



3N80

Power MOSFET

3.0 Amps, 800Volts N-CHANNEL POWER MOSFET

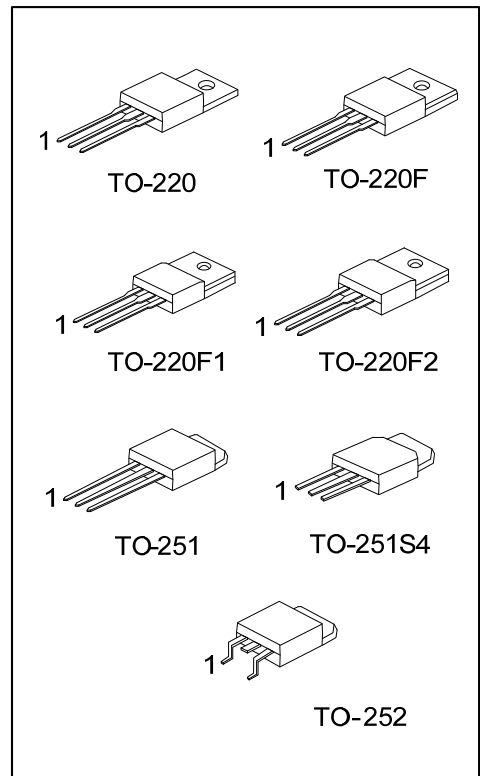
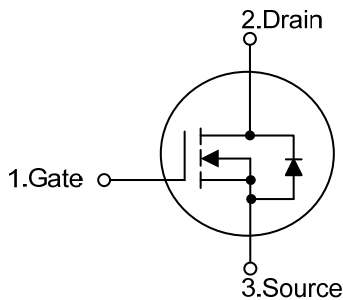
■ DESCRIPTION

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



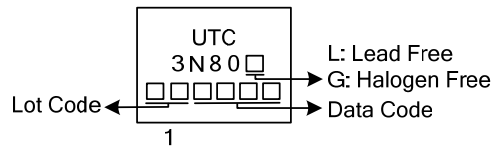
■ ORDERING INFORMATION

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-R	3N80G-TMS4-R	TO-251S4	G	D	S	Tape Reel
3N80L-TN3-R	3N80G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>3N80L-TA3-T</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) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING



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■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage (V _{GS} =0V)		V _{DSS}	800	V
Drain-Gate Voltage (R _G =20kΩ)		V _{DGR}	800	V
Gate-Source Voltage		V _{GSS}	±30	V
Gate-Source Breakdown Voltage (I _{GS} =±1mA)		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		25	
	TO-220F2			
	TO-251/TO-251S4 TO-252		50	
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°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 °C, I_D=I_{AR}, V_{DD}=50V
4. I_{SD} ≤ 2.5A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, T_J ≤ T_{J(MAX)}.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ _{JA}	62.5	°C/W
	TO-251/TO-251S4 TO-252		110	
	TO-220		1.78	
Junction to Case	TO-220F/ TO-220F1 TO-220F2	θ _{JC}	5	°C/W
	TO-251/TO-251S4 TO-252		2.5	

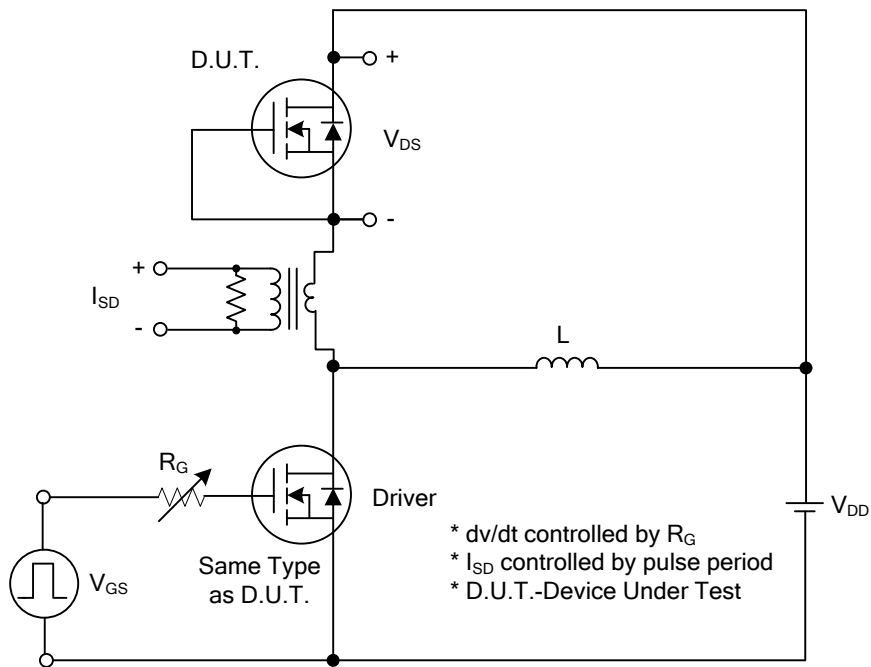
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

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	3.75	4.5	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

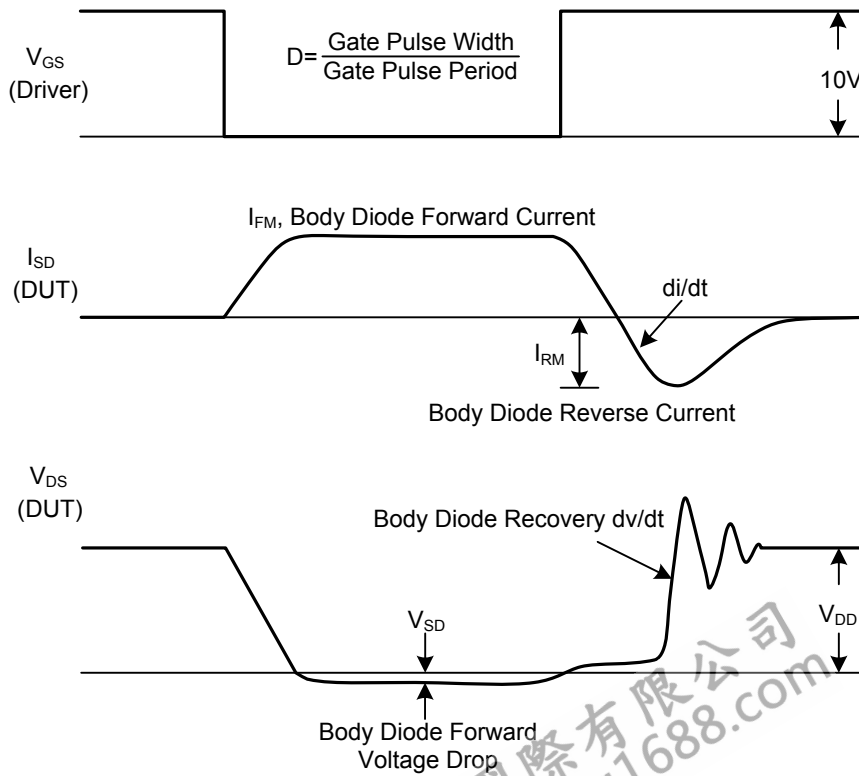
Note: 1. Pulse width = 300μs, Duty cycle ≤ 1.5%

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

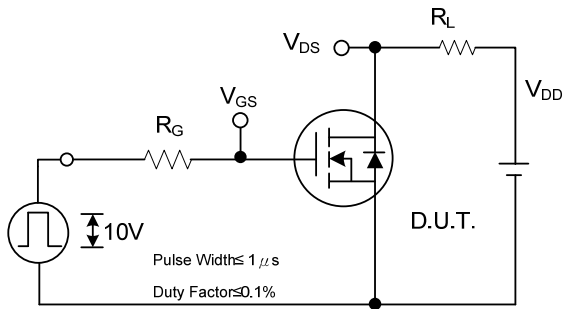


Peak Diode Recovery dv/dt Test Circuit

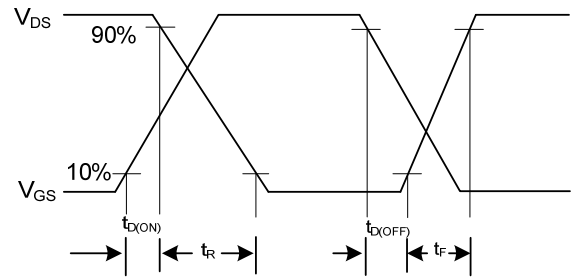


Peak Diode Recovery dv/dt Waveforms

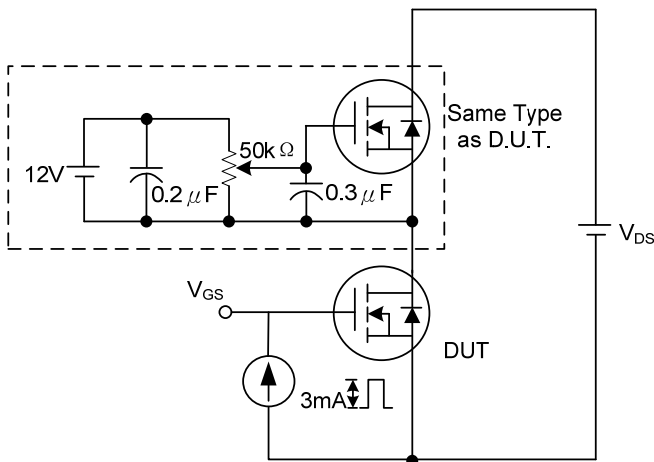
TEST CIRCUITS AND WAVEFORMS (Cont.)



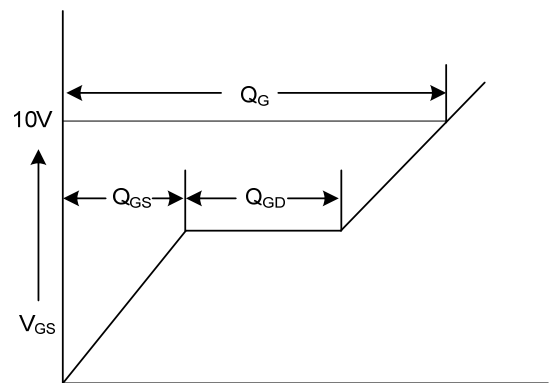
Switching Test Circuit



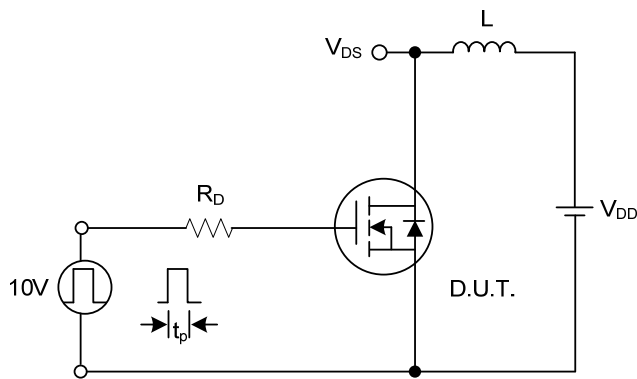
Switching Waveforms



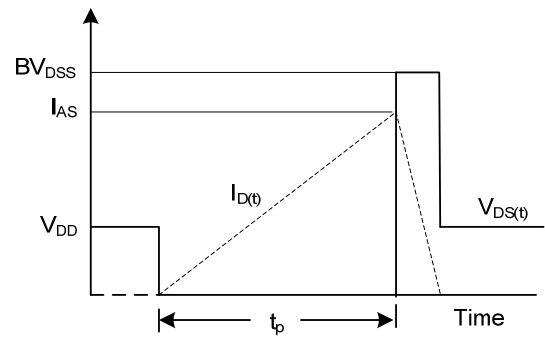
Gate Charge Test Circuit



Charge
Gate Charge Waveform

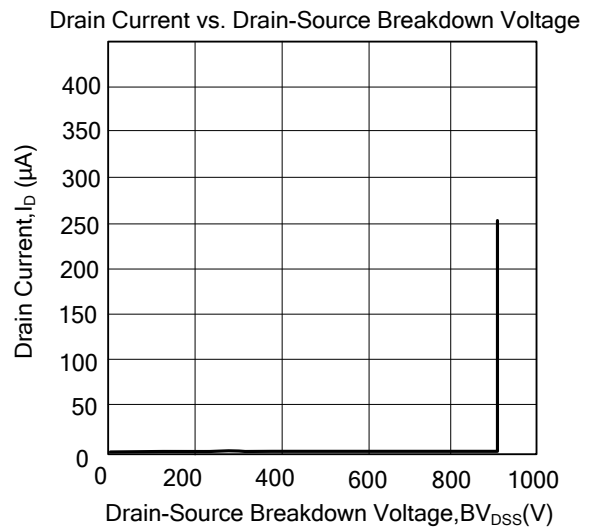
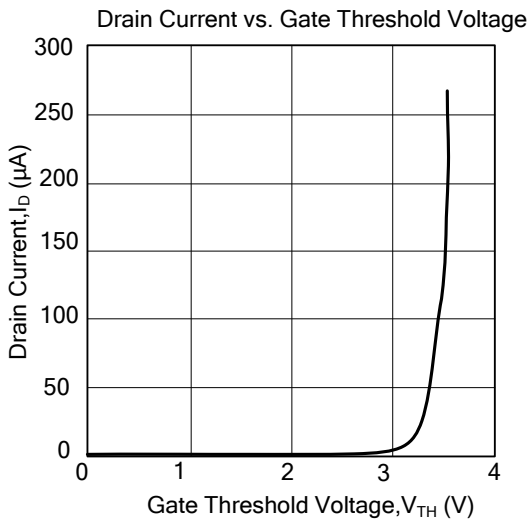
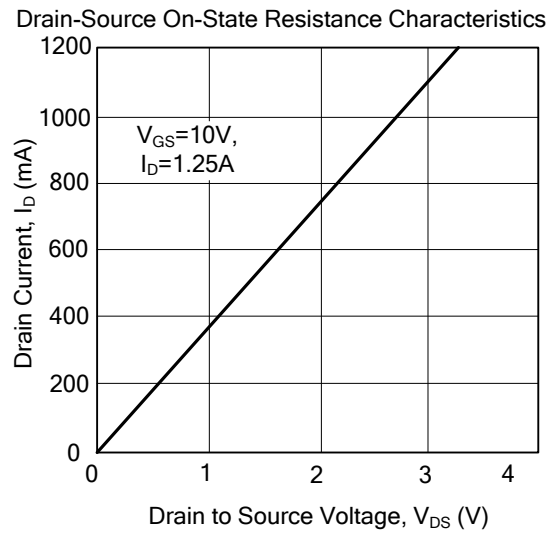
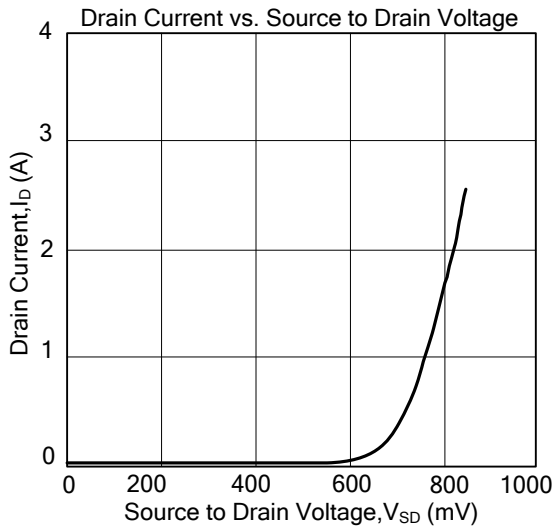


Unclamped Inductive Switching Test Circuit

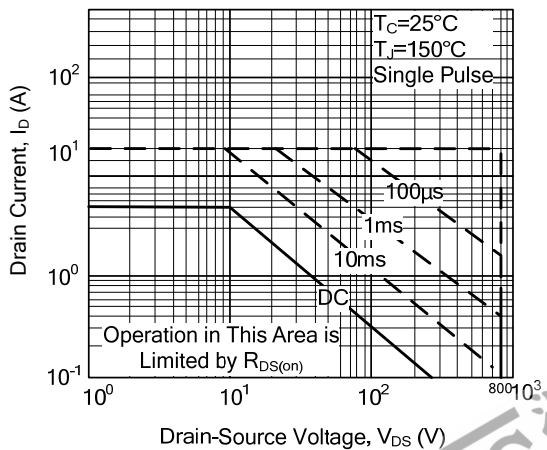


Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



Max. Safe Operating Area



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