

# UNISONIC TECHNOLOGIES CO., LTD

10N65-C **Preliminary Power MOSFET** 

# **10A, 650V N-CHANNEL POWER MOSFET**

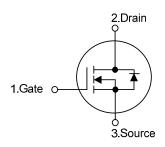
#### DESCRIPTION

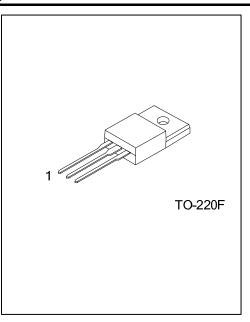
The UTC 10N65-C is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

## **FEATURES**

- \*  $R_{DS(ON)}$  < 0.86 $\Omega$ @ $V_{GS}$  =10V
- \* Fast switching
- \* 100% avalanche tested
- \* Improved dv/dt capability

#### **SYMBOL**

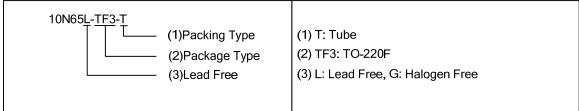




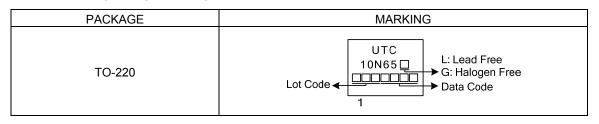
#### ORDERING INFORMATION

Ordering	Dooksons	Pin .	Assignr	Daakina			
Lead Free	Halogen Free	Package	1	2	3	Packing	
10N65L-TF3-T	10N65G-TF3-T	TO-220F	G	D	S	Tube	

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



# MARKING INFORMATION



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

PAR	AMETER	SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	650	V	
Gate-Source Voltage		$V_{GSS}$	± 30	V	
Avalanche Current (Note 2)		I <sub>AR</sub>	10	Α	
Dunin Oursent	Continuous	I <sub>D</sub>	10	Α	
Drain Current	Pulsed (Note 2)	$I_{DM}$	38	Α	
A	Single Pulsed (Note 3)	E <sub>AS</sub>	156	mJ	
Avalanche Energy	Repetitive (Note 2)	E <sub>AR</sub>	15.6	mJ	
Peak Diode Recovery	Diode Recovery dv/dt (Note 4)		4.5	V/ns	
Power Dissipation		$P_D$	156	W	
Junction Temperature		TJ	+150	°C	
Operating Temperature		T <sub>OPR</sub>	-55 ~ +150	°C	
Storage Temperature		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. L = 3.12mH,  $I_{AS}$  = 10A,  $V_{DD}$  = 50V,  $R_G$  = 25  $\Omega$  Starting  $T_J$  = 25°C
- 4.  $I_{SD} \le 9.5A$ , di/dt  $\le 200A/\mu s$ ,  $V_{DD} \le BV_{DSS}$ , Starting  $T_J = 25^{\circ}C$

## **■ THERMAL DATA**

PARAMETER	SYMBOL	RATING	UNIT	
Junction to Ambient	$\theta_{JA}$	62.5	°C/W	
Junction to Case	$\theta_{JC}$	2.5	°C/W	

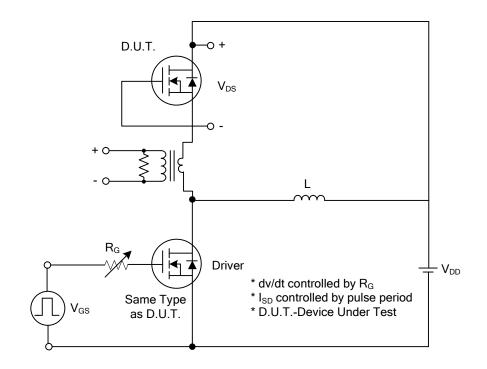
# ■ **ELECTRICAL CHARACTERISTICS**( T<sub>C</sub>=25°C, unless otherwise specified)

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	650			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V			1	μΑ
Cata Cauraa Laaka sa Currant	Forward	I <sub>GSS</sub>	$V_{GS}$ =30V, $V_{DS}$ =0V			100	nA
Gate-Source Leakage Current	Reverse		$V_{GS}$ =-30V, $V_{DS}$ =0V			-100	nA
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_{J}$	I <sub>D</sub> =250 μA, Referenced to 25°C		0.7		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =4.75A		0.60	0.80	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		$C_{ISS}$			1520	1750	pF
Output Capacitance		Coss	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0 MHz		160	210	pF
Reverse Transfer Capacitance		$C_{RSS}$			11	15	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$			95	120	ns
Turn-On Rise Time		$t_R$	$V_{DD}$ =30V, $I_{D}$ =0.5A, $R_{G}$ =25 $\Omega$		128	160	ns
Turn-Off Delay Time		$t_{D(OFF)}$	(Note1, 2)		228	260	ns
Turn-Off Fall Time		$t_{F}$			115	130	ns
Total Gate Charge		$Q_G$	\/ -E0\/   -1.3A \/ -10\/		40	60	nC
Gate-Source Charge Gate-Drain Charge		$Q_GS$	V <sub>DS</sub> =50V, I <sub>D</sub> =1.3A, V <sub>GS</sub> =10V (Note1, 2)		12		nC
		$Q_GD$	(Note 1, 2)		8.8		nC
DRAIN-SOURCE DIODE CHARAC	TERISTIC	S AND MAX	IMUM RATINGS				
Drain-Source Diode Forward Voltage		$V_{SD}$	V <sub>GS</sub> =0V, I <sub>S</sub> =10A			1.4	V
Maximum Continuous Drain-Source Diode		1-				10	Α
Forward Current		I <sub>S</sub>				10	^
Maximum Pulsed Drain-Source Diode		I <sub>SM</sub>				38	A
Forward Current						50	
Reverse Recovery Time		t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A,		420		ns
Reverse Recovery Charge		$Q_{RR}$	dl <sub>F</sub> /dt=100A/µs (Note1)		4.2		μC

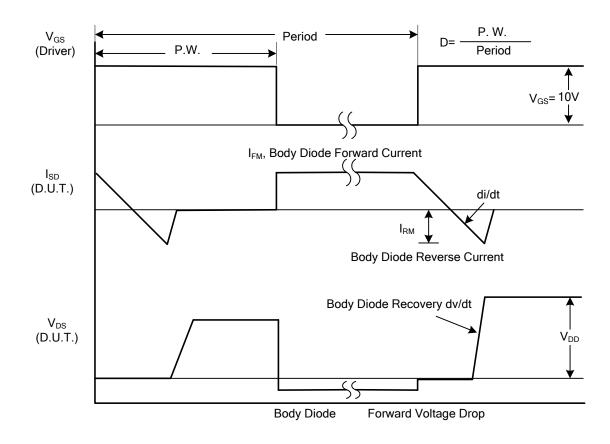
Notes: 1. Pulse Test : Pulse width ≤300µs, Duty cycle ≤2%

<sup>2.</sup> Essentially independent of operating temperature

## TEST CIRCUITS AND WAVEFORMS

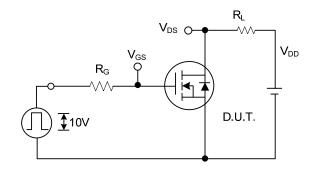


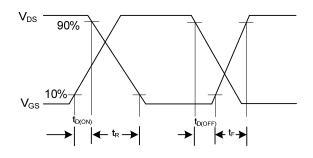
Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

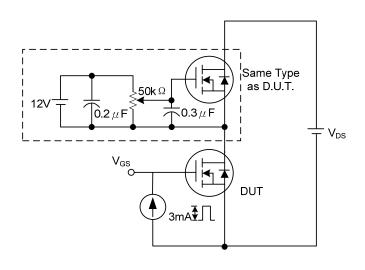
# ■ TEST CIRCUITS AND WAVEFORMS (Cont.)

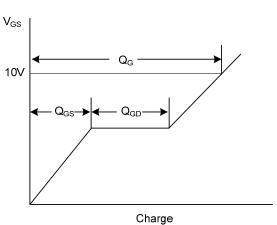




**Switching Test Circuit** 

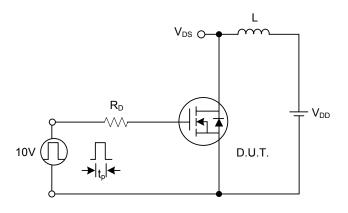
**Switching Waveforms** 

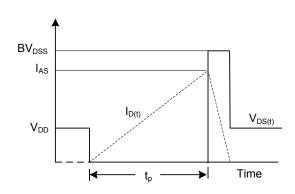




**Gate Charge Test Circuit** 

**Gate Charge Waveform** 





**Unclamped Inductive Switching Test Circuit** 

**Unclamped Inductive Switching Waveforms** 

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