



## 7NM64

Preliminary

Power MOSFET

### 5.0A, 640V N-CHANNEL SUPER-JUNCTION MOSFET

#### DESCRIPTION

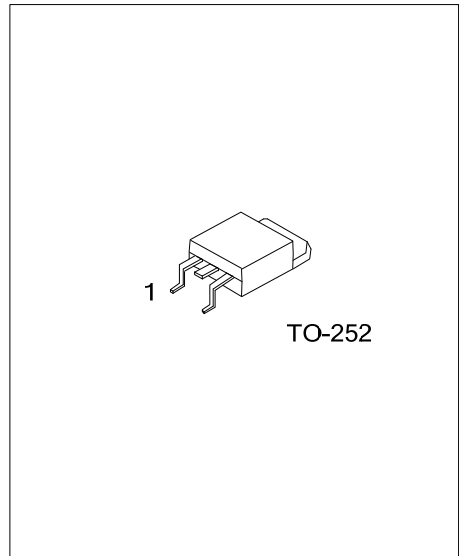
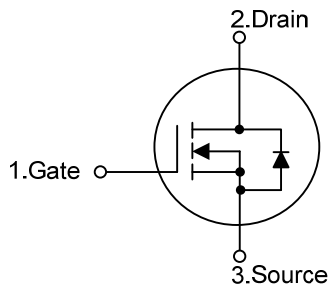
The UTC **7NM64** is an Super Junction MOSFET Structure. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **7NM64** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

#### FEATURES

- \* Low drain-source on-resistance:  $R_{DS(ON)} < 0.95 \Omega$  (max.) by using Super Junction Structure
- \* Fast switching capability
- \* Avalanche energy tested
- \* Improved dv/dt capability, high ruggedness

#### SYMBOL



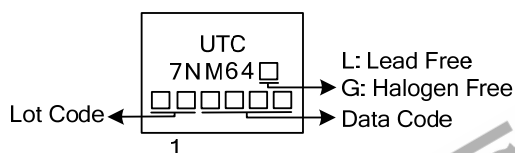
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7NM64L-TN3-R	7NM64G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>7NM64L-TN3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>		<p>(1) R: Tape Reel</p> <p>(2) TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
--	--	---

#### MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	640	V
Gate-Source Voltage		$V_{GSS}$	$\pm 25$	V
Avalanche Current (Note 2)		$I_{AR}$	2	A
Drain Current	Continuous	$I_D$	5	A
	Pulsed (Note 2)	$I_{DM}$	20	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	35	mJ
Peak Diode Recovery $dv/dt$ (Note 4)		$dv/dt$	3.0	V/ns
Power Dissipation		$P_D$	60	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

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.  $L = 30\text{mH}$ ,  $I_{AS} = 1.5\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 5\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	110	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	2.08	$^\circ\text{C}/\text{W}$

Note: When mounted on 1 inch<sup>2</sup> FR-4, 2 Oz copper board.

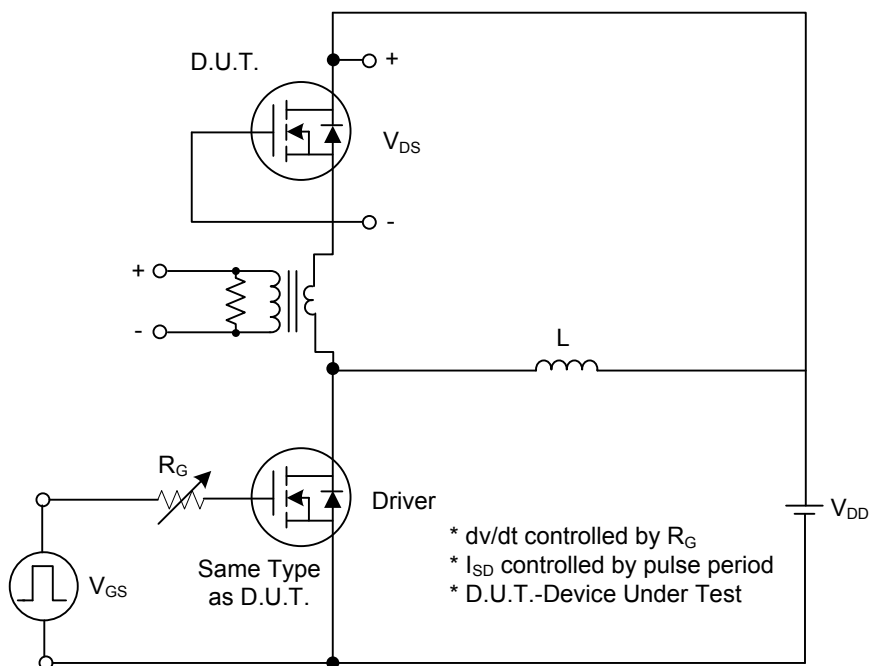
■ ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	640			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> = 640V, V <sub>GS</sub> = 0V			1	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	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
ON CHARACTERISTICS							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A			0.95	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0 MHz		250		pF
Output Capacitance		C <sub>OSS</sub>			180		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			20		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q <sub>G</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =1.3A, I <sub>D</sub> =100μA (Note 1, 2)		40		nC
Gate-Source Charge		Q <sub>GS</sub>			4.2		nC
Gate-Drain Charge		Q <sub>GD</sub>			11.5		nC
Turn-On Delay Time		t <sub>D(ON)</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A, R <sub>G</sub> =25Ω (Note 1, 2)		45		ns
Turn-On Rise Time		t <sub>R</sub>			90		ns
Turn-Off Delay Time		t <sub>D(OFF)</sub>			190		ns
Turn-Off Fall Time		t <sub>F</sub>			70		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>				5	A
Maximum Pulsed Drain-Source Diode Forward Current		I <sub>SM</sub>				20	A
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	I <sub>S</sub> =5.0A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time		t <sub>RR</sub>	I <sub>S</sub> =5.0A, V <sub>GS</sub> =0V		470		ns
Body Diode Reverse Recovery Charge		Q <sub>RR</sub>	dl/dt=100A/μs		4.6		μC

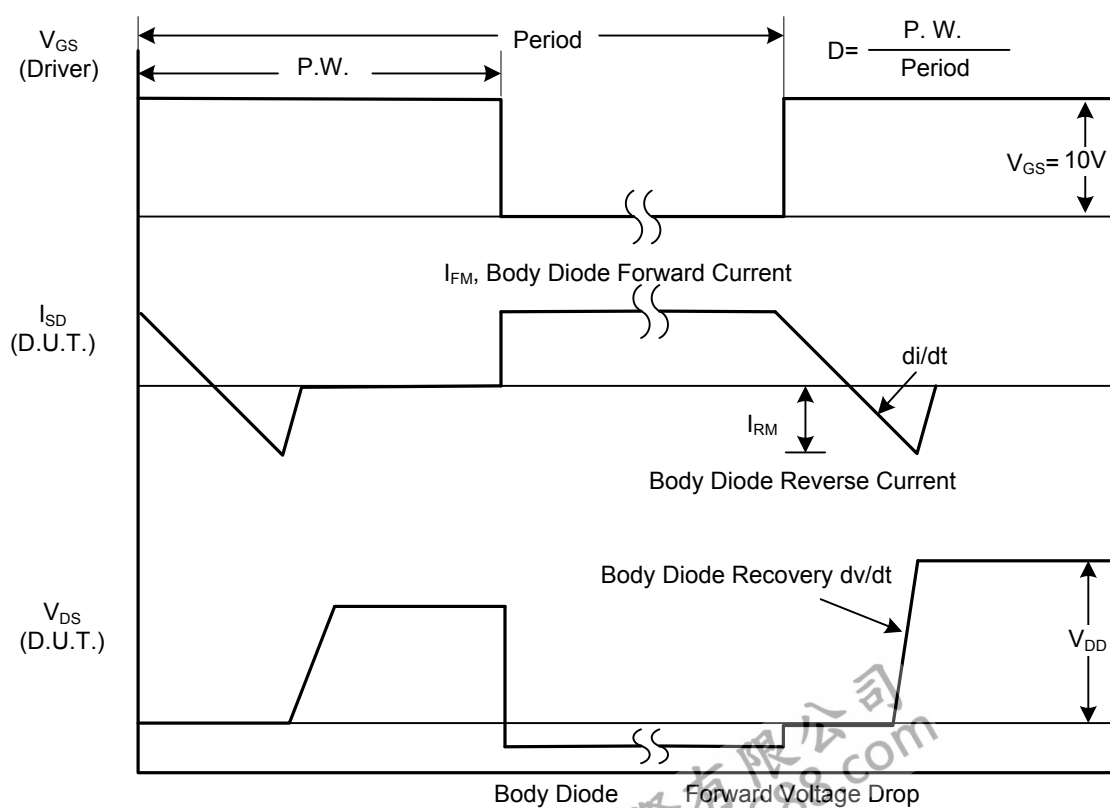
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

# ■ TEST CIRCUITS AND WAVEFORMS

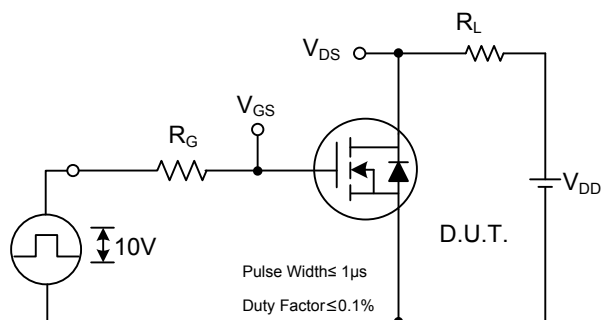


Peak Diode Recovery  $dv/dt$  Test Circuit

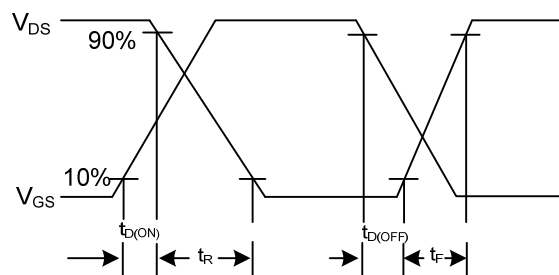


Peak Diode Recovery  $dv/dt$  Waveforms

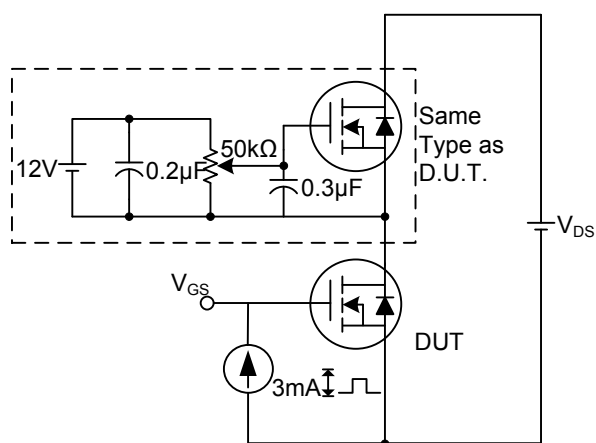
# ■ TEST CIRCUITS AND WAVEFORMS (Cont.)



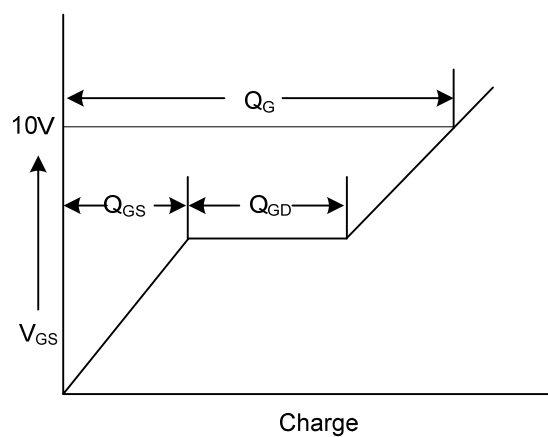
Switching Test Circuit



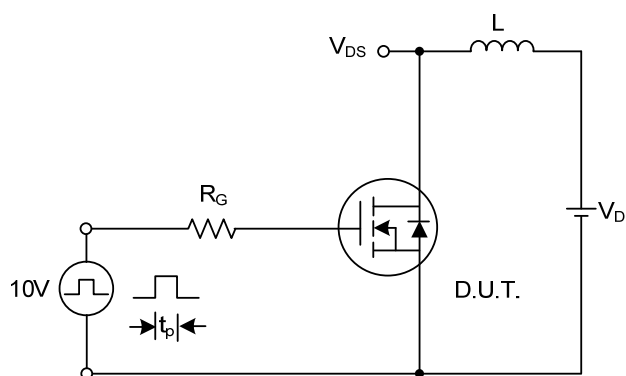
Switching Waveforms



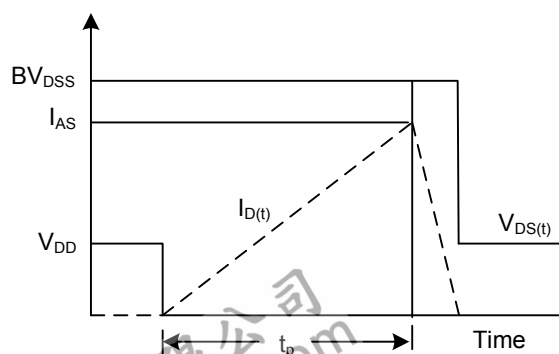
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.