

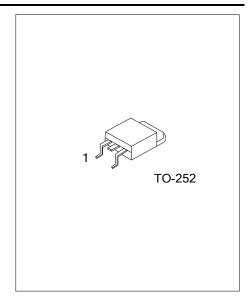
UNISONIC TECHNOLOGIES CO., LTD

05NL70 Preliminary Power MOSFET

0.5A, 700V N-CHANNEL POWER MOSFET

■ DESCRIPTION

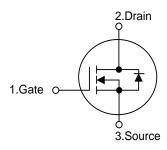
The **UTC 05NL70** is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.



■ FEATURES

- * $R_{DS(ON)} \le 8.5 \Omega @ V_{GS} = 10V, I_D = 0.25A$
- * Fast switching
- * 100% avalanche tested
- * Improved dv/dt capability

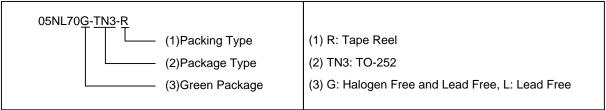
■ SYMBOL



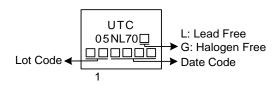
■ ORDERING INFORMATION

Ordering Number		Daalaasa	Pin Assignment			Da alda a	
Lead Free	Halogen Free	Package	1	2	3	Packing	
05NL70L-TN3-R	05NL70G-TN3-R	TO-252	G	D	S	Tape Reel	

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



MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		V_{DSS}	700	V	
Gate-Source Voltage		V_{GSS}	±30	V	
Duning Organisat	Continuous	I_{D}	0.5	Α	
Drain Current	Pulsed	I_{DM}	1	Α	
Avalanche Energy	valanche Energy Single Pulsed (Note 3)		1	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4	V/ns	
Power Dissipation		P_{D}	38	W	
Junction Temperature		TJ	+150	°C	
Storage Temperature Range		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=1.0mH, I_{AS} =1.4A, V_{DD} =50V, R_{G} =25 Ω , Starting T_{J} = 25 $^{\circ}$ C
- 4. $I_{SD} \le 5.0 \text{A}$, di/dt $\le 200 \text{A}/\mu \text{s}$, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25 ^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT	
Junction to Ambient	θ_{JA}	°C/W		
Junction to Case	$\theta_{ m Jc}$	3.28 (Note)	°C/W	

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

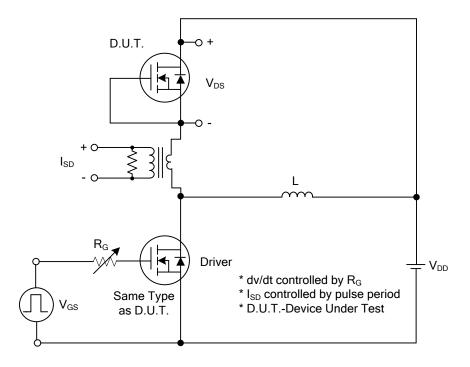
■ **ELECTRICAL CHARACTERISTICS** (T_C =25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS				•	•		
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	700			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =700V, V _{GS} =0V			10	μΑ
0-1- 0	Forward	I _{GSS}	V_{GS} =+30V, V_{DS} =0V			+100	nΑ
Gate-Source Leakage Current	Reverse		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	stance	R _{DS(ON)}	V _{GS} =10V, I _D =0.25A			8.5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}			90		pF
Output Capacitance		Coss	V_{GS} =0V, V_{DS} =25V, f=1.0MHz		45		pF
Reverse Transfer Capacitance		C _{RSS}			6.5		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V 560V V 10V I 0.5A		9		nC
Gate to Source Charge		Q_GS	V_{DS} =560V, V_{GS} =10V, I_{D} =0.5A, I_{G} =1mA (Note 1, 2)		4		nC
Gate to Drain Charge		Q_GD	IG= IIIIA (Note 1, 2)		1.5		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}			4		ns
Rise Time		t _R	V_{DD} =100V, V_{GS} =10V, I_{D} =0.5A,		16		ns
Turn-OFF Delay Time		t _{D(OFF)}	$R_G = 25\Omega$ (Note 1, 2)		15		ns
Fall-Time		tϝ			50		ns
SOURCE- DRAIN DIODE RATING	SS AND CHA	RACTERIST	ICS				
Maximum Continuous Drain-Source Diode		Is				0.5	Α
Forward Current						0.5	А
Maximum Pulsed Drain-Source Di	ode Forward	I _{SM}				1.0	Α
Current		ISM				1.0	^
Drain-Source Diode Forward Volta	ige (Note 1)	V_{SD}	I _S =0.5A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =0.5A,V _{GS} =0V,		130		ns
Reverse Recovery Charge		Q_{rr}	dl/dt=100A/µs		0.7		μC

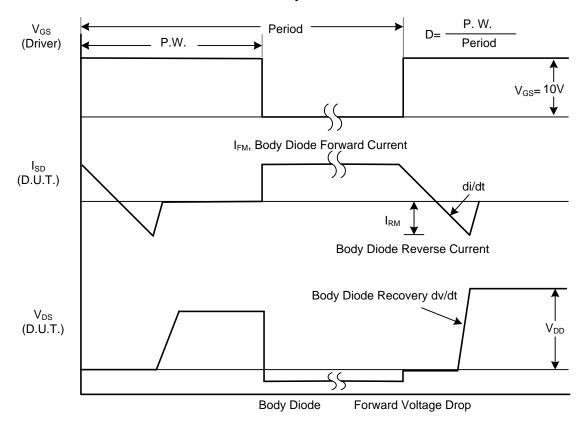
Notes: 1. Pulse Test: Pulse width ≤ 300µs, Duty cycle ≤2%.

^{2.} Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

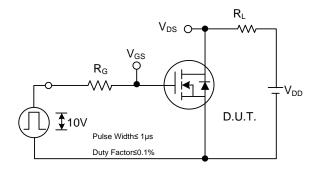


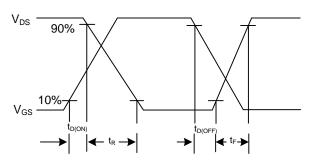
Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

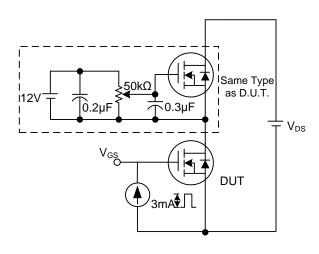
■ TEST CIRCUITS AND WAVEFORMS (Cont.)

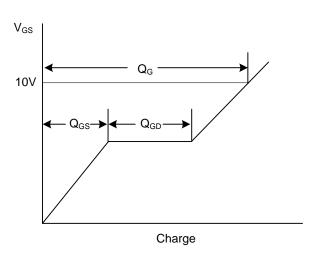




Switching Test Circuit

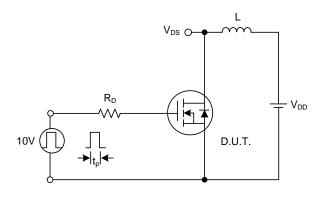
Switching Waveforms

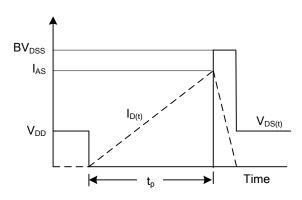




Gate Charge Test Circuit

Gate Charge Waveform





Unclamped Inductive Switching Test Circuit

Unclamped Inductive Switching Waveforms

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