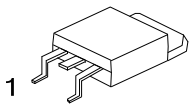
30V, 78A N-CHANNEL FAST SWITCHING POWER MOSFETS



TO-252

■ DESCRIPTION

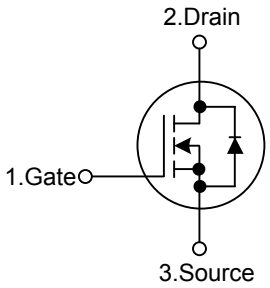
The UTC **UT3009** is an N-channel enhancement power MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$, low gate charge, ultra high cell density and high switching speed.

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

■ FEATURES

* $R_{DS(ON)}$=5.5mΩ @ 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

UT3009L-TN3-R (1)Packing Type (2)Package Type (3)Lead Free	(1) R: Tape Reel (2) TN3: TO-252 (3) G: Halogen Free, L: Lead Free

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±20	V
Drain Current	Continuous V_{GS}@10V (Note 1)	T_C=25°C	I_D	78	A
		T_C=100°C		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°C) (Note 4)			P_D	53	W
Junction Temperature			T_J	-55~175	°C
Storage Temperature			T_{STG}	-55~175	°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	°C/W
Junction to Case (Note 1)	θ_{JC}	2.8	°C/W

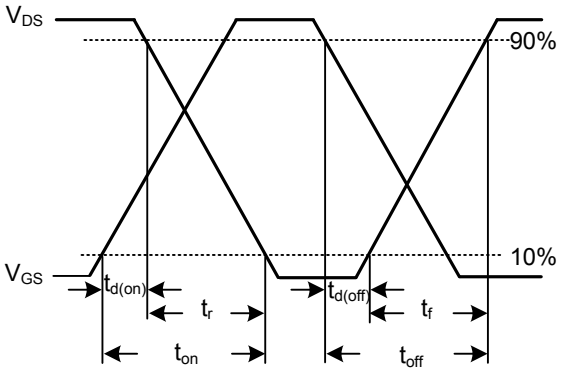
Notes: 1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.
3. The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=48A.
4. The power dissipation is limited by 175°C 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		$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=1mA			96.4		mV/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=24V,V_{GS}=0V	T_J=25°C			1	μA
				T_J=55°C			5	
Gate- Source Leakage Current	Forward	I_{GSS}	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		$\triangle V_{GS(TH)}$				-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

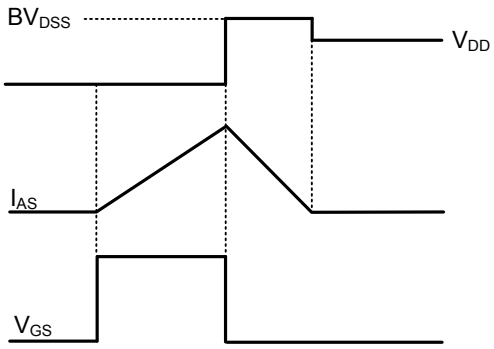
Notes: 1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.
3. The Min. value is 100% EAS tested guarantee.
4. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by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

■ TEST CIRCUITS AND WAVEFORMS



Switching Time Waveform

$$E_{AS}=\frac{1}{2}L\times I_{AS}^{2}\times\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$



Unclamped Inductive Switching Wave