UNISONIC TECHNOLOGIES CO., LTD

9NM65-FDS Power MOSFET

9A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

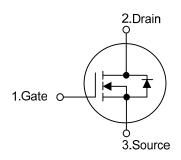
DESCRIPTION

The **UTC 9NM65-FDS** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at DC-DC, AC-DC converters for power applications.

■ FEATURES

- * $R_{DS(ON)}$ < 0.72 Ω @ V_{GS} = 10V, I_D = 4.5A
- * Fast Switching Capability
- * Avalanche Energy Tested
- * Improved dv/dt Capability, High Ruggedness

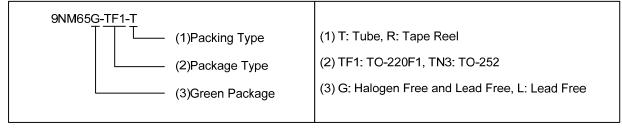
SYMBOL



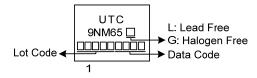
■ ORDERING INFORMATION

Ordering Number		Dookogo	Pin Assignment			Dooking	
Lead Free	Halogen Free	Package	1	2	3	Packing	
9NM65L-TF1-T	9NM65G-TF1-T	TO-220F1	G	D	S	Tube	
9NM65L-TN3-R	9NM65G-TN3-R	TO-252	G	D	S	Tape Reel	

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



■ MARKING



TO-252

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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		V_{DSS}	650	V	
Gate-Source Voltage		V_{GSS}	±30	V	
Drain Current	Continuous	I _D 9		Α	
Drain Current	Pulsed (Note 2)	I_{DM}	27	Α	
Avalanche Energy Single Pulsed (Note 3)		E _{AS}	324	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	12.7	V/ns	
Dower Dissipation	TO-220F1	ם	44	W	
Power Dissipation	TO-252	P_D	62	W	
Junction Temperature		T_J	+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 maximum junction temperature.
- 3. L=144mH, I_{AS} =2.12A, V_{DD} =50V, R_{G} =25 Ω , Starting T_{J} = 25°C
- 4. $I_{SD} \le 9.0A$, di/dt $\le 200A/\mu s$, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25^{\circ}C$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1	Q	62.5	°C/W
Junction to Ambient	TO-252	θ_{JA}	110	°C/W
lunation to Coop	TO-220F1	θ_{JC}	2.84	°C/W
Junction to Case	TO-252		2	°C/W

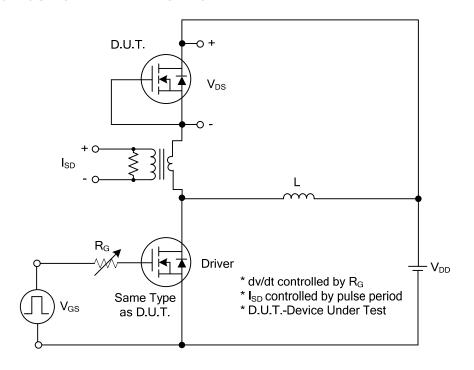
■ ELECTRICAL CHARACTERISTICS (T」=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	650			V	
Drain-Source Leakage Current	I _{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			1	μΑ	
Cata Source Lookage Current	Forward		$V_{GS} = 30V, V_{DS} = 0V$			100	nA
Gate- Source Leakage Current	Reverse	I _{GSS}	$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
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 Resi	R _{DS(ON)}	$V_{GS} = 10V, I_D = 4.5A$			0.72	Ω	
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}			555		pF
Output Capacitance		Coss	V _{GS} =0V, V _{DS} =25V, f=1.0 MHz		455		pF
Reverse Transfer Capacitance	C _{RSS}			40		pF	
SWITCHING CHARACTERISTICS	8						
Total Gate Charge (Note 1)		Q_{G}	\\ -400\\ \\ -10\\ -0.04		29		nC
Gate to Source Charge		Q_{GS}	V _{DS} =400V, V _{GS} =10V, I _D =9.0A,		11		nC
Gate to Drain Charge		Q_{GD}	I _G =10mA (Note 1, 2)		11		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DD} =325V, V _{GS} =10V, I _D =9.0A,		10		ns	
Rise Time				t _R	22		ns
Turn-OFF Delay Time		t _{D(OFF)}	$R_G = 25\Omega$ (Note 1, 2)		56		ns
Fall-Time	t _F			24		ns	
SOURCE- DRAIN DIODE RATING	S AND CHA	RACTERIS1	rics	-		-	-
Maximum Body-Diode Continuous	Is				9	Α	
Maximum Body-Diode Pulsed Curi	I _{SM}				27	Α	
Drain-Source Diode Forward Volta	V_{SD}	I _S =9.0A, V _{GS} =0V			1.4	V	
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =9.0A, V _{GS} =0V,		195		ns
Body Diode Reverse Recovery Ch	Q _{rr}	dI _F /dt=100A/μs		1.5		μC	

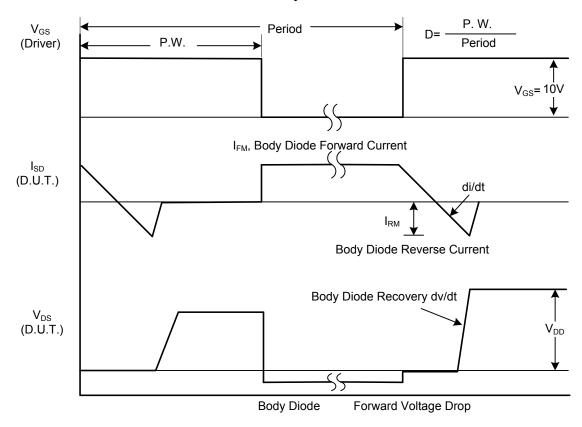
Notes: 1. Pulse Test: Pulse width ≤ 300µs, Duty cycle≤2%.

^{2.} Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

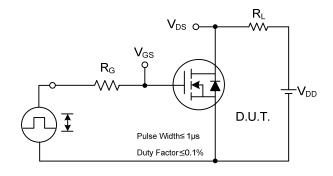


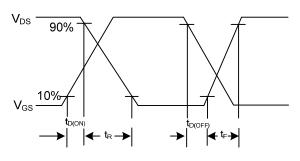
Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

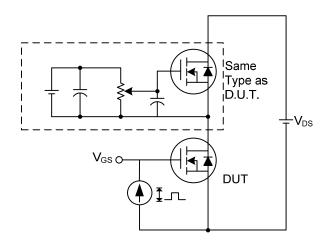
TEST CIRCUITS AND WAVEFORMS

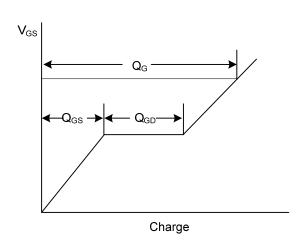




Switching Test Circuit

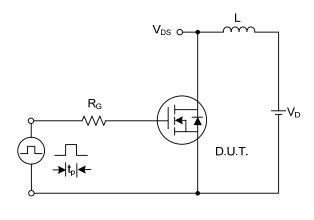
Switching Waveforms

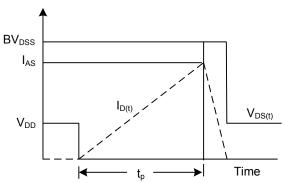




Gate Charge Test Circuit

Gate Charge Waveform

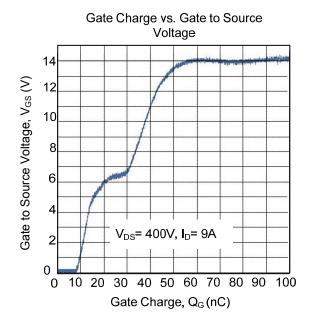


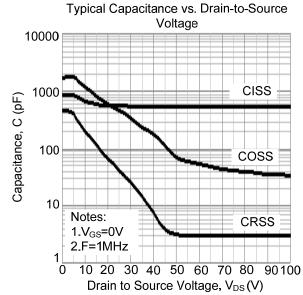


Unclamped Inductive Switching Test Circuit

Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS





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.