



**UP9972**

*Power MOSFET*

**60A, 60V N-CHANNEL  
POWER MOSFET**

■ **DESCRIPTION**

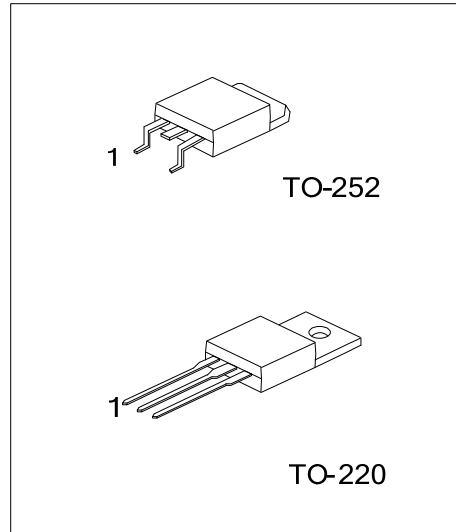
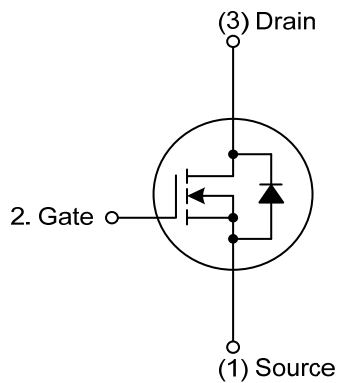
The UTC **UP9972** is an N-ch enhancement mode Power MOS Field Effect Transistor using advanced technology to provide fast speed switching, low on-resistance and perfect cost-effectiveness.

The UTC **UP9972** is ideal for commercial-industrial surface mount applications applied to DC/DC converters or other low voltage applications.

■ **FEATURES**

- \* Single drive required
- \* Fast switching capability
- \* Ultra low gate charge
- \* Halogen Free

■ **SYMBOL**



■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UP9972L-TN3-R	UP9972G-TN3-R	TO-252	G	D	S	Tape Reel
UP9972L-TN3-T	UP9972G-TN3-T	TO-252	G	D	S	Tube
UP9972L-TA3-T	UP9972G-TA3-T	TO-220	G	D	S	Tube

<p>UP9972L-TN3-T</p> <p>(1)Packing Type (2)Package Type (3) Lead Plating</p>	<p>(1) T: Tube (2) TA3: TO-220, TN3: TO-252 (3) G: Halogen Free, L: Lead Free</p>
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### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 25$	V
Continuous Drain Current ( $V_{GS}=10V, T_C=25^\circ C$ )	$I_D$	60	A
Pulsed Drain Current (Note 2)	$I_{DM}$	230	A
Avalanche Current (Note 3)	$I_{AR}$	30	A
Single Pulse Avalanche Energy (Note 3)	$E_{AS}$	45	mJ
Power Dissipation ( $T_C=25^\circ C$ )	TO-252	54	W
	TO-220	89	
Junction Temperature	$T_J$	+150	$^\circ C$
Storage Temperature	$T_{STG}$	-55 ~ +150	$^\circ C$

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. Pulse width limited by  $T_{J(MAX)}$
3.  $L = 100\mu H, V_{DD} = 30V, I_{AS} = 30A, R_G = 25\Omega, \text{Starting } T_J = 25^\circ C$

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to ambient	TO-252	160	$^\circ C/W$
	TO-220	62	
Junction to case	TO-252	2.3	$^\circ C/W$
	TO-220	1.4	

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	60			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$			10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 25V, V_{DS}=0V$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1		3	V
Drain to Source On-state Resistance (Note)	$R_{DS(ON)}$	$V_{GS}=10V, I_D=35A$			18	m $\Omega$
		$V_{GS}=4.5V, I_D=25A$			22	m $\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$		3170	5070	pF
Output Capacitance	$C_{OSS}$			280		pF
Reverse Transfer Capacitance	$C_{RSS}$			230		pF
Gate Resistance	$R_G$	$f=1.0MHz$		1.7		$\Omega$
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time (Note)	$t_{D(ON)}$	$V_{DS}=30V, V_{GS}=10V, I_D=35A, R_G=3.3\Omega, R_D=0.86\Omega$		11		ns
Turn-ON Rise Time	$t_R$			58		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			45		ns
Turn-OFF Fall-Time	$t_F$			80		ns
Total Gate Charge (Note)	$Q_G$	$I_D=35A, V_{DS}=48V, V_{GS}=4.5V$		32	51	nC
Gate Source Charge	$Q_{GS}$			8		nC
Gate Drain Charge	$Q_{GD}$			20		nC

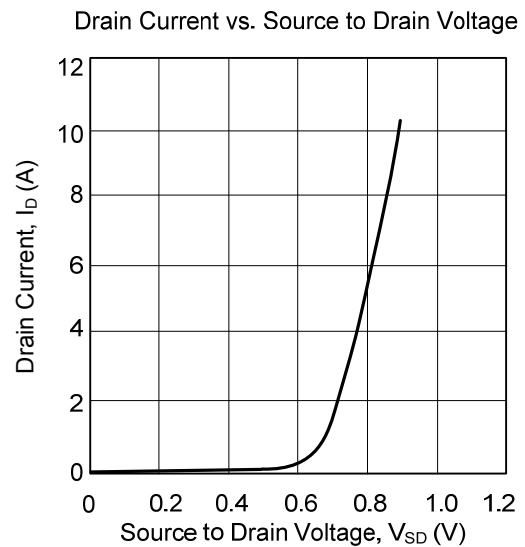
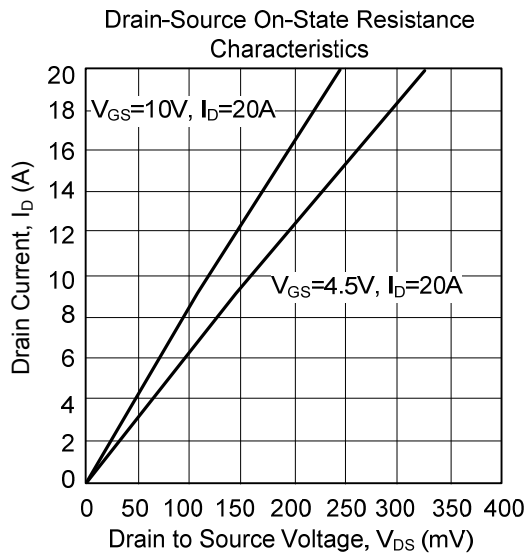
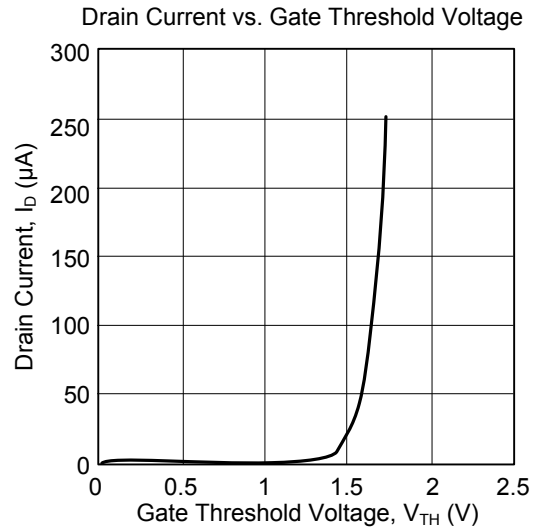
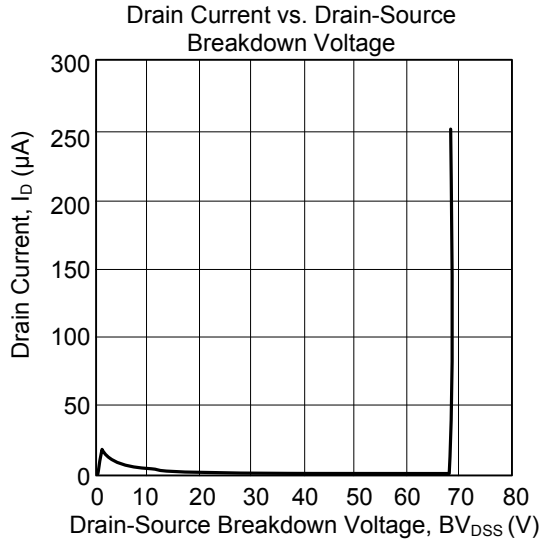


■ ELECTRICAL CHARACTERISTICS(Cont.) (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage (Note)	V <sub>SD</sub>	I <sub>S</sub> =35A, V <sub>GS</sub> =0V			1.2	V
Reverse Recovery Time (Note)	t <sub>RR</sub>	I <sub>S</sub> =35A, V <sub>GS</sub> =0V		50		ns
Reverse Recovery Charge	Q <sub>RR</sub>	dI/dt=100A/μs		48		nC

Note: Pulse test

#### TYPICAL CHARACTERISTICS



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