

## 20A, 500V N-CHANNEL POWER MOSFET

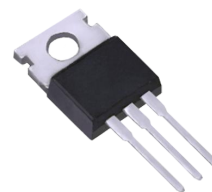
### ■ DESCRIPTION

The UTC **20N50** is an N-channel MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on-state resistance, high switching speed and low leakage current, etc.

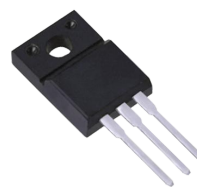
The UTC **20N50** is suitable for switching regulator application, etc.

### ■ FEATURES

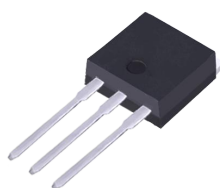
- \*  $R_{DS(on)} < 0.27\Omega @ V_{GS}=10V, I_D=10A$
- \* High switching speed
- \* Low leakage current



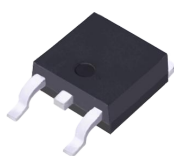
T0-220



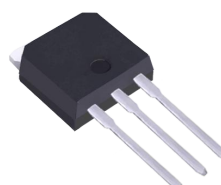
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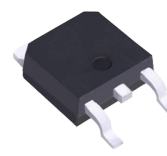
T0-262



T0-263



T0-251



T0-252

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	500	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current (Note 2)	Continuous	$I_D$	20	A
	Pulsed	$I_{DM}$	80	A
Avalanche Current		$I_{AR}$	20	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	960	mJ
	Repetitive (Note 4)	$E_{AR}$	15	mJ
Power Dissipation ( $T_C=25^\circ\text{C}$ )	TO-247	$P_D$	367	W
	TO-3P		416	W
Channel Temperature		$T_{CH}$	150	$^\circ\text{C}$
Storage Temperature Range		$T_{STG}$	-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. Ensure that the channel temperature does not exceed  $150^\circ\text{C}$ .

3.  $V_{DD}=90\text{V}$ ,  $T_{ch}=25^\circ\text{C}$  (initial),  $L=4.08\text{mH}$ ,  $R_G=25\Omega$ ,  $I_{AR}=20\text{A}$ .

4. Repetitive rating: pulse width limited by maximum channel temperature This transistor is an electrostatic-sensitive device. Handle with care.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-247	$\theta_{JA}$	40	$^\circ\text{C/W}$
	TO-3P		30	$^\circ\text{C/W}$
Junction to Case	TO-247	$\theta_{JC}$	0.34	$^\circ\text{C/W}$
	TO-3P		0.3	$^\circ\text{C/W}$

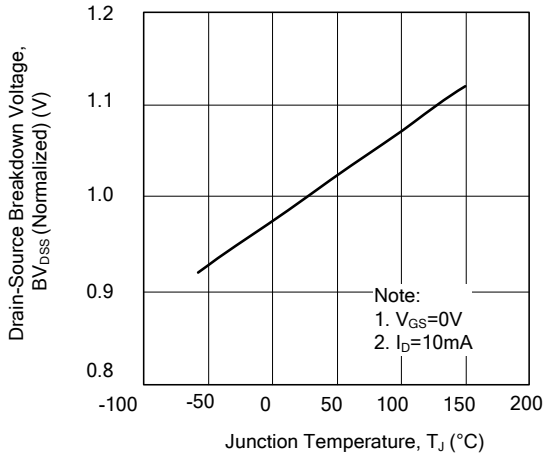
■ ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =10mA, V <sub>GS</sub> =0V	500			V	
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V			100	μA	
Gate-Source Leakage Current	I <sub>GSS</sub>	Forward			+10	μA	
		Reverse			-10	μA	
Gate-Source Breakdown Voltage	V <sub>(BR)GSS</sub>	I <sub>G</sub> =±10μA, V <sub>DS</sub> =0V	±30			V	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA	2.0		4.0	V	
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A		0.21	0.27	Ω	
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		3400		pF	
Output Capacitance	C <sub>OSS</sub>			320		pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>			25		pF	
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> ≈400V, I <sub>D</sub> =20A		70		nC	
Gate to Source Charge	Q <sub>GS</sub>			45		nC	
Gate to Drain Charge	Q <sub>GD</sub>			25		nC	
Turn-ON Delay Time	t <sub>D(ON)</sub>	<p>Duty ≤1%, t<sub>w</sub>=10μs</p>		130		ns	
Rise Time	t <sub>r</sub>				70		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>				280		ns
Fall-Time	t <sub>f</sub>				70		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Maximum Body-Diode Continuous Current (Note)	I <sub>S</sub>				20	A	
Maximum Body-Diode Pulsed Current (Note)	I <sub>SM</sub>				80	A	
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V			1.7	V	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V, dI <sub>DR</sub> /dt=100A/μs		1300		ns	
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>				20		μC

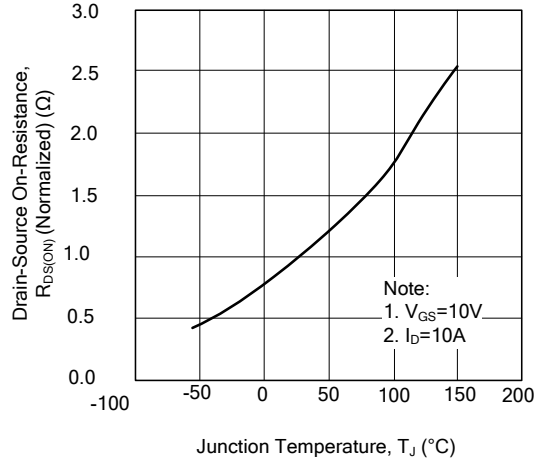
Note: Ensure that the channel temperature does not exceed 150°C.

## TYPICAL CHARACTERISTICS

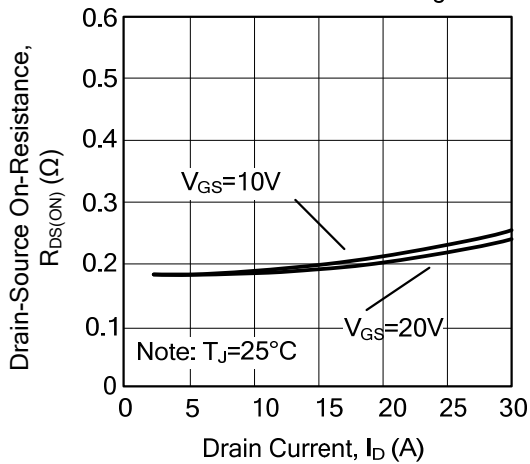
Breakdown Voltage Variation vs. Temperature



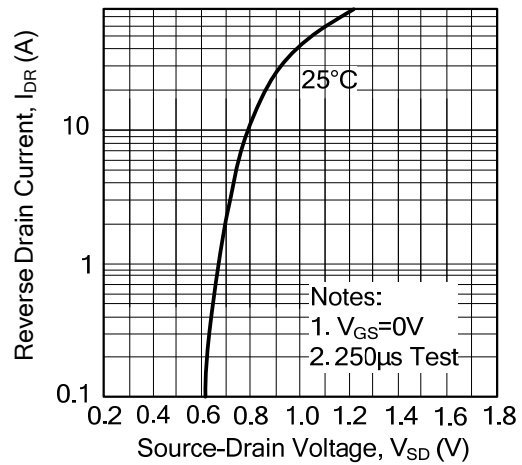
On-Resistance Junction Temperature



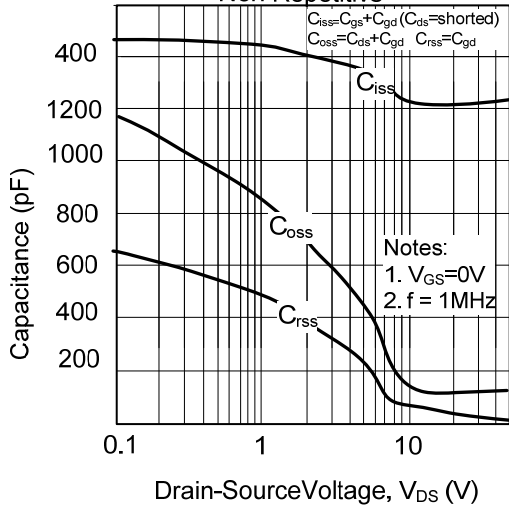
On-Resistance Variation vs. Drain Current and Gate Voltage



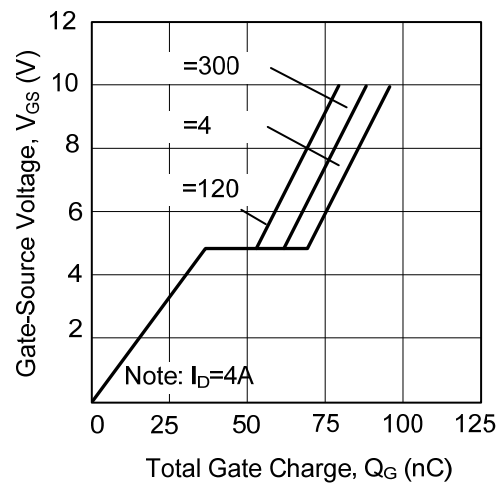
On State Current vs. Allowable Case Temperature



Capacitance Characteristics Non-Repetitive



Gate Charge Characteristics



## ■ TYPICAL CHARACTERISTICS (Cont.)

