



3N80

Power MOSFET

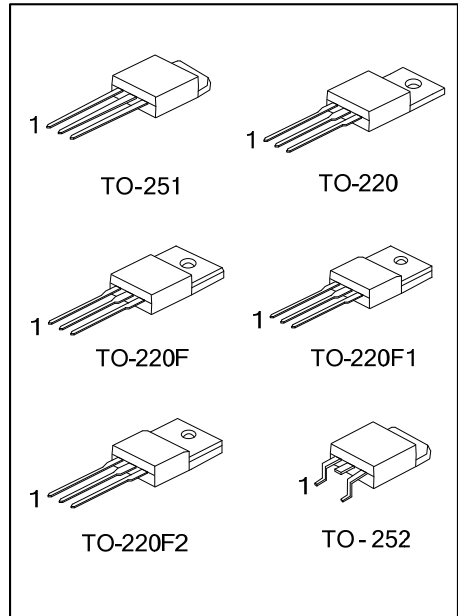
3 Amps, 800Volts N-CHANNEL POWER MOSFET

■ DESCRIPTION

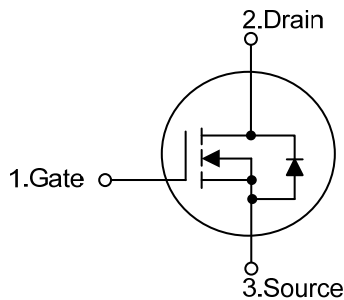
The UTC **3N80** provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

- * $R_{DS(ON)} < 4.2\Omega @ V_{GS} = 10 V$
- * 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



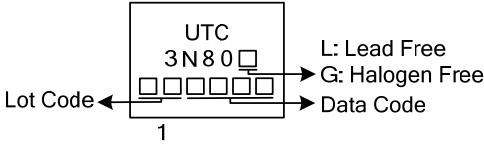
■ ORDERING INFORMATION

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-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)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, TN3: TO-252 (3) L: Lead Free, G: Halogen Free and 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 ($V_{GS}=0V$)		V_{DSS}	800	V
Drain-Gate Voltage ($R_G=20k\Omega$)		V_{DGR}	800	V
Gate-Source Voltage		V_{GSS}	± 30	V
Gate-Source Breakdown Voltage ($I_{GS}=\pm 1mA$)		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		50	
	TO-251/ TO-252			
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Note: 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 $T_J=25^\circ\text{C}$, $I_D=I_{AR}$, $V_{DD}=50V$

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

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT	
Junction to Ambient	TO-220F/TO-220F1	θ_{JA}	62.5	$^\circ\text{C/W}$	
	TO-220F2				
	TO-220				125
	TO-251/TO-252				110
Junction to Case	TO-220	θ_{JC}	1.78	$^\circ\text{C/W}$	
	TO-220F/ TO-220F1		5		
	TO-220F2				
	TO-251/ TO-252		2.5		

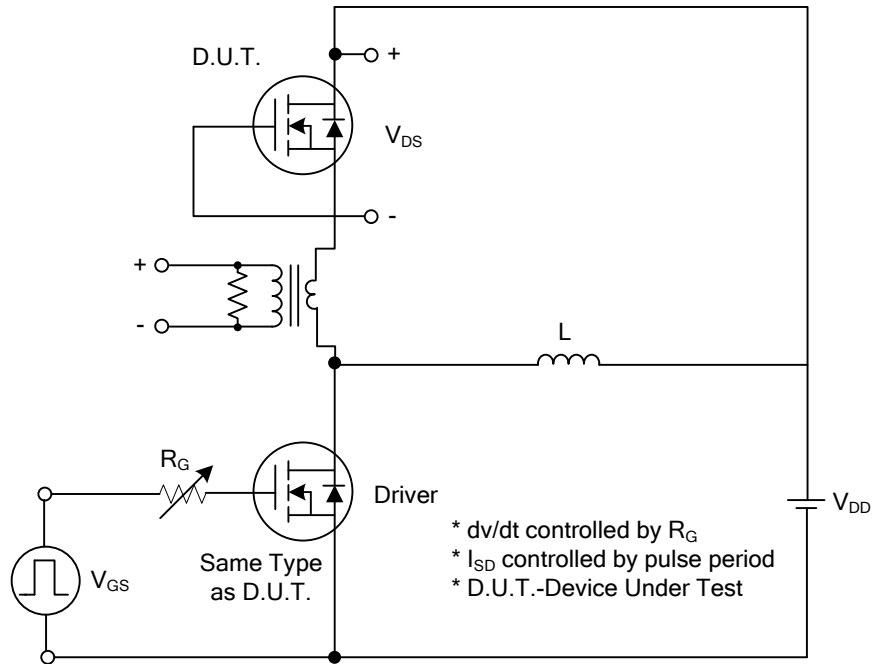
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

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						
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
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
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Diode Forward Voltage(Note 1)	V _{SD}	I _{SD} =3A, V _{GS} =0V			1.6	V
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
Body Diode Reverse Recovery Time	t _{rr}			384		ns
Body Diode Reverse Recovery Charge	Q _{RR}			1600		nC

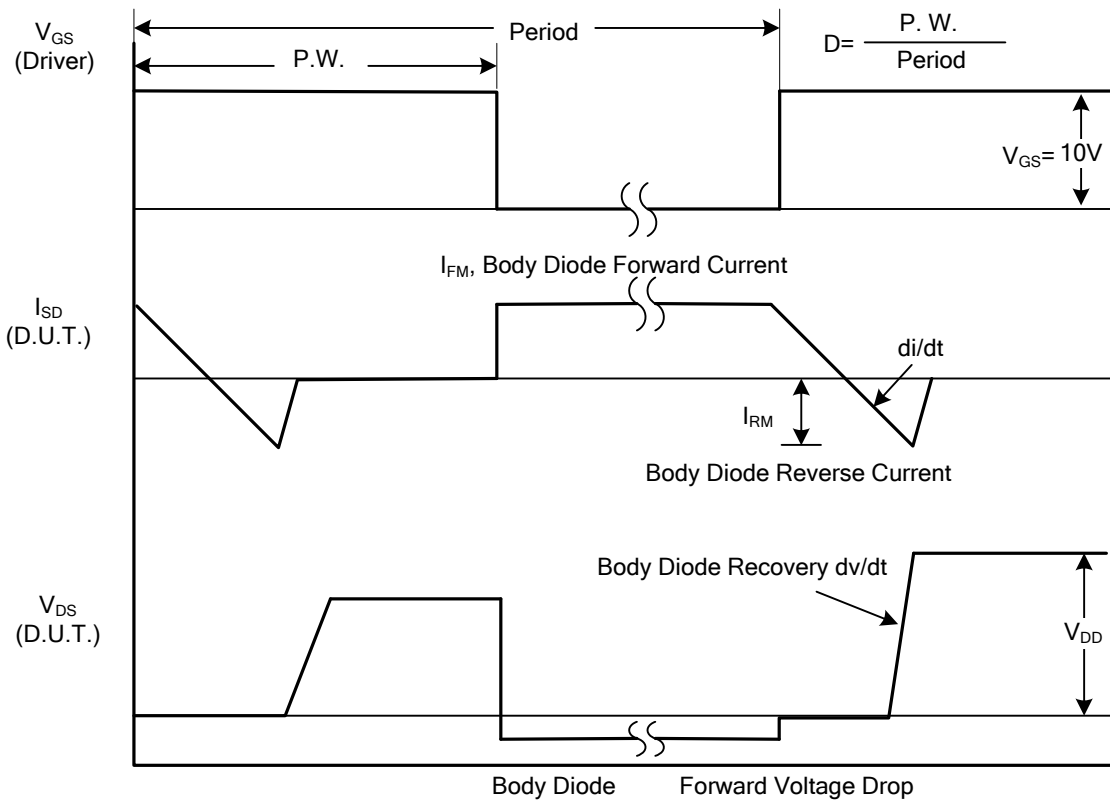
Note: 1. Pulse width = 300μs, Duty cycle ≤ 1.5%

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

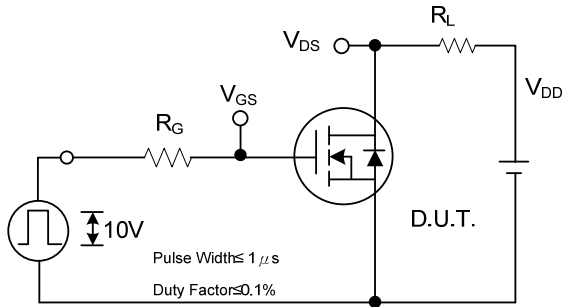


Peak Diode Recovery dv/dt Test Circuit

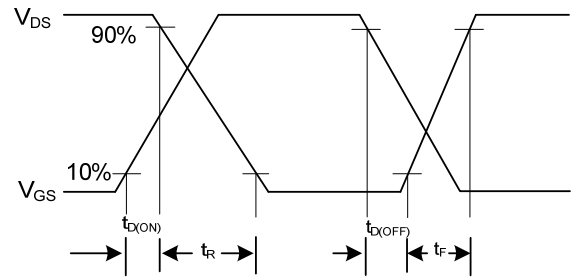


Peak Diode Recovery dv/dt Waveforms

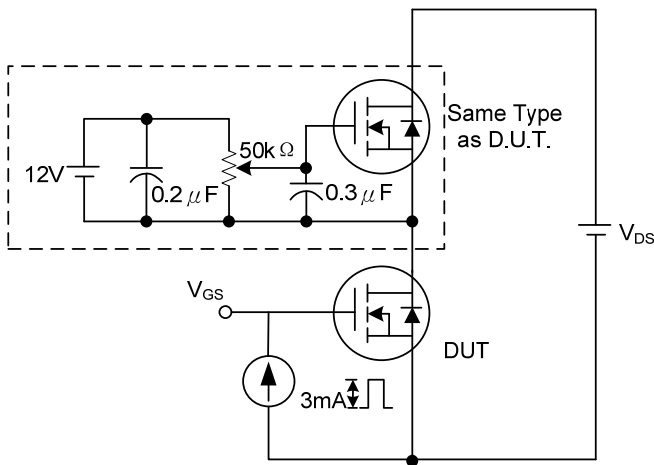
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



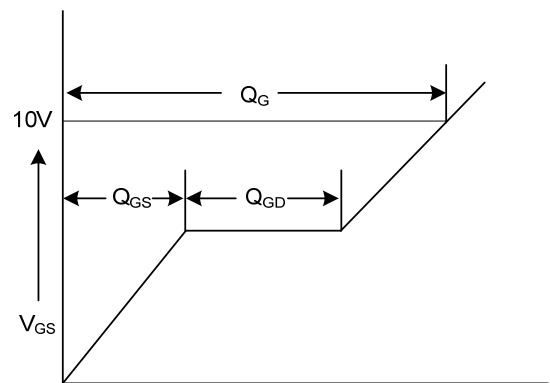
Switching Test Circuit



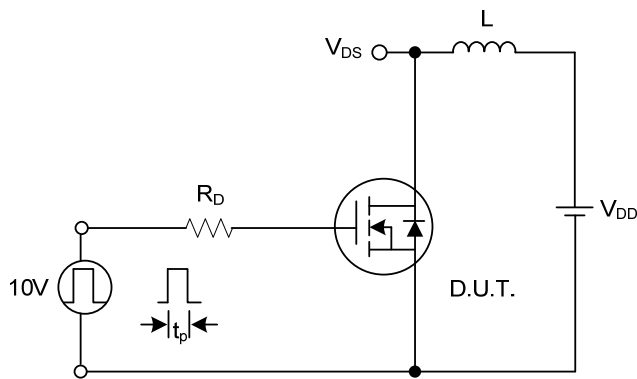
Switching Waveforms



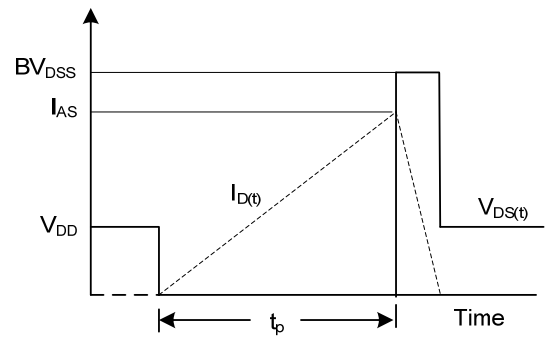
Gate Charge Test Circuit



Charge
Gate Charge Waveform

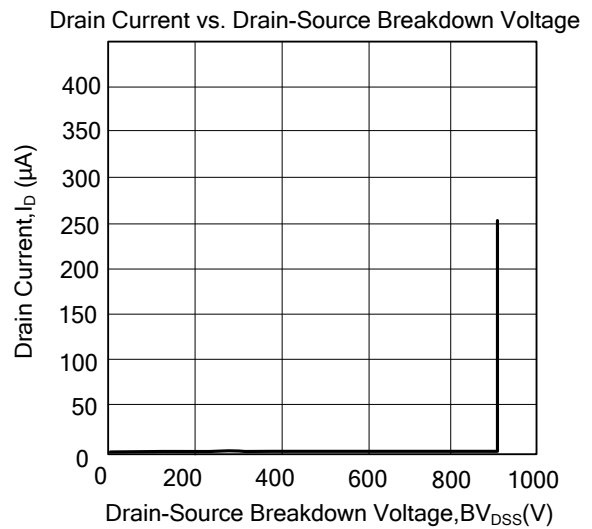
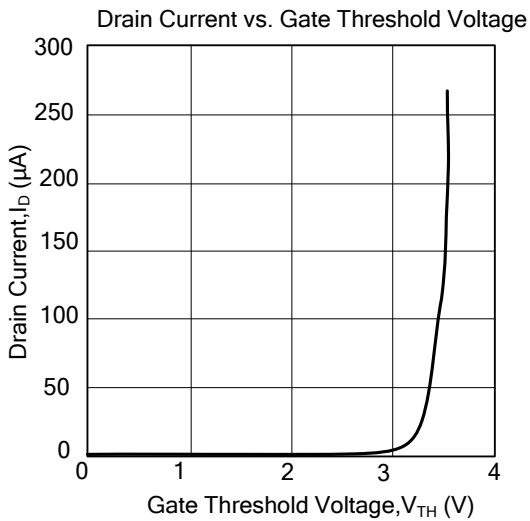
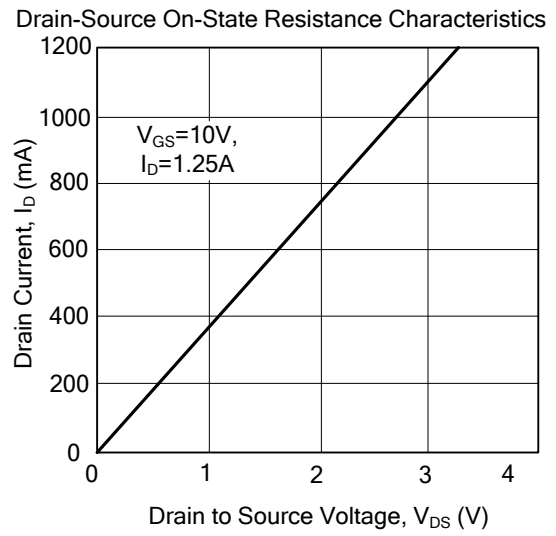
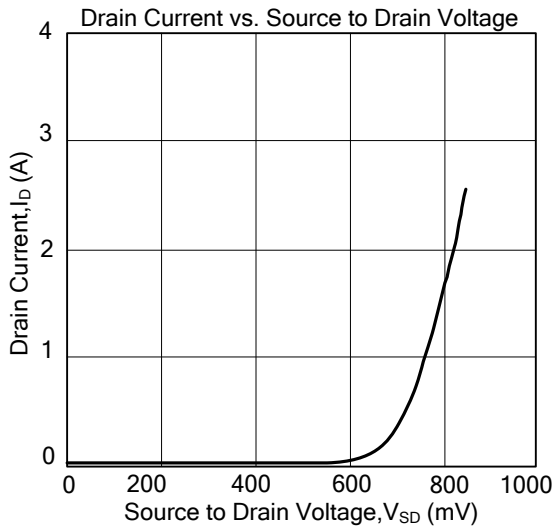


Unclamped Inductive Switching Test Circuit

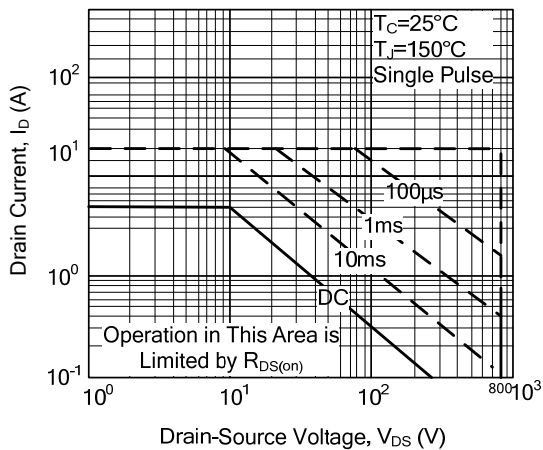


Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



Max. Safe Operating Area



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