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				6.6	A
Maximum Body-Diode Pulsed Current		I_{SM}				26.4	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S =6.6A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	V_{GS}=0V, I_S=6.6A, dI_F/dt=100A/μs (Note 1)		650		ns
Body Diode Reverse Recovery Charge		Q_{RR}			7.0		μC

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

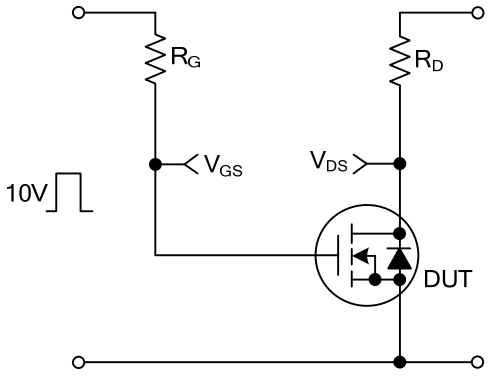
■ TEST CIRCUITS AND WAVEFORMS



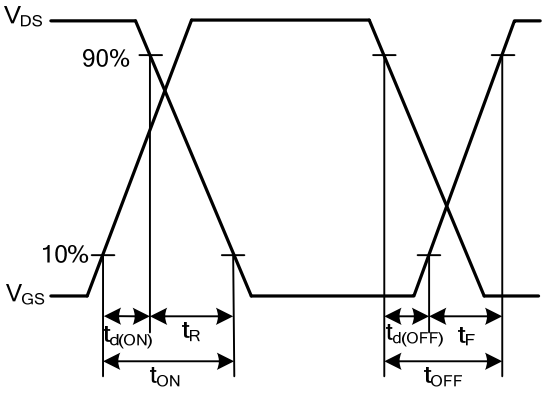
Gate Charge Test Circuit



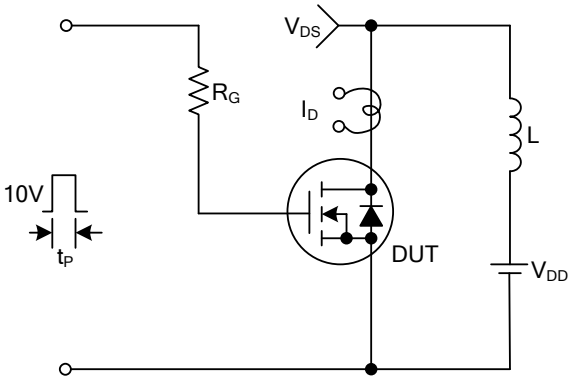
Gate Charge Waveforms



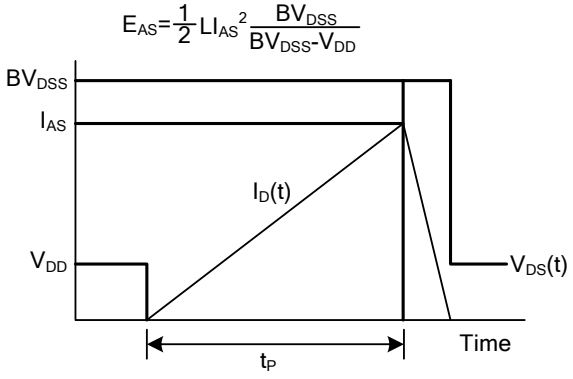
Resistive Switching Test Circuit



Resistive Switching Waveforms

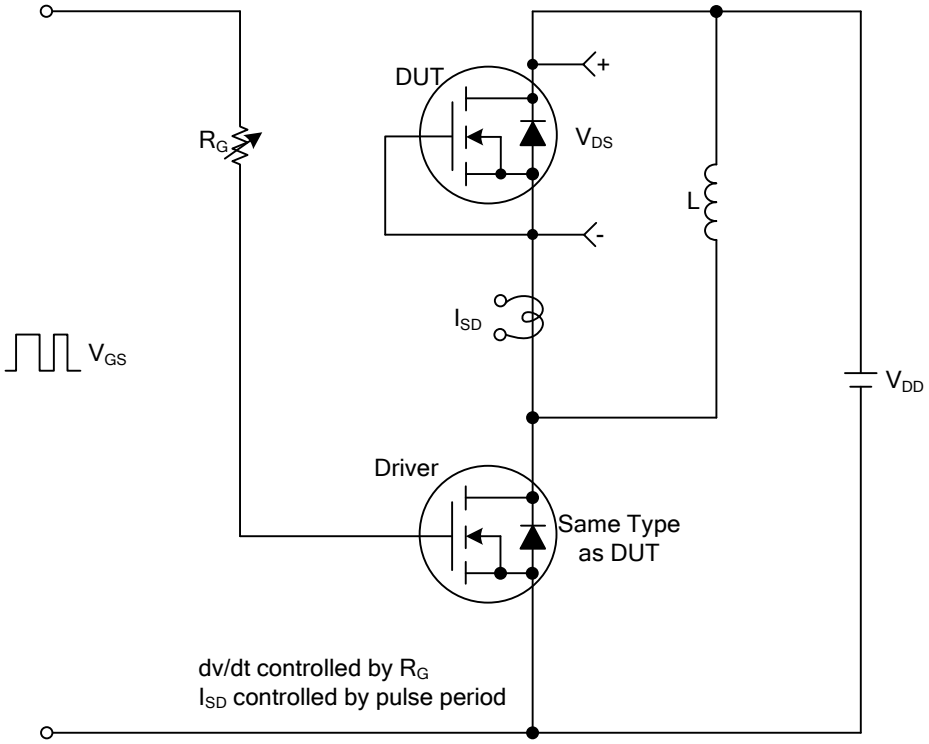


Unclamped Inductive Switching Test Circuit

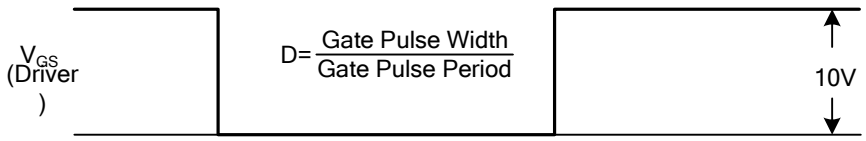


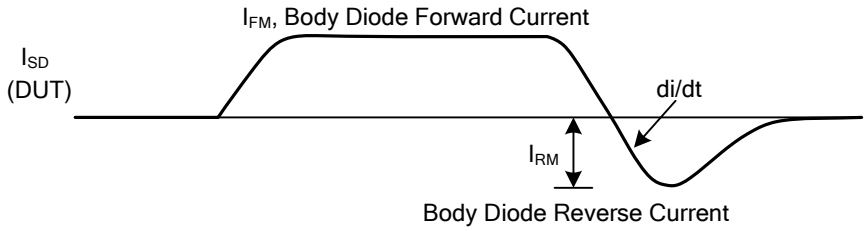
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)

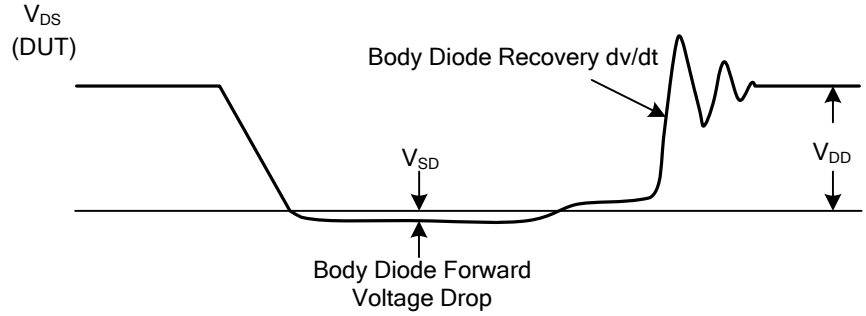


Peak Diode Recovery dv/dt Test Circuit & Waveforms



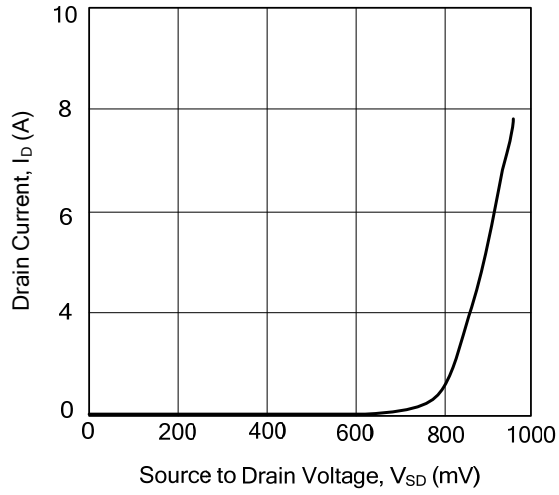


Body Diode Reverse Current

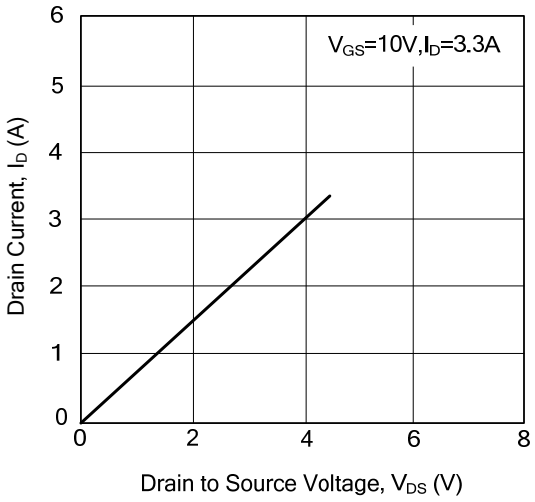


■ TYPICAL CHARACTERISTICS

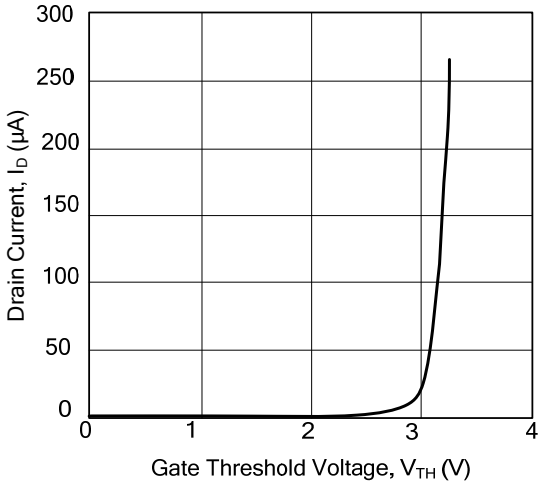
Drain Current vs. Source to Drain Voltage



Drain-Source On State Resistance Characteristics



Drain Current vs. Gate Threshold Voltage



Drain Current vs. Drain-Source Breakdown Voltage