



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

■ **DESCRIPTION**

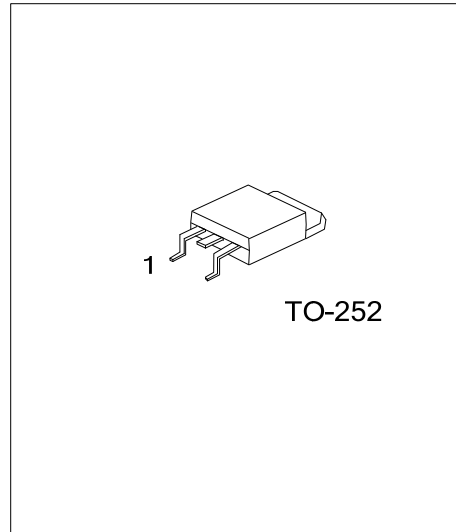
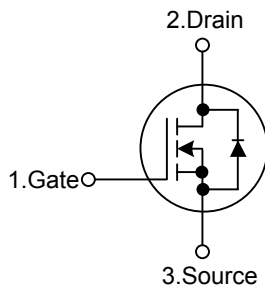
The UTC **UT3009** is an N-channel enhancement power MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$, low gate charge, ultra high cell density and high switching speed.

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) 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}	± 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)	θ_{JA}	62	$^\circ C/W$
Junction to Case (Note 1)	θ_{JC}	2.8	$^\circ C/W$

Notes: 1. The data tested by surface mounted on a 1 inch² 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_J=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	30			V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	Reference to 25°C, I _D =1mA		96.4		mV/°C
Drain-Source Leakage Current	I _{DSS}	V _{DS} =24V, V _{GS} =0V			1	μA
					5	
Gate- Source Leakage Current	Forward	V _{GS} =+20V, V _{DS} =0V			+100	nA
	Reverse	V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
V _{GS(th)} Temperature Coefficient	ΔV _{GS(TH)}			-6.16		mV/°C
Static Drain-Source On-State Resistance (Note 2)	R _{DS(ON)}	V _{GS} =10V, I _D =30A		4.7	5.5	mΩ
		V _{GS} =4.5V, I _D =15A		7.5	9	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =30A		22		S
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =15V, f=1.0MHz		2361		pF
Output Capacitance	C _{OSS}			315		pF
Reverse Transfer Capacitance	C _{RSS}			237		pF
SWITCHING PARAMETERS						
Total Gate Charge (4.5V)	Q _G	V _{GS} =4.5V, V _{DS} =20V, I _D =12A		20.8		nC
Gate to Source Charge	Q _{GS}			5.3		nC
Gate to Drain Charge	Q _{GD}			10.5		nC
Gate Resistance	R _G	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		1.7	3.4	Ω
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =12V, V _{GS} =10V, I _D =5A, R _G =3.3Ω	7.2	9	13.5	ns
Rise Time	t _R		17.3	21.6	32.4	ns
Turn-OFF Delay Time	t _{D(OFF)}		21.3	26.6	40	ns
Fall-Time	t _F		8.4	10.5	15.8	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current (Note 1,4)	I _S	V _D =V _G =0V, Force Current			78	A
Maximum Body-Diode Pulsed Current (Note 2, 4)	I _{SM}				155	A
Drain-Source Diode Forward Voltage (Note 2)	V _{SD}	I _S =1A, V _{GS} =0V, T _J =25°C			1	V
Single Pulse Avalanche Energy (Note 3)	E _{AS}	V _{DD} =25V, L=0.1mH, I _{AS} =24A	63			mJ

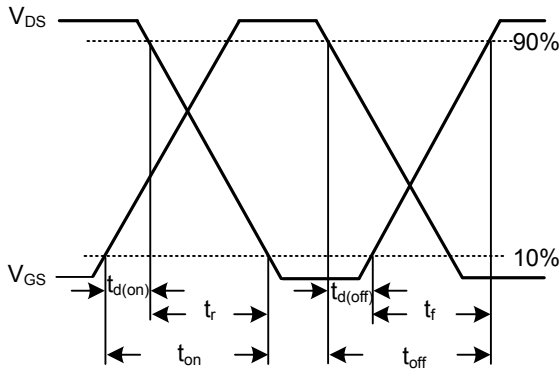
Notes: 1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

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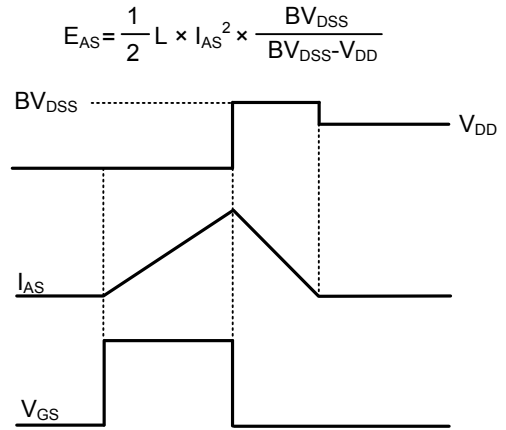
3. The Min. value is 100% EAS tested guarantee.

4. The data is theoretically the same as I_D and I_{DM}, 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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