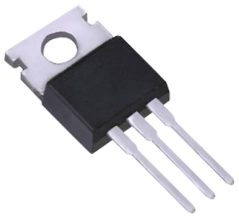
10A, 500V N-CHANNEL POWER MOSFET

■ DESCRIPTION

The UTC **10N50** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **10N50** is generally applied in high efficiency switch mode power supplies, active power factor correction and electronic lamp ballasts based on half bridge topology.



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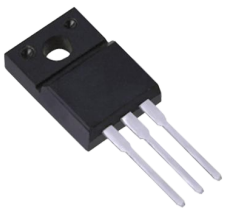
■ FEATURES

* $R_{DS(ON)}$=0.68Ω @ V_{GS}=10V
* High Switching Speed
* 100% Avalanche Tested



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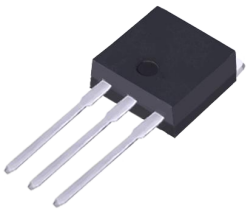

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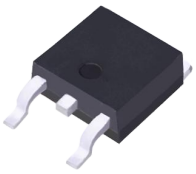

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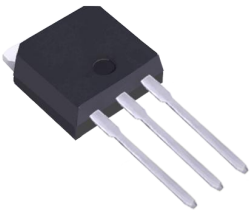

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■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	500	V
Gate-Source Voltage			V_{GSS}	±30	V
Drain Current	Continuous (T_C=25°C)		I_D	10 (Note 2)	A
	Pulsed (Note 3)		I_{DM}	40 (Note 2)	A
Avalanche Current (Note 3)			I_{AR}	10	A
Avalanche Energy	Single Pulsed (Note 4)		E_{AS}	388	mJ
	Repetitive (Note 5)		E_{AR}	14.3	mJ
Peak Diode Recovery dv/dt (Note 5)			dv/dt	4.5	V/ns
Power Dissipation		TO-220	P_D	143	W
		TO-220F1		48	
Derate above 25°C		TO-220		1.14	W/°C
		TO-220F1		0.38	
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. Drain current limited by maximum junction temperature
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. L = 7mH, I_{AS} = 10A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
5. I_{SD} ≤ 10A, di/dt ≤ 200A/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}	0.87	°C/W
	TO-220F1		2.58	

■ 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	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=5A		0.54	0.68	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1610	2096	pF
Output Capacitance		C_{OSS}			177	230	pF
Reverse Transfer Capacitance		C_{RSS}			16	24	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=400V, I_D=10A (Note 1, 2)		43	56	nC
Gate to Source Charge		Q_{GS}			7.5		nC
Gate to Drain Charge		Q_{GD}			18.5		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=250V, I_D=10A, R_G=25Ω (Note 1, 2)		29	67	ns
Rise Time		t_R			80	170	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			141	290	ns
Fall-Time		t_F			80	165	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				10	A
Maximum Body-Diode Pulsed Current		I_{SM}				40	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=10A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=10A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		50		ns
Body Diode Reverse Recovery Charge		Q_{RR}			0.1		μC

Note: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature