



## 30V, 78A N-CHANNEL FAST SWITCHING POWER MOSFETS

### DESCRIPTION

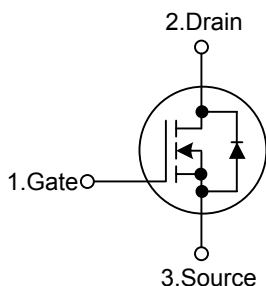
The UTC **UT3009** is an N-channel enhancement power MOSFET using UTC's advanced technology to provide the customers with perfect  $R_{DS(ON)}$ , low gate charge, ultra high cell density and high switching speed.

This UTC **UT3009** is suitable for most of the synchronous buck converter applications, etc.

### FEATURES

- \*  $R_{DS(ON)}=5.5m\Omega @ V_{DSS}=30V, I_D=78A$
- \* High Switching Speed
- \* Low Gate Charge(typical 20.8nC)

### SYMBOL

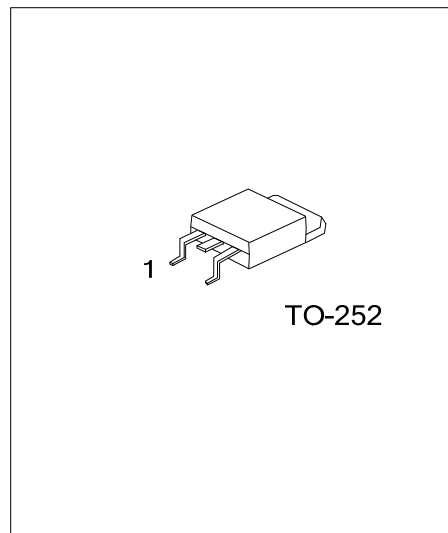


### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT3009L-TN3-R	UT3009G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>UT3009L-TN3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Free</p>	<p>(1) R: Tape Reel</p> <p>(2) TN3: TO-252</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	30	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	78	A
	$V_{GS}@10V$ (Note 1)		55	A
	Pulsed (Note 2)	$I_{DM}$	155	A
Avalanche Current		$I_{AR}$	48	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	252	mJ
Power Dissipation ( $T_C=25^\circ C$ ) (Note 4)		$P_D$	53	W
Junction Temperature		$T_J$	-55~175	$^\circ C$
Storage Temperature		$T_{STG}$	-55~175	$^\circ C$

Note: 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.

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient (Note 1)	$\theta_{JA}$	62	$^\circ C/W$
Junction to Case (Note 1)	$\theta_{JC}$	2.8	$^\circ C/W$

Notes: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

2. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

3. The EAS data shows Max. rating. The test condition is  $V_{DD}=25V$ ,  $V_{GS}=10V$ ,  $L=0.1mH$ ,  $I_{AS}=48A$ .

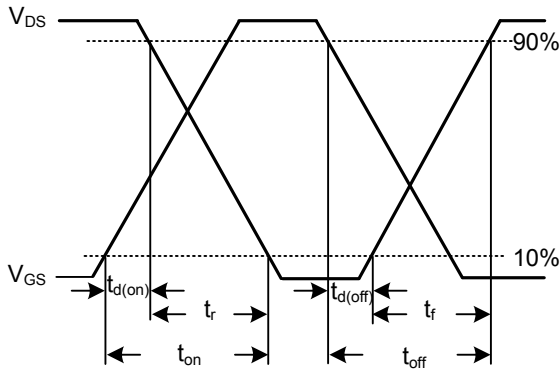
4. The power dissipation is limited by 175 $^\circ C$  junction temperature.

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

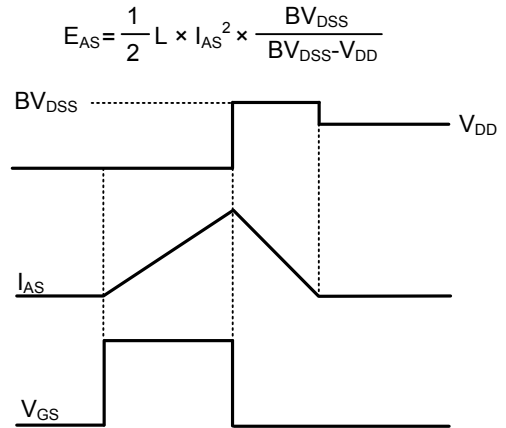
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =1mA		96.4		mV/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V			1	μA
					5	
Gate- Source Leakage Current	Forward	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V			+100	nA
	Reverse	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.5	2.5	V
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(TH)</sub>			-6.16		mV/°C
Static Drain-Source On-State Resistance (Note 2)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A		4.7	5.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A		7.5	9	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =30A		22		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1.0MHz		2361		pF
Output Capacitance	C <sub>OSS</sub>			315		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			237		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (4.5V)	Q <sub>G</sub>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =20V, I <sub>D</sub> =12A		20.8		nC
Gate to Source Charge	Q <sub>GS</sub>			5.3		nC
Gate to Drain Charge	Q <sub>GD</sub>			10.5		nC
Gate Resistance	R <sub>G</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1.0MHz		1.7	3.4	Ω
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =12V, V <sub>GS</sub> =10V, I <sub>D</sub> =5A, R <sub>G</sub> =3.3Ω	7.2	9	13.5	ns
Rise Time	t <sub>R</sub>		17.3	21.6	32.4	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>		21.3	26.6	40	ns
Fall-Time	t <sub>F</sub>		8.4	10.5	15.8	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current (Note 1,4)	I <sub>S</sub>	V <sub>D</sub> =V <sub>G</sub> =0V, Force Current			78	A
Maximum Body-Diode Pulsed Current (Note 2, 4)	I <sub>SM</sub>				155	A
Drain-Source Diode Forward Voltage (Note 2)	V <sub>SD</sub>	I <sub>S</sub> =1A, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			1	V
Single Pulse Avalanche Energy (Note 3)	E <sub>AS</sub>	V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =24A	63			mJ

- Notes: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.  
 2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.  
 3. The Min. value is 100% EAS tested guarantee.  
 4. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

■ TEST CIRCUITS AND WAVEFORMS



Switching Time Waveform



Unclamped Inductive Switching Wave

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