



# UP9971

**Power MOSFET**

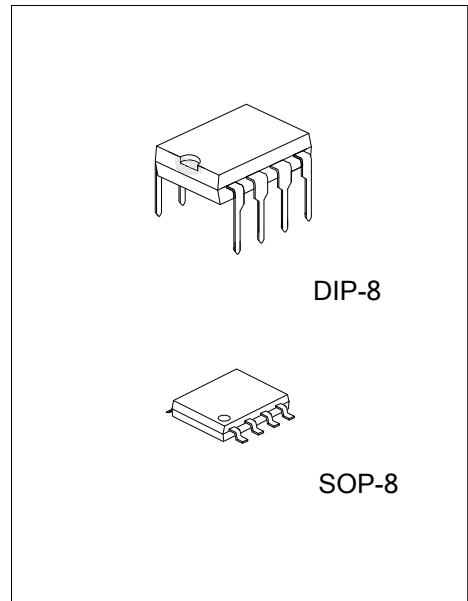
## 5A, 60V N-CHANNEL POWER MOSFET

■ DESCRIPTION

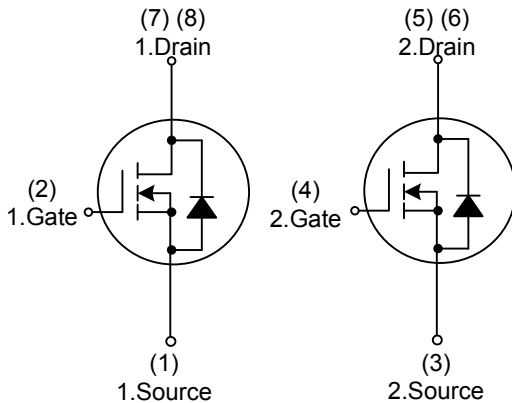
The UTC **UP9971** uses UTC's advanced technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable for being used as a load switch or in PWM applications.

■ FEATURES

- \*  $R_{DS(ON)} < 60 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=5\text{A}$
- \*  $R_{DS(ON)} < 72 \text{ m}\Omega @ V_{GS}=4.5\text{V}, I_D=2.5\text{A}$
- \* Ultra low gate charge ( typical 32.5 nC )
- \* Low reverse transfer Capacitance (  $C_{RSS}$  = typical 109 pF )
- \* Fast switching capability
- \* Avalanche energy Specified
- \* Improved dv/dt capability, high ruggedness



■ SYMBOL



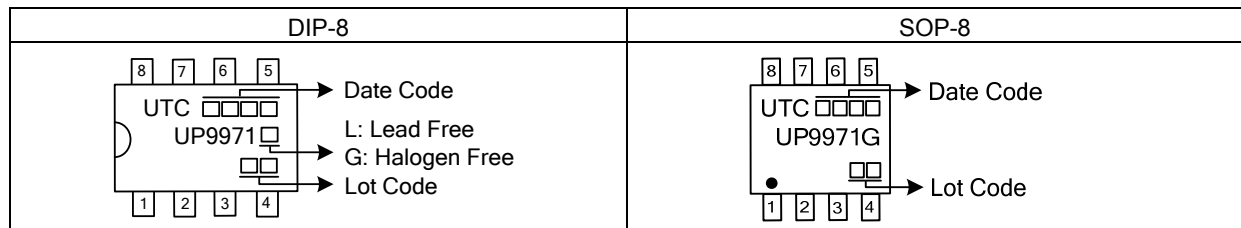
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UP9971L-D08-T	UP9971G-D08-T	DIP-8	S	G	S	G	D	D	D	D	Tube
-	UP9971G-S08-R	SOP-8	S	G	S	G	D	D	D	D	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>UP9971L-D08-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) D08: DIP-8, S08: SOP-8</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING



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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	60	V
Gate-Source Voltage	$V_{GSS}$	$\pm 25$	V
Continuous Drain Current ( $V_{GS}=10\text{V}$ )	$I_D$	5	A
Pulsed Drain Current (Note 2,3)	SOP-8	30	A
	DIP-8	20	A
Power Dissipation	$P_D$	2	W
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Operating Temperature	$T_{OPR}$	-55 ~ +150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

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. Pulse width limited by  $T_{J(MAX)}$

3. Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

■ THERMAL DATA

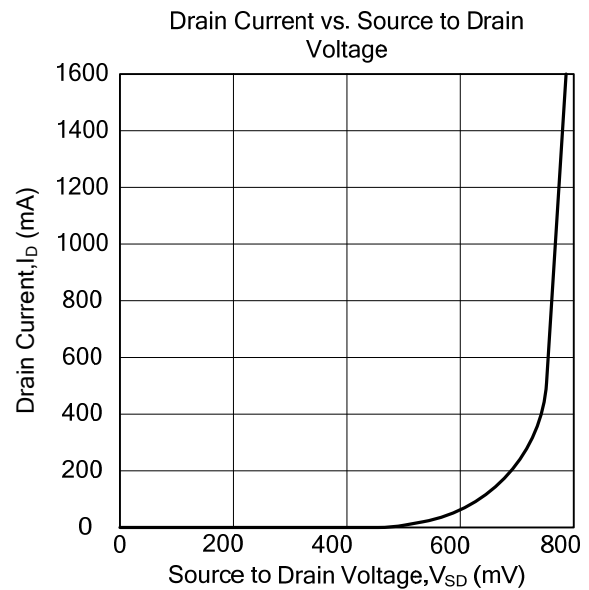
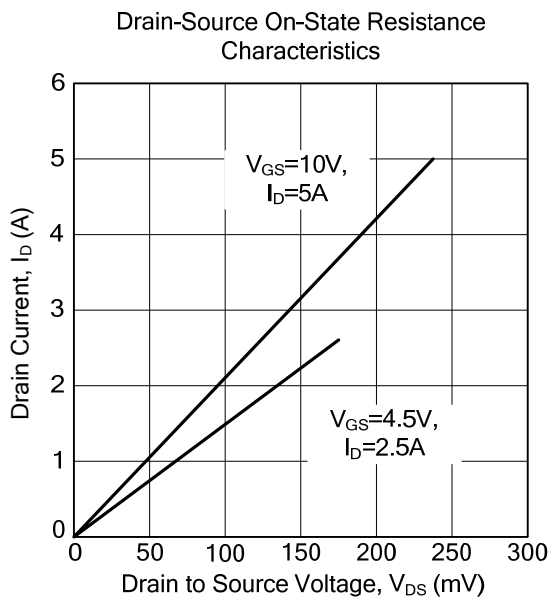
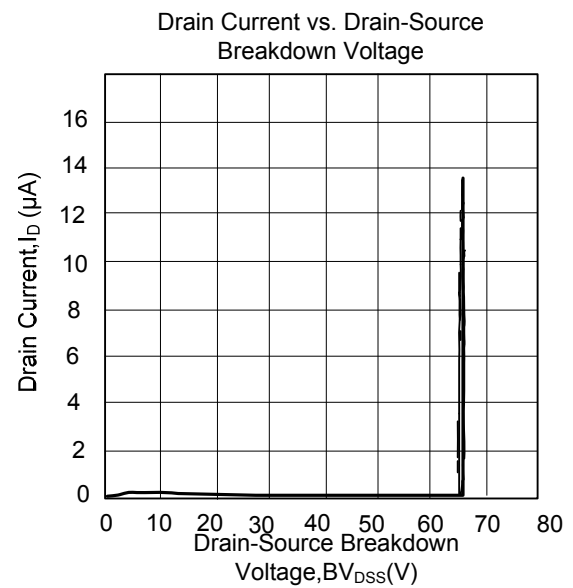
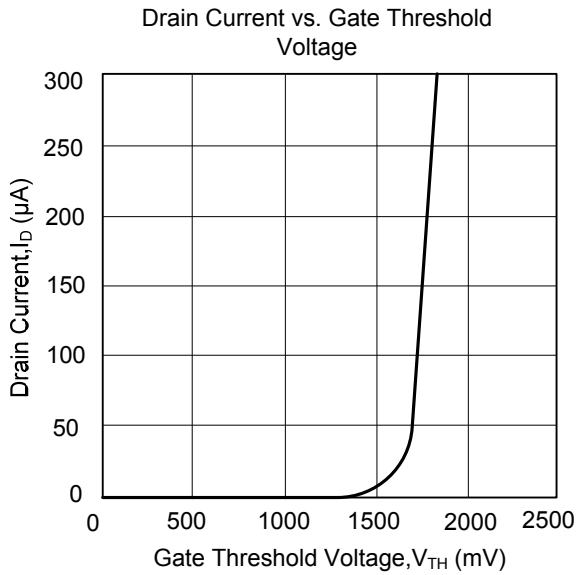
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C/W}$

■ 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	$BV_{DSS}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	60			V	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$			1	$\mu\text{A}$	
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 25\text{V}$			$\pm 100$	nA	
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}, I_D=1\text{mA}$		0.06		$\text{V}/^\circ\text{C}$	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.5		3	V	
Static Drain-Source On-Resistance (Note)	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=5\text{A}$			60	$\text{m}\Omega$	
		$V_{GS}=4.5\text{V}, I_D=2.5\text{A}$			72		
Forward Transconductance (Note)	SOP-8	$V_{DS}=10\text{V}, I_D=5\text{A}$		16		S	
	DIP-8			7		S	
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance	SOP-8	$V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1.0\text{MHz}$		1658		pF	
	DIP-8			1560		pF	
Output Capacitance	$C_{OSS}$			156		pF	
Reverse Transfer Capacitance	SOP-8		$C_{RSS}$		109		pF
	DIP-8				110		pF
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge (Note)	$Q_G$	$V_{DS}=48\text{V}, V_{GS}=10\text{V}, I_D=5\text{A}$		32.5		nC	
Gate Source Charge	$Q_{GS}$			4.9		nC	
Gate Drain Charge	$Q_{GD}$			8.8		nC	
Turn-ON Delay Time (Note)	$t_{D(ON)}$	$V_{GS}=10\text{V}, V_{DS}=30\text{V}, R_D=6\Omega, R_G=3.3\Omega, I_D=5\text{A}$		9.6		ns	
Turn-ON Rise Time	$t_R$			10		ns	
Turn-OFF Delay Time	$t_{D(OFF)}$			30		ns	
Turn-OFF Fall-Time	$t_F$			5.5		ns	
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Diode Forward Voltage (Note)	$V_{SD}$	$I_S=1.6\text{A}, V_{GS}=0\text{V}$			1.2	V	
Body Diode Reverse Recovery Time	$t_{rr}$	$I_S=5\text{A}, V_{GS}=0\text{V},$		29.2		ns	
Body Diode Reverse Recovery Charge	$Q_{RR}$	$di/dt=100\text{A}/\mu\text{s}$		48		nC	

Note: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

## TYPICAL CHARACTERISTICS



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