



3N80

Power MOSFET

3.0A, 800V N-CHANNEL POWER MOSFET

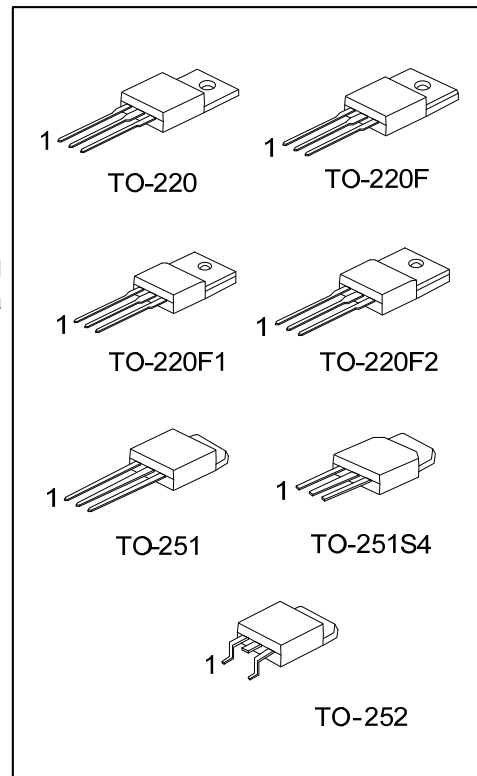
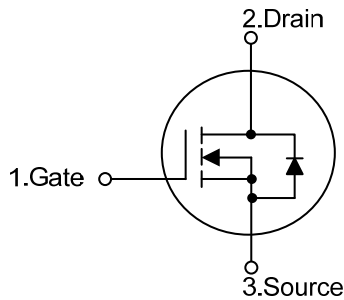
■ DESCRIPTION

The UTC **3N80** 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

- * $R_{DS(ON)} < 4.2\Omega @ V_{GS} = 10V$
- * Ultra Low Gate Charge (typical 19 nC)
- * Low Reverse Transfer Capacitance ($C_{RSS} = \text{Typical } 11 \text{ pF}$)
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

■ SYMBOL



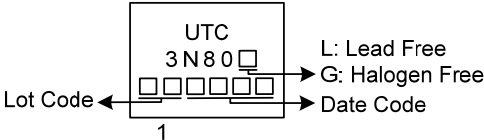
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
3N80L-TA3-T	3N80G-TA3-T	TO-220	G	D	S	Tube
3N80L-TF3-T	3N80G-TF3-T	TO-220F	G	D	S	Tube
3N80L-TF1-T	3N80G-TF1-T	TO-220F1	G	D	S	Tube
3N80L-TF2-T	3N80G-TF2-T	TO-220F2	G	D	S	Tube
3N80L-TM3-T	3N80G-TM3-T	TO-251	G	D	S	Tube
3N80L-TMS4-T	3N80G-TMS4-T	TO-251S4	G	D	S	Tube
3N80L-TN3-R	3N80G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>3N80G-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TMS4: TO-251S4 TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage ($V_{GS}=0\text{V}$)		V_{DSS}	800	V
Drain-Gate Voltage ($R_G=20\text{k}\Omega$)		V_{DGR}	800	V
Gate-Source Voltage		V_{GSS}	± 30	V
Gate-Source Breakdown Voltage ($I_{GS}=\pm 1\text{mA}$)		BV_{GSO}	30 (MIN)	V
Insulation Withstand Voltage (DC)	TO-220F/ TO-220F1	V_{ISO}	2500	V
Avalanche Current (Note 2)		I_{AR}	3	A
Continuous Drain Current		I_D	3	A
Pulsed Drain Current		I_{DM}	10	A
Single Pulse Avalanche Energy (Note 3)		E_{AS}	170	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	70	W
	TO-220F/ TO-220F1 TO-220F2		25	W
	TO-251/TO-251S4 TO-252		50	W
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. Pulse width limited by $T_{J(MAX)}$.

3. Starting $T_J=25^\circ\text{C}$, $I_D=I_{AR}$, $V_{DD}=50\text{V}$

4. $I_{SD}\leq 2.5\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, $T_J\leq T_{J(MAX)}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-251S4 TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.78	$^\circ\text{C}/\text{W}$
	TO-220F/ TO-220F1 TO-220F2		5	$^\circ\text{C}/\text{W}$
	TO-251/TO-251S4 TO-252		2.5	$^\circ\text{C}/\text{W}$

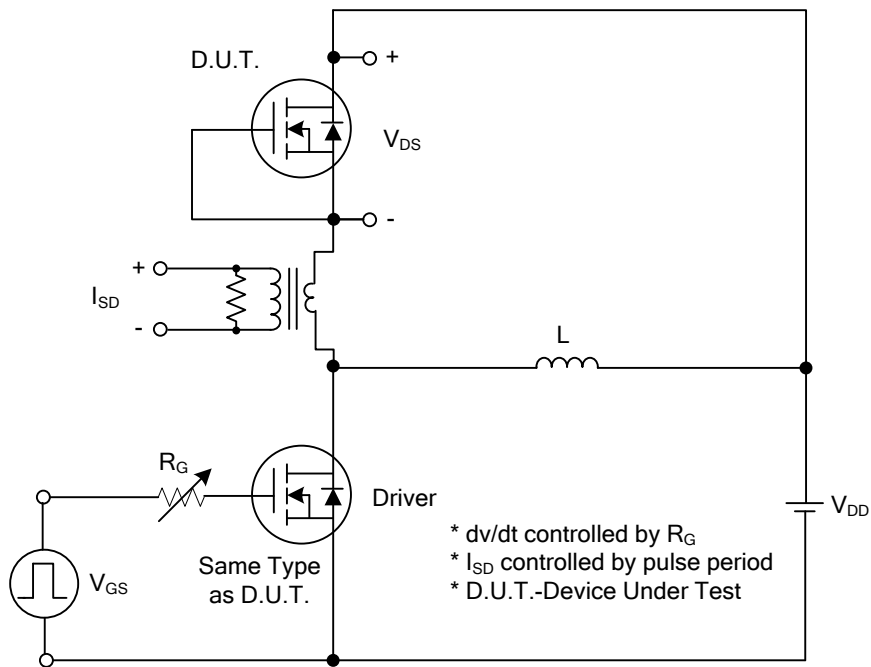
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	800			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =800V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V			±10	μA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =1.5A		3.2	4.2	Ω
Forward Transconductance (Note 1)	g _{FS}	V _{DS} =15V, I _D =1.5A		2.1		S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		485		pF
Output Capacitance	C _{OSS}			57		pF
Reverse Transfer Capacitance	C _{RSS}			11		pF
Equivalent Output Capacitance (Note 2)	C _{OSS(EQ)}	V _{GS} =0V, V _{DS} =0V~640V		22		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DD} =640V, I _D =3A, V _{GS} =10V		19		nC
Gate-Source Charge	Q _{GS}			3.2		nC
Gate-Drain Charge	Q _{DD}			10.8		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =400V, I _D =3 A, R _G =4.7Ω V _{GS} =10V		17		ns
Turn-On Rise Time	t _R			27		ns
Turn-Off Delay Time	t _{D(OFF)}			36		ns
Turn-Off Fall Time	t _F			40		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Source-Drain Current	I _{SD}				2.5	A
Source-Drain Current (Pulsed)	I _{SDM}				10	A
Reverse Recovery Current	I _{RRM}	I _{SD} =3A, di/dt=100A/μs, V _{DD} =50V, T _J =25°C		8.4		A
Diode Forward Voltage(Note 1)	V _{SD}	I _{SD} =3A, V _{GS} =0V			1.6	V
Body Diode Reverse Recovery Time	t _{rr}			384		ns
Body Diode Reverse Recovery Charge	Q _{rr}			1600		nC

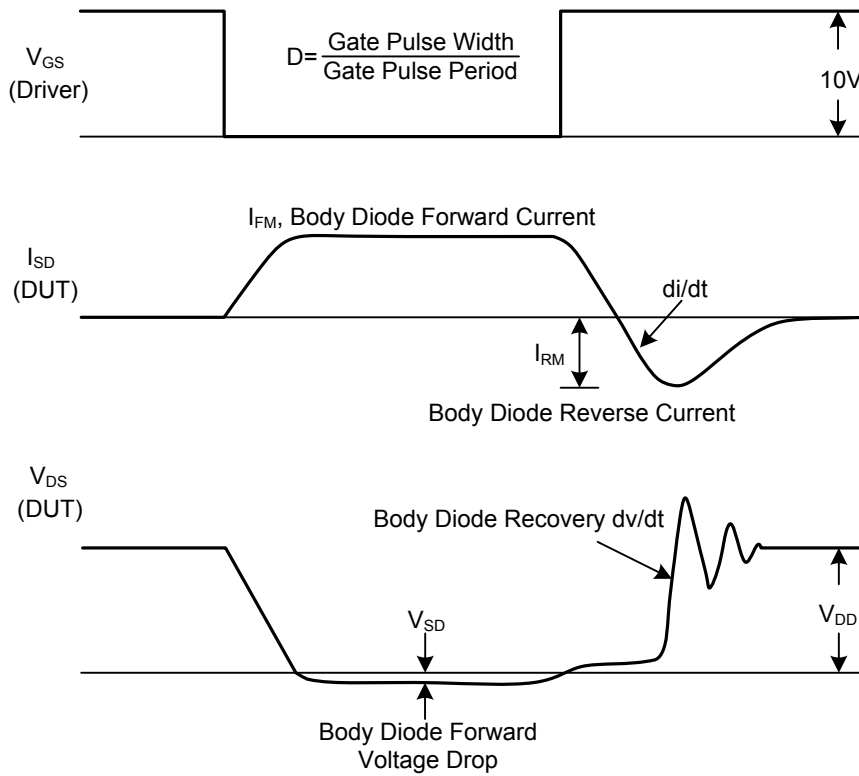
Note: 1. Pulse width = 300μs, Duty cycle ≤ 1.5%.

2. C_{OSS(EQ)} is defined as constant equivalent capacitance giving the same charging time as C_{OSS} when V_{DS} increases from 0 to 80% V_{DSS}.

■ TEST CIRCUITS AND WAVEFORMS

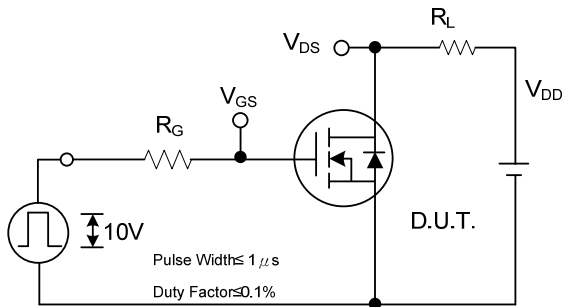


Peak Diode Recovery dv/dt Test Circuit

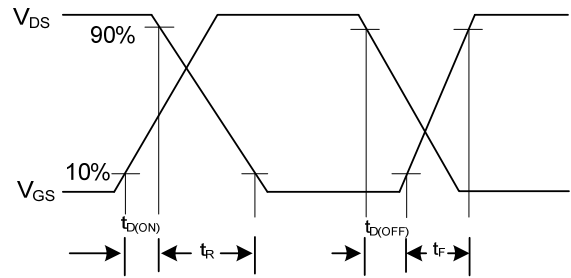


Peak Diode Recovery dv/dt Waveforms

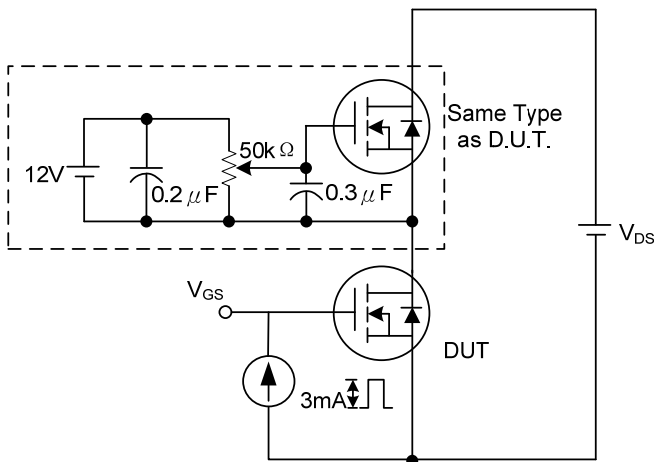
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



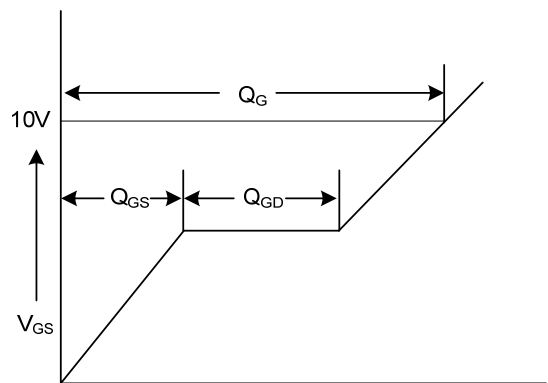
Switching Test Circuit



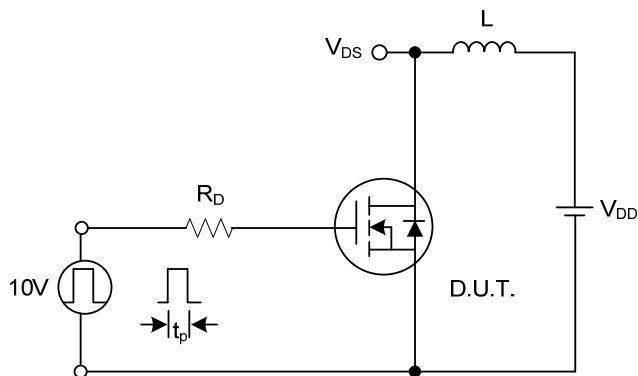
Switching Waveforms



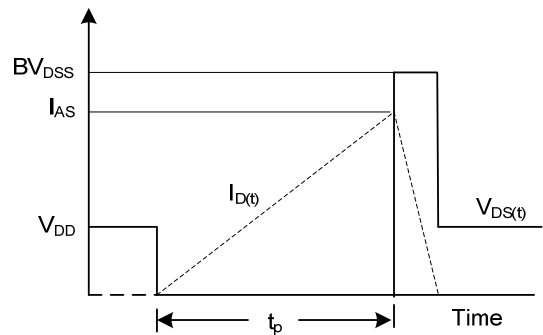
Gate Charge Test Circuit



Charge
Gate Charge Waveform

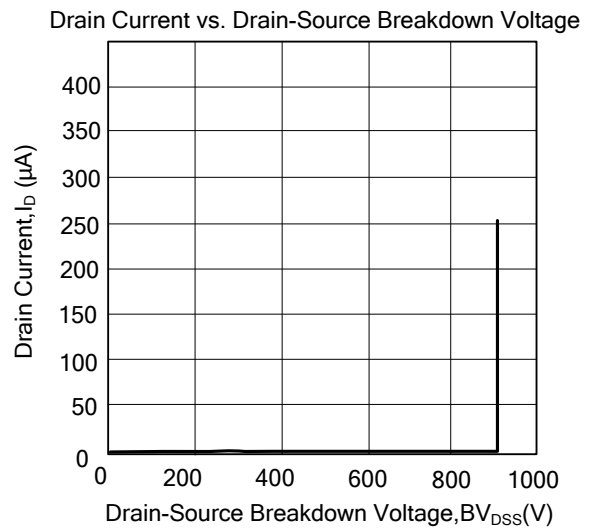
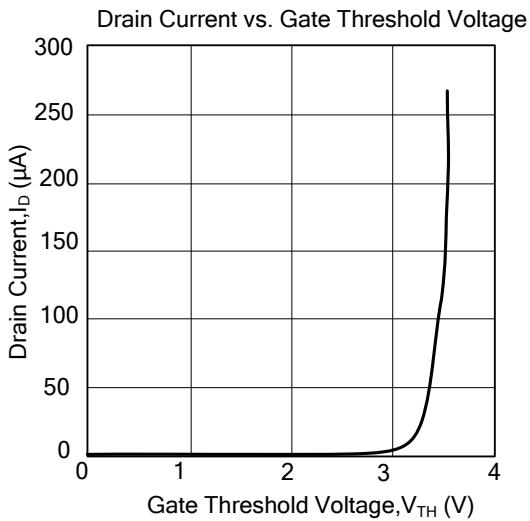
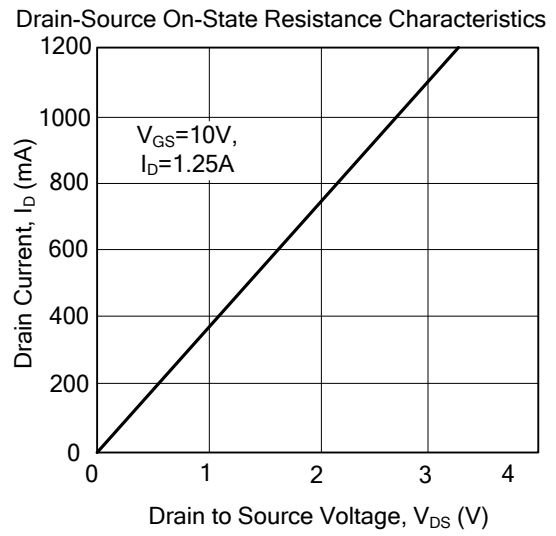
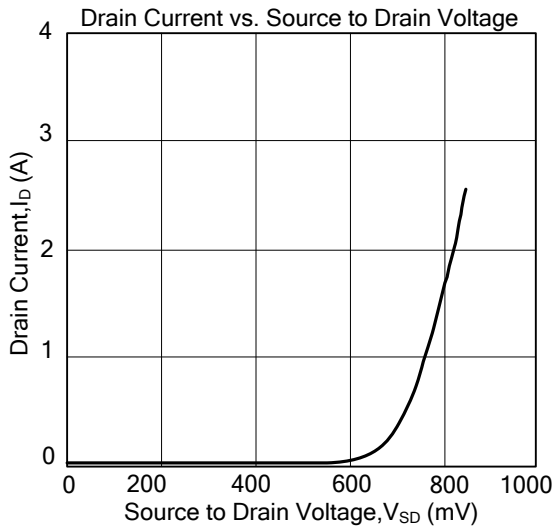


Unclamped Inductive Switching Test Circuit

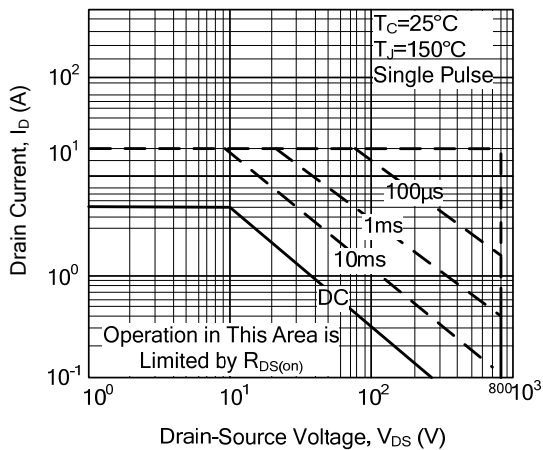


Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



Max. Safe Operating Area



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.