

## UNISONIC TECHNOLOGIES CO., LTD

5NM100 Preliminary Power MOSFET

# 5.0A, 1000V N-CHANNEL SUPER-JUNCTION MOSFET

#### **■** DESCRIPTION

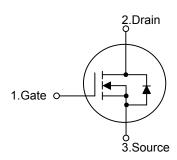
The UTC **5NM100** is an Super Junction MOSFET Structure. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **5NM100** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

#### ■ FEATURES

- \*  $R_{DS(ON)} \le 2.3 \Omega @ V_{GS} = 10V, I_D = 2.5A$
- \* High switching speed
- \* High breakdown voltage

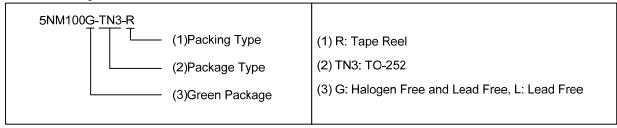
#### ■ SYMBOL



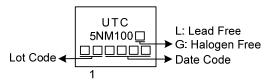
#### ORDERING INFORMATION

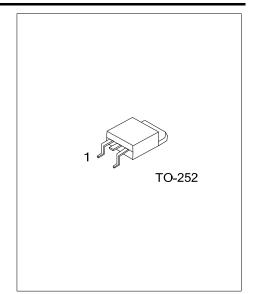
Ordering Number		Dookone	Pin Assignment			Dooking	
Lead Free	Halogen Free	Package	1	2	3	Packing	
5NM100L-TN3-R	5NM100G-TN3-R	TO-252	G	D	S	Tape Reel	

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



#### MARKING





<u>www.unisonic.com.tw</u> 1 of 5

## ■ ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub>=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{ extsf{DSS}}$	1000	V	
Drain-Gate Voltage		$V_{DGR}$	1000	V	
Gate-Source Voltage		$V_{GSS}$	±30	V	
Drain Current	Continuous	I <sub>D</sub>	5	Α	
	Pulsed	I <sub>DM</sub>	10	Α	
Peak Diode Recovery dv/dt (Note 3)		dv/dt	2.4	V/ns	
Power Dissipation		$P_D$	28	W	
Junction Temperature		TJ	-55 ~ <b>+</b> 150	°C	
Storage Temperature Range		T <sub>STG</sub>	-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 maximum junction temperature
- 3.  $I_{SD} \le 5.0$ A, di/dt  $\le 200$ A/ $\mu$ s,  $V_{DD} \le BV_{DSS}$ , Starting  $T_J = 25$ °C

#### **■ THERMAL DATA**

PARAMETER	SYMBOL	RATING	UNIT °C/W	
Junction to Ambient	$\theta_{JA}$	110		
Junction to Case	$\theta_{ m JC}$	4.4 (Note)	°C/W	

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

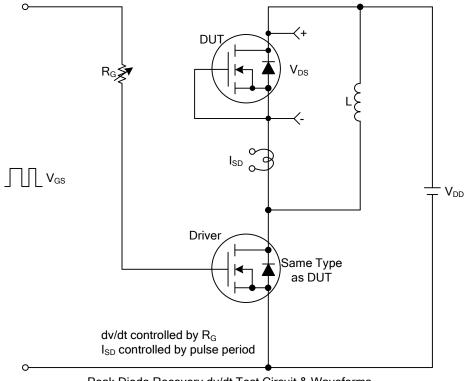
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS								
Drain-Source Breakdown Voltage		$BV_{DSS}$	I <sub>D</sub> =0.25mA, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C				V	
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =1000V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			10	μΑ	
			V <sub>DS</sub> =1000V, V <sub>GS</sub> =0V, T <sub>C</sub> =125°C			100	μΑ	
Gate-Source Leakage Current	Forward	1	$V_{GS}$ =+30V, $V_{DS}$ =0V			+100	nA	
	Reverse	$I_{GSS}$	V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V			-100	nA	
ON CHARACTERISTICS	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 Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =2.5A			2.3	Ω	
DYNAMIC PARAMETERS								
Input Capacitance		C <sub>ISS</sub>			425		pF	
Output Capacitance		Coss	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		130		pF	
Reverse Transfer Capacitance		$C_{RSS}$			7		pF	
SWITCHING PARAMETERS								
Total Gate Charge		$Q_G$	\/ -800\/ \/ -10\/   -5.0A		24		nC	
Gate to Source Charge		$Q_GS$	V <sub>DS</sub> =800V, V <sub>GS</sub> =10V, I <sub>D</sub> =5.0A, (Note 1,2)		7.8		nC	
Gate to Drain Charge		$Q_GD$	(Note 1,2)		7		nC	
Turn-ON Delay Time		t <sub>D(ON)</sub>			7		ns	
Rise Time		$t_R$	V <sub>DD</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =5.0A,		17		ns	
Turn-OFF Delay Time		$t_{D(OFF)}$	R <sub>G</sub> =25Ω (Note 1,2)		53		ns	
Fall-Time		$t_{F}$			3.7		ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS								
Maximum Body-Diode Continuous Current		I <sub>S</sub>	T <sub>C</sub> =25°C			5	Α	
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>	T <sub>C</sub> =25°C			10	Α	
Drain-Source Diode Forward Voltage		$V_{SD}$	I <sub>F</sub> =5.0A, V <sub>GS</sub> =0V			1.4	V	
Reverse Recovery Time		t <sub>rr</sub>	I <sub>S</sub> =5.0A,V <sub>GS</sub> =0V,		504		ns	
Reverse Recovery Charge		$Q_{rr}$	dI <sub>F</sub> /dt=100A/μs (Note 1)		4.4		μC	

Notes: 1. Pulse Test: Pulse width  $\leq$  300µs, Duty cycle  $\leq$  2%.

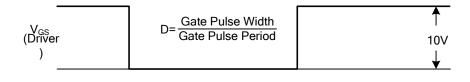
2. Essentially independent of operating temperature.

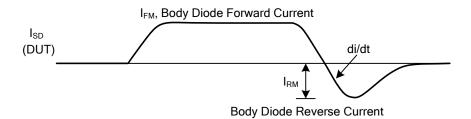


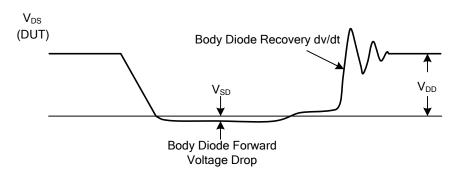
## **TEST CIRCUITS AND WAVEFORMS**



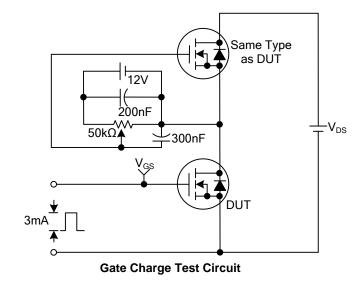
Peak Diode Recovery dv/dt Test Circuit & Waveforms

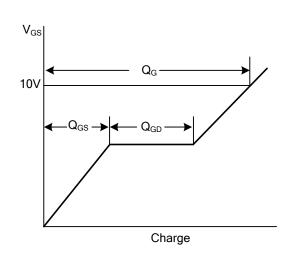




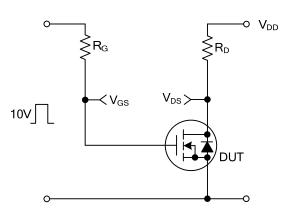


## ■ TEST CIRCUITS AND WAVEFORMS(Cont.)

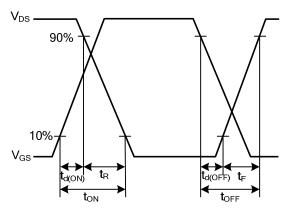




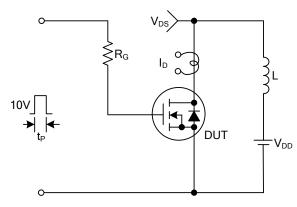
**Gate Charge Waveforms** 



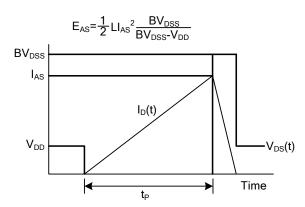
**Resistive Switching Test Circuit** 



**Resistive Switching Waveforms** 



**Unclamped Inductive Switching Test Circuit** 



**Unclamped Inductive Switching Waveforms** 

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

