UNISONIC TECHNOLOGIES CO., LTD

5 Amps, 800 Volts
# N-CHANNEL POWER MOSFET

■ **DESCRIPTION**

The UTC **5N80** is a N-channel enhancement mode power MOSFET. It use UTC advanced technology to provide avalanche rugged technology and low gate charge.

It can be applied in high current, high speed switching, switch mode power supplies (SMPS), consumer and industrial lighting, DC-AC inverters for welding equipment and uninterruptible power supply(UPS).

TO-220

TO-220F

■ **FEATURES**

* $R_{DS(on)}$:1.8Ω (TYP.)
* Avalanche rugged technology
* Low input capacitance
* Low gate charge
* Application oriented characterization

■ **SYMBOL**

2.Drain

1.Gate
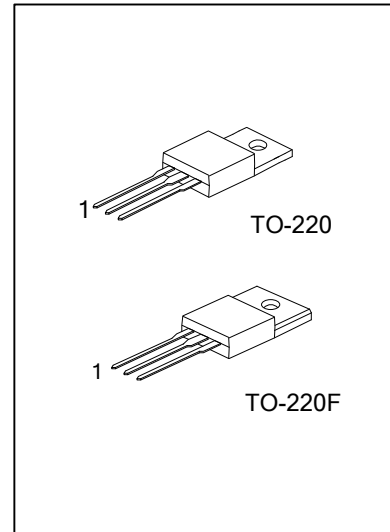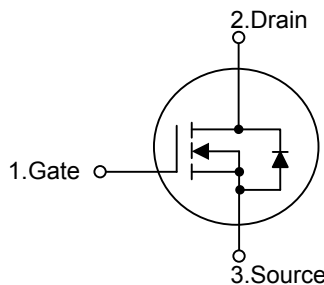
3.Source

■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
5N80L-TA3-T	5N80G-TA3-T	TO-220	G	D	S	Tube
5N80L-TF3-T	5N80G-TF3-T	TO-220F	G	D	S	Tube

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

5N80L-TA3-T

      (1)Packing Type   (1) T: Tube

      (2)Package Type   (2) TA3: TO-220, TF3: TO-220F

      (3)Lead Free   (3) G: Halogen Free, L: Lead Free

QW-R502-483.b

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{GS}=0		V_{DS}	800	V
Gate-Source Voltage			V_{GS}	±30	V
Drain-Gate Voltage	R_{GS}=20kΩ		V_{DGR}	800	V
Drain Current (Continuous)	Continuous		I_D	5.5	A
	Pulsed (Note 2)		I_{DM}	20	A
Avalanche Energy	Single Pulsed (Note 3)		E_{AS}	320	mJ
Power Dissipation	TO-220	P_D		125	W
	TO-220F			40	W
Derating Factor	TO-220			1	W/°C
	TO-220F			0.32	
Junction Temperature			T_J	150	°C
Storage Temperature			T_{STG}	-65~150	°C

Notes : 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	TO-220	$θ_{JA}$	62.5	°C/W
	TO-220F		62.5	
Junction to Case	TO-220	$θ_{JC}$	1	°C/W
	TO-220F		3.12	

5N80

■ **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}	I_D=250µA, V_{GS}=0V	800			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=Max Rating			250	µA
			V_{DS}= Max Rating$\times$0.8, T_C=125°C			1000	
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V			+100	nA
	Reverse		V_{GS}=-20V			-100	nA
ON CHARACTERISTICS (Note 1)							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250µA	3		5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=2.5A		1.8	2.6	Ω
			V_{GS}=10V, I_D=2.5A, T_C=100°C			4	
On State Drain Current		$I_{D(ON)}$	V_{DS}>$I_{D(ON)}\times R_{DS(ON)}$max, V_{GS}=10V	5			A
Forward Transconductance (Note 1)		g_{FS}	V_{DS}>$I_{D(ON)}\times R_{DS(ON)}$max, I_D=2.5A	2	4		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1190	1450	pF
Output Capacitance		C_{OSS}			165	200	pF
Reverse Transfer Capacitance		C_{RSS}			70	85	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DD}=500V, I_D=6A		75	95	nC
Gate to Source Charge		Q_{GS}			9		nC
Gate to Drain Charge		Q_{GD}			33		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=400V, I_D=2.5A, R_G=50Ω V_{GS}=10V (See test circuit, Fig. 3)		50	65	ns
Rise Time		t_R			85	105	ns
Turn-OFF Delay Time		$t_{D(OFF)}$	V_{DD}=640V, I_D=5.5A, R_G=50Ω V_{GS}=10V (See test circuit, Fig. 5)		120	150	ns
Fall-Time		t_F			30	40	ns
Cross-Over Time		t_C			160	200	ns
Turn-On Current Slope		$(di/dt)_{on}$	V_{DD}=640V, I_D=5.5A, R_G=50Ω V_{GS}=10V (See test circuit, Fig. 5)		200		A/µs
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_{SD}=5.5A, V_{GS}=0V			2	V
Reverse Recovery Time		t_{RR}	I_{SD}=5.5A,dI/dt=100A/µs, V_{DD}=80V,T_J=150°C (See test circuit, Fig. 5)		700		ns
Reverse Recovery Charge		Q_{RR}			7.7		nC
Reverse Recovery Current		I_{RRM}			22		A
Source-Drain Current		I_{SD}				5.5	A
Source-Drain Current (Pulsed) (Note 1)		I_{SDM}				20	A

Notes: 1. Pulsed: Pulse duration=300µs, duty cycle 1.5%.
           2. Pulse width limited by safe operating area.
           3. Starting T_J=25°C, I_D=I_{AR}, V_{DD}=50V

■ SWITCHING TIME TEST CIRCUIT
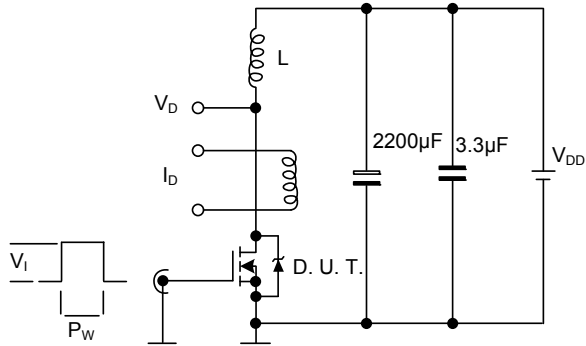
Fig. 1 Unclamped Inductive Load Test Circuits
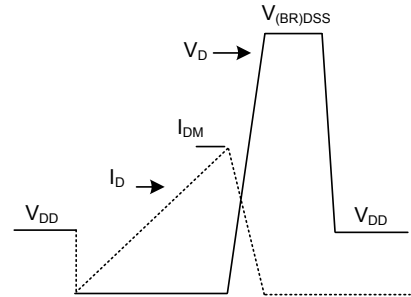
Fig. 2 Unclamped Inductive Waveforms

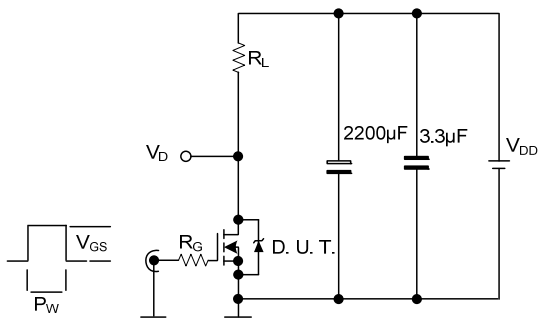Fig. 3 Switching Times Test Circuits For Resistive Load
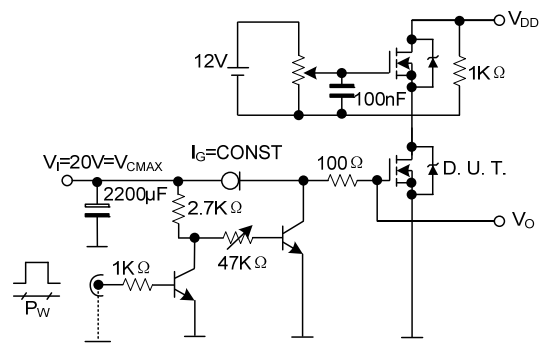
Fig. 4 Gate Charge Test Cricuit

Fig. 5 Test Circuit For Inductive Load Switching And Diode Reverse Recovery Time