9A, 800V   N-CHANNEL POWER MOSFET

■   DESCRIPTION

The UTC **9N80** is an N-channel mode power MOSFET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.
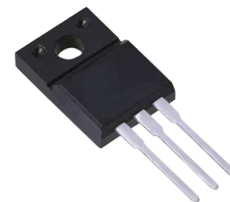
The UTC **9N80** is universally applied in high efficiency switch mode power supply.
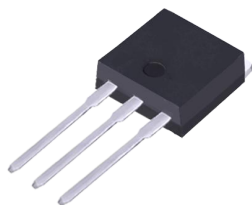
■   FEATURES

* $R_{DS(on)}$ = 1.3Ω @V_{GS} = 10 V
* Improved Gate Charge
* Lower Input Capacitance
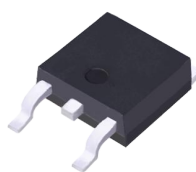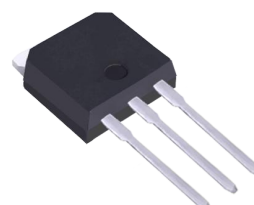* Lower Leakage Current: 25µA (Max.) @ V_{DS} = 800V
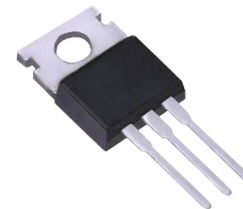
TO-220

TO-220F

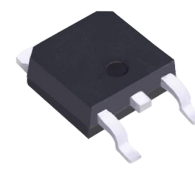TO-262   TO-263   TO-251   TO-252

9N80

■ **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
Avalanche Current (Note 2)		I_{AR}	9	A
Drain Current (Continuous)	Continuous	I_D	9	A
	Pulsed (Note 2)	I_{DM}	36	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	900	mJ
	Repetitive (Note 2)	E_{AR}	24	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.0	V/ns
Power Dissipation	TO-220	P_D	147	W
	TO-220F1		61	
	TO-220F2		64	
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55~+150	°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. Repetitive Rating: Pulse width limited by maximum junction temperature

3. L = 21mH, I_{AS} = 9A, V_{DD} = 50V, R_G = 27Ω, Starting T_J = 25°C

4. I_{SD} ≤ 9A, di/dt ≤ 180A/µs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220	θ_{JC}	0.85	°C/W
	TO-220F1		2.04	
	TO-220F2		1.95	

■ **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
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250µA		0.96		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=800V			25	µA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V			+100	nA
	Reverse		V_{GS}=-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=5V, I_D=250µA	3		5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=4.5A		1.05	1.3	Ω
Forward Transconductance		g_{FS}	V_{DS}=50V, I_D=4.5A (Note 1)		5.54		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}			2020	2600	pF
Output Capacitance		C_{OSS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz,		195	230	pF
Reverse Transfer Capacitance		C_{RSS}			82	95	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=640V, I_D=9A,		93	120	nC
Gate to Source Charge		Q_{GS}	(Note 1, 2)		14.3		nC
Gate to Drain Charge		Q_{GD}			42.1		nC
Turn-ON Delay Time		$t_{D(ON)}$			25	60	ns
Rise Time		t_R	V_{DD}=400V, I_D=9 A, R_G=16Ω,		37	85	ns
Turn-OFF Delay Time		$t_{D(OFF)}$	(Note 1, 2)		113	235	ns
Fall-Time		t_F			42	95	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S	Integral reverse pn-diode in the mosfet			9	A
Maximum Pulsed Drain-Source Diode Forward Current (Note 1)		I_{SM}				36	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=9A, V_{GS}=0V, T_J=25°C			1.4	V
Reverse Recovery Time		t_{rr}	T_J=25°C, I_F=9A,		560		ns
Reverse Recovery Charge		Q_{RR}	dI_F/dt=100A/µs, (Note 1)		8.4		µC

Note: 1. Pulse Test: Pulse width ≤ 250µs, Duty cycle ≤ 2%
       2. Essentially independent of operating temperature

■ **TYPICAL CHARACTERISTICS**

Drain Current vs. Drain-Source
Breakdown Voltage

Drain Current vs. Gate Threshold Voltage

Drain-Source On-State Resistance
Characteristics

V_{GS}=10V, I_D=4.5A

Continuous Drain-Source Current
vs. Source to Drain Voltage