

UNISONIC TECHNOLOGIES CO., LTD

3N65K-MK4

Preliminary

Power MOSFET

3A, 650V N-CHANNEL POWER MOSFET

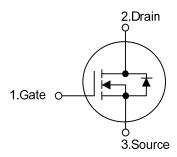
■ DESCRIPTION

The UTC **3N65K-MK4** is a high voltage and high current power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications at power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

■ FEATURES

- * $R_{DS(ON)}$ < 3.5 Ω @ V_{GS} = 10V, I_{D} = 1.5A
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

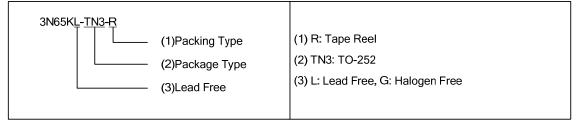
■ SYMBOL



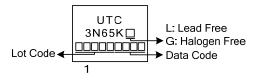
ORDERING INFORMATION

Ordering Number		Dookogo	Pin Assignment			Dooking	
Lead Free	Halogen Free Package		1	2	3	Packing	
3N65KL-TN3-R	3N65KG-TN3-R	TO-252	G	D	S	Tape Reel	

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



MARKING



1 TO-252

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■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAME	ETER	SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		V_{DSS}	650	V	
Gate-Source Voltage		V_{GSS}	±30	V	
Avalanche Current (Note 2)		I _{AR}	3.0	Α	
Continuous Drain Current		I_{D}	3.0	Α	
Pulsed Drain Current (Note 2)		I _{DM}	12	Α	
Avalonaha Energy	Single Pulsed (Note 3)	E _{AS}	130	mJ	
Avalanche Energy	Repetitive (Note 2)	E _{AR}	7.5	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns	
Power Dissipation		D	50	W	
Derate above 25°C		P_{D}	0.4	W/°C	
Junction Temperature		T_J	+150	°C	
Operating Temperature		T _{OPR}	-55 ~ +150	°C	
Storage Temperature		T_{STG}	-55 ~ +150	°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. Repetitive Rating: Pulse width limited by T_J.
- 3. L=28mH, I_{AS}=3A, V_{DD}=50V, R_G=25 Ω , Starting T_J = 25°C
- 4. $I_{SD} \le 3.0$ A, di/dt ≤ 200 A/ μ s, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25$ °C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT		
Junction to Ambient	θ_{JA}	110	°C/W		
Junction to Case	θ _{JC}	2.5	°C/W		

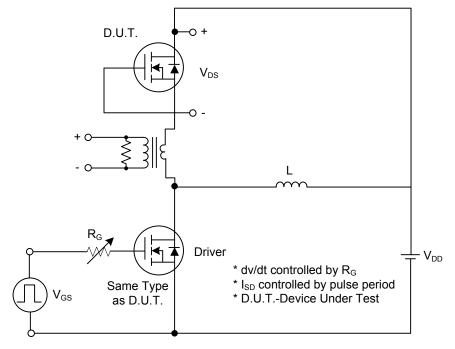
■ ELECTRICAL CHARACTERISTICS (T_C =25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS					•	•		
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} = 0 V, I _D = 250 μA	650			V	
Drain-Source Leakage Current		I _{DSS}	V _{DS} = 650 V, V _{GS} = 0 V			10	μA	
Cata Cauraa Laaka aa Currant	Forward		$V_{GS} = 30 \text{ V}, V_{DS} = 0 \text{ V}$			100	nA	
Gate-Source Leakage Current	Reverse	I _{GSS}	$V_{GS} = -30 \text{ V}, V_{DS} = 0 \text{ V}$			-100	nA	
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I _D =250μA,Referenced to 25°C		0.6		V/°C	
ON CHARACTERISTICS								
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	2.5		4.5	V	
Static Drain-Source On-State Res	sistance	R _{DS(ON)}	$V_{GS} = 10V, I_D = 1.5A$			3.5	Ω	
DYNAMIC CHARACTERISTICS								
Input Capacitance	Input Capacitance		V 05V V 0V		385		pF	
Output Capacitance		C _{ISS}	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		60		pF	
Reverse Transfer Capacitance		C_{RSS}			5		pF	
SWITCHING CHARACTERISTIC	S							
Turn-On Delay Time		$t_{D(ON)}$			43		ns	
Turn-On Rise Time		t_R	$V_{DD} = 30V, I_D = 0.5A,$		20		ns	
Turn-Off Delay Time		t _{D(OFF)}	$R_G = 25\Omega \text{ (Note 1, 2)}$		90		ns	
Turn-Off Fall Time		t_{F}			18		ns	
Total Gate Charge		Q_G	V - 50VI - 4 2A		14		nC	
Gate-Source Charge		Q_GS	V _{DS} = 50V,I _D = 1.3A, V _{GS} = 10 V (Note 1, 2)		5.8		nC	
Gate-Drain Charge		Q_{DD}	V _{GS} - 10 V (Note 1, 2)		1.7		nC	
SOURCE- DRAIN DIODE RATIN	IGS AND CI	HARACTERIST	rics	-	ā.	ā.		
Drain-Source Diode Forward Volt	age	V_{SD}	$V_{GS} = 0 \text{ V}, I_{S} = 3.0 \text{ A}$			1.4	V	
Maximum Continuous Drain-Source Diode		1.				3.0	Α	
Forward Current		I _S				3.0	A	
Maximum Pulsed Drain-Source D	iode	la				12	Α	
Forward Current		I _{SM}				12	^	

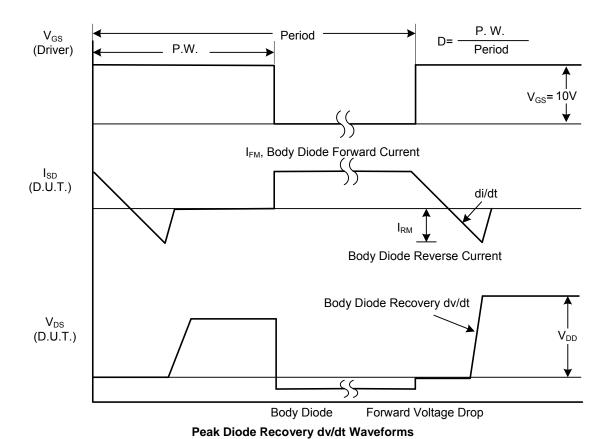
Notes: 1. Pulse Test: Pulse width ≤ 300µs, Duty cycle≤2%

^{2.} Essentially independent of operating temperature

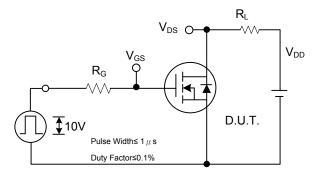
■ TEST CIRCUITS AND WAVEFORMS



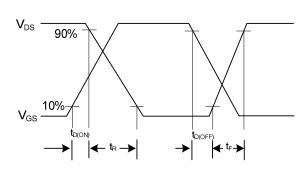
Peak Diode Recovery dv/dt Test Circuit



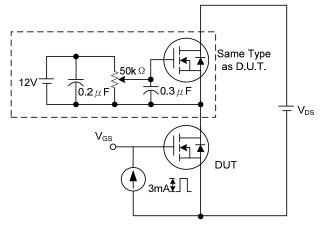
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



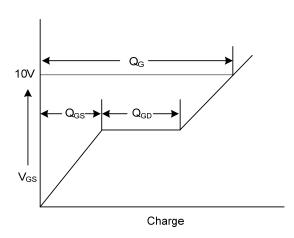
Switching Test Circuit



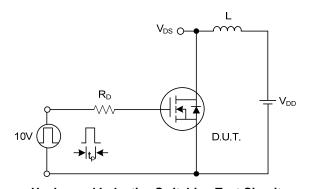
Switching Waveforms



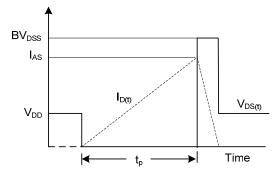
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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