

## 14A, 500V N-CHANNEL POWER MOSFET

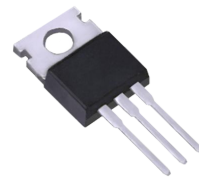
### ■ DESCRIPTION

The UTC **14N50** is a N-Channel enhancement mode power MOSFET. The device adopts planar stripe and uses DMOS technology to minimize and provide lower on-state resistance and faster switching speed. It can also withstand high energy pulse under the avalanche and commutation mode conditions.

The UTC **14N50** is ideally suitable for high efficiency switch mode power supply, power factor correction and electronic lamp ballast based on half bridge topology.

### ■ FEATURES

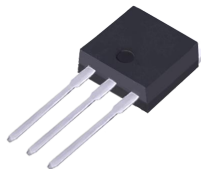
- \*  $R_{DS(ON)} < 0.50 \Omega @ V_{GS} = 10V, I_D = 7.0A$
- \* Fast switching capability
- \* Avalanche energy tested
- \* Improved dv/dt capability, high ruggedness



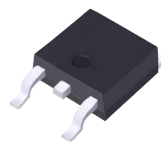
T0-220



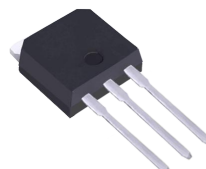
T0-220F



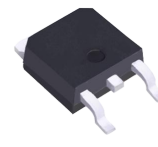
T0-262



T0-263



T0-251



T0-252

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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	500	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	14	A
Pulsed Drain Current (Note 2)	$I_{DM}$	48	A
Avalanche Current (Note 2)	$I_{AR}$	14	A
Single Pulsed Avalanche Energy (Note 3)	$E_{AS}$	400	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns
Power Dissipation ( $T_C=25^\circ\text{C}$ )	TO-220	150	W
	TO-220F1	50	W
	TO-263	150	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. Repetitive Rating : Pulse width limited by maximum junction temperature.

3.  $L = 9.3\text{mH}$ ,  $I_{AS} = 13\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 13\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	0.83	$^\circ\text{C}/\text{W}$
	TO-220F1	2.5	$^\circ\text{C}/\text{W}$
	TO-263	0.83	$^\circ\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 1mA$	500			V	
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 500V, V_{GS} = 0V$			10	$\mu\text{A}$	
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS} = 20V, V_{DS} = 0V$			100	nA	
		$V_{GS} = -20V, V_{DS} = 0V$			-100	nA	
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250mA, \text{Referenced to } 25^\circ\text{C}$		0.5		$V/^\circ\text{C}$	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 100\mu\text{A}$	2.0		4.0	V	
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 7.0A$			0.50	$\Omega$	
<b>DYNAMIC CHARACTERISTICS</b>							
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$		2000		pF	
Output Capacitance	$C_{OSS}$				238		pF
Reverse Transfer Capacitance	$C_{RSS}$				55		pF
<b>SWITCHING CHARACTERISTICS</b>							
Total Gate Charge	$Q_G$	$V_{DS}=400V, I_D=12A,$ $V_{GS}=10V \text{ (Note 1,2)}$		69	92	nC	
Gate-Source Charge	$Q_{GS}$			12		nC	
Gate-Drain Charge	$Q_{GD}$			31		nC	
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 250V, I_D = 14A,$ $R_G = 25\Omega \text{ (Note 1,2)}$		24		nS	
Turn-On Rise Time	$t_R$			70		nS	
Turn-Off Delay Time	$t_{D(OFF)}$			54		nS	
Turn-Off Fall Time	$t_F$			50		nS	
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>							
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 14A$			1.6	V	
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				14	A	
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				56	A	
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_S = 14A,$		470		nS	
Reverse Recovery Charge	$Q_{RR}$	$di_F / dt = 100A/\mu\text{s} \text{ (Note 1)}$		3.1		$\mu\text{C}$	

Notes: 1. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating ambient temperature.

## ■ TYPICAL CHARACTERISTICS

