

# 13N50

*Power MOSFET*

## 13A, 500V N-CHANNEL POWER MOSFET

### ■ DESCRIPTION

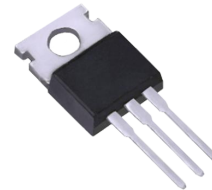
The UTC **13N50** is a N-Channel enhancement mode power MOSFET. The device adopts planar stripe and uses DMOS technology to minimize and provide lower on-state resistance and faster switching speed. It can also withstand high energy pulse under the avalanche and commutation mode conditions.

The UTC **13N50** is ideally suitable for high efficiency switch mode power supply, power factor correction, electronic lamp ballast based on half bridge topology.

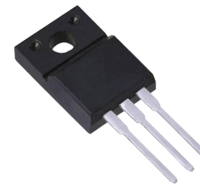
### ■ FEATURES

\*  $R_{DS(ON)} < 0.48\Omega$  @  $V_{GS} = 10V, I_D = 6.5A$

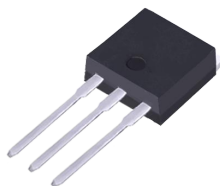
\* Avalanche energy tested



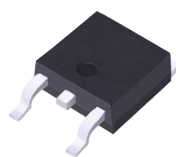
TO-220



TO-220F



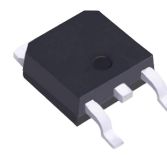
TO-262



TO-263



TO-251



TO-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
Drain Current	Continuous	$I_D$	13	A
	Pulsed (Note 2)	$I_{DM}$	52	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	972	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.1	V/ns
Power Dissipation	TO-220/TO-262 TO-263	$P_D$	168	W
	TO-220F/TO-220F1 TO-220F2		35	W
	Junction Temperature		$T_J$	+150
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.  $L=11.5\text{mH}$ ,  $I_{AS}=13\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , 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/TO-262 TO-263	$\theta_{JC}$	0.74	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2		3.57	

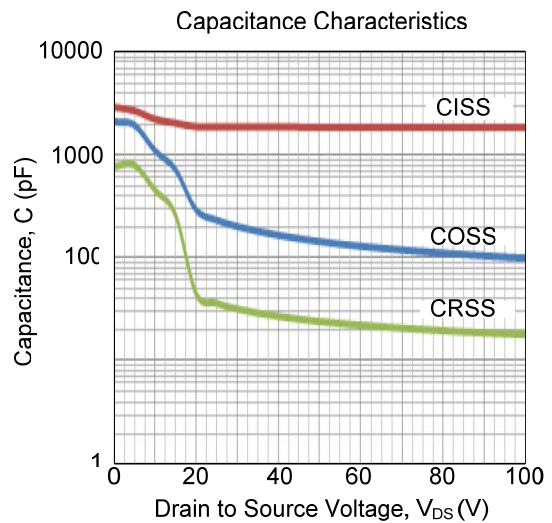
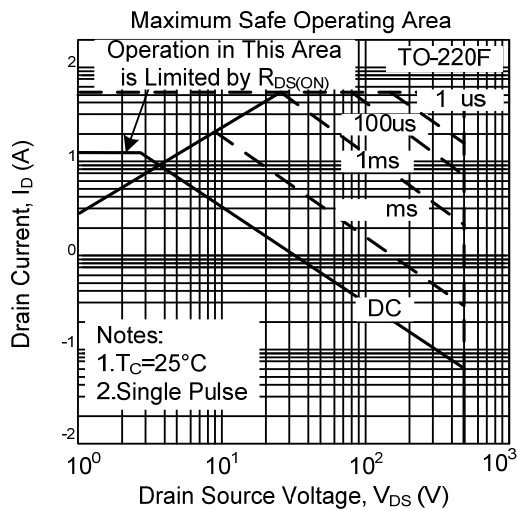
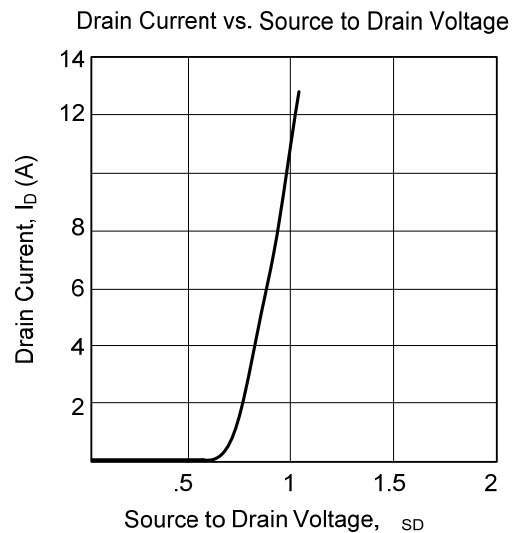
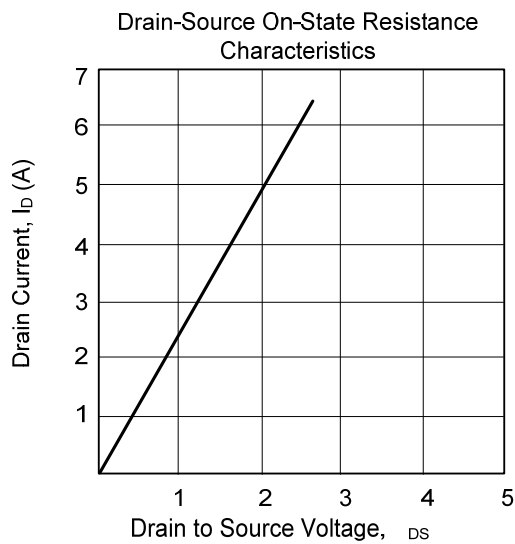
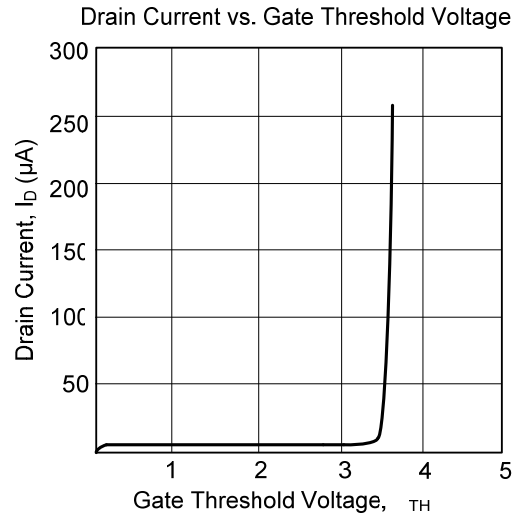
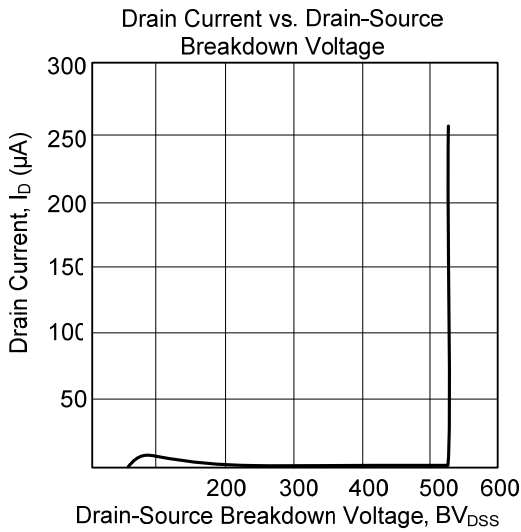
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	500			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 500V, V_{GS} = 0V$			1	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
		$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 6.5A$			0.48	$\Omega$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$		1920		pF
Output Capacitance	$C_{OSS}$			235		pF
Reverse Transfer Capacitance	$C_{RSS}$			36		pF
<b>SWITCHING CHARACTERISTICS</b>						
Total Gate Charge (Note 1)	$Q_G$	$V_{DS}=400V, V_{GS}=10V, I_D=13A,$ $I_D=1mA$ (Note 1, 2)		60		nC
Gate to Source Charge	$Q_{GS}$			16		nC
Gate to Drain Charge	$Q_{GD}$			24		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=250V, V_{GS}=10V, I_D=13A,$ $R_G=25\Omega$ (Note 1, 2)		27		nS
Rise Time	$t_R$			25		nS
Turn-OFF Delay Time	$t_{D(OFF)}$			140		nS
Fall-Time	$t_F$			35		nS
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$				13	A
Maximum Body-Diode Pulsed Current	$I_{SM}$				52	A
Drain-Source Diode Forward Voltage (Note 1)	$V_{SD}$	$I_S=13A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	$t_{rr}$	$I_S=13A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$		380		nS
Body Diode Reverse Recovery Charge	$Q_{rr}$				5.5	

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

2. Essentially independent of operating ambient temperature.

## ■ TYPICAL CHARACTERISTICS



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