6N60-FTC Power MOSFET

# 6A, 600V N-CHANNEL POWER MOSFET

#### **■** DESCRIPTION

The UTC **6N60-FTC** is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in switching power supplies and adaptors.

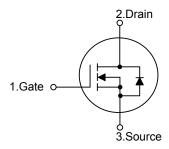
# 1

TO-252

#### **■ FEATURES**

- \*  $R_{DS(ON)} \le 1.8\Omega$  @  $V_{GS} = 10V$ ,  $I_D = 3.0A$
- \* High Switching Speed

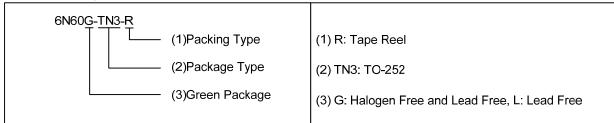
#### ■ SYMBOL



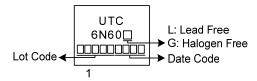
#### ■ ORDERING INFORMATION

Ordering Number		Dookogo	Pin Assignment			Dooking	
Lead Free	Halogen Free	Package	1	2	3	Packing	
6N60L-TN3-R	6N60G-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 7

6N60-FTC Power MOSFET

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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	600	V	
Gate-Source Voltage		$V_{GSS}$	±30	V	
Drain Current	Continuous	$I_{D}$	6	Α	
Drain Current	Pulsed (Note 2)	$I_{DM}$	12	Α	
Avalanche Energy	valanche Energy Single Pulsed (Note 3)		120	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.3	V/ns	
Power Dissipation		$P_{D}$	55	W	
Junction Temperature		$T_J$	+150	°C	
Storage Temperature		$T_{STG}$	-55 ~ <b>+</b> 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 = 10mH,  $I_{AS}$  = 4.9A,  $V_{DD}$  = 50V,  $R_{G}$  = 25 $\Omega$  Starting  $T_{J}$  = 25 $^{\circ}$ C
- 4.  $I_{SD} \le 6.0$ A, di/dt  $\le 200$ A/ $\mu$ s,  $V_{DD} \le BV_{DSS}$ , Starting  $T_J = 25$ °C

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT	
Junction to Ambient	$\theta_{JA}$	62.5	°C/W	
Junction to Case	$\theta_{JC}$	2.27	°C/W	

Note: The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

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

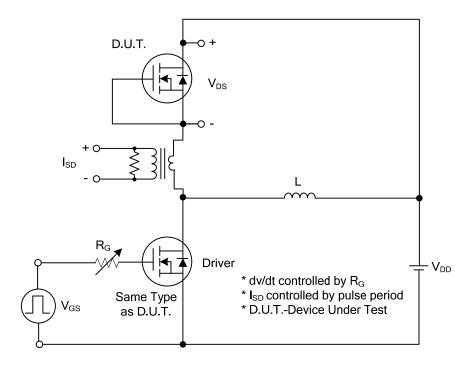
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS	Į.			ı		
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> = 250μA	600			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V			10	μΑ
Coto Source Leekage Current Forward	- I <sub>GSS</sub>	$V_{GS}$ =30V, $V_{DS}$ =0V			100	nΑ
Gate-Source Leakage Current Reverse		$V_{GS}$ =-30V, $V_{DS}$ =0V			-100	nΑ
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> =3.0A			1.8	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	apacitance C <sub>ISS</sub>			682		pF
Output Capacitance	Coss	$V_{GS}$ =0V, $V_{DS}$ =25V, f=1.0 MHz		80		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			5.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	$Q_G$	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =6.0A		20		nC
Gateource Charge	$Q_{GS}$	$I_{G}$ =1mA (Note 1, 2)		7.2		nC
Gate-Drain Charge	$Q_GD$	IG-IIIA (Note 1, 2)		4		nC
Turn-on Delay Time (Note 1)	t <sub>D(ON)</sub>			8		ns
Rise Time	t <sub>R</sub>	$V_{DS}$ =100V, $V_{GS}$ =10V, $I_{D}$ =6.0A,		16.8		ns
Turn-off Delay Time	t <sub>D(OFF)</sub>	R <sub>G</sub> =25Ω (Note 1, 2)		52		ns
Fall-Time	t <sub>F</sub>			27.5		ns
SOURCE- DRAIN DIODE RATINGS AND CH	ARACTERIS	TICS				
Maximum Continuous Drain-Source Diode	Is				6	Α
Forward Current					0	^
Maximum Pulsed Drain-Source Diode	I <sub>SM</sub>				12	Α
Forward Current	ISM				12	
Drain-Source Diode Forward Voltage (Note 1)	$V_{SD}$	V <sub>GS</sub> =0V, I <sub>S</sub> =6.0A			1.4	V
Reverse Recovery Time (Note 1)	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =6.0A,		137		ns
Reverse Recovery Charge	$Q_{rr}$	dI <sub>F</sub> /dt=100A/μs (Note1)		0.5		μC

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

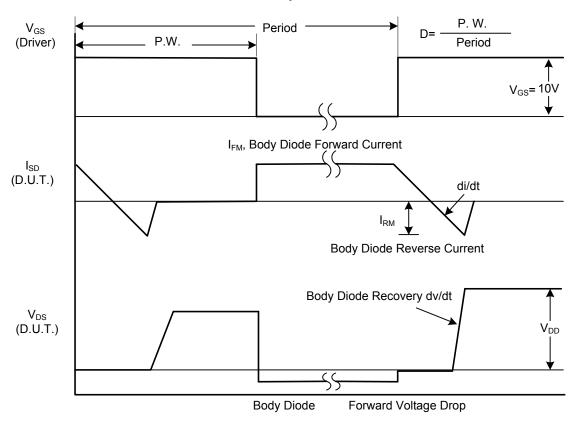
2. Essentially independent of operating temperature.



#### **■ TEST CIRCUITS AND WAVEFORMS**



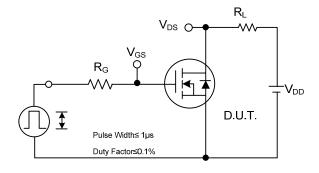
### Peak Diode Recovery dv/dt Test Circuit

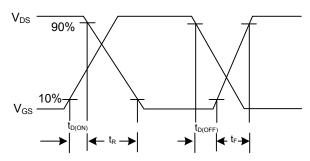


Peak Diode Recovery dv/dt Waveforms

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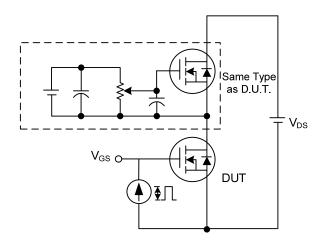
#### ■ TEST CIRCUITS AND WAVEFORMS

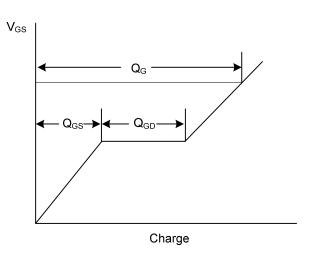




**Switching Test Circuit** 

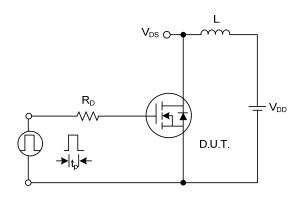
**Switching Waveforms** 

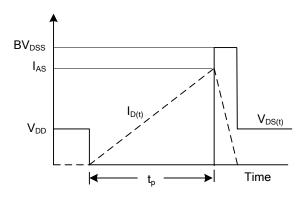




**Gate Charge Test Circuit** 

**Gate Charge Waveform** 

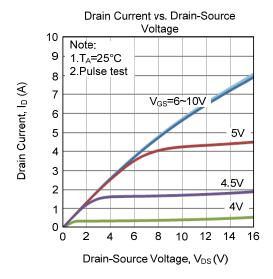


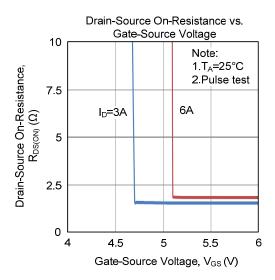


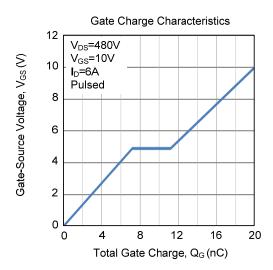
**Unclamped Inductive Switching Test Circuit** 

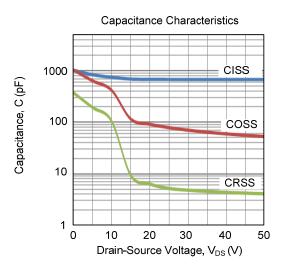
**Unclamped Inductive Switching Waveforms** 

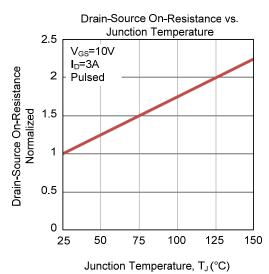
#### **■ TYPICAL CHARACTERISTICS**

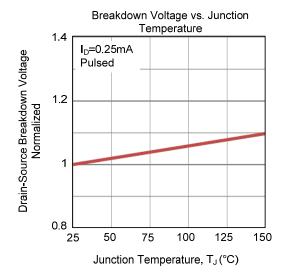




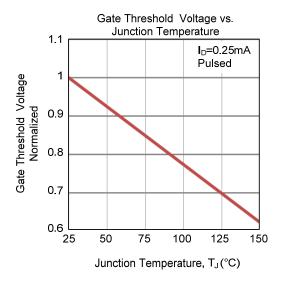


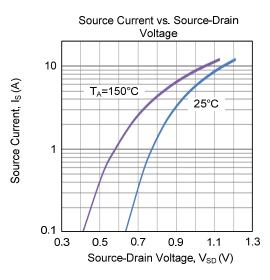


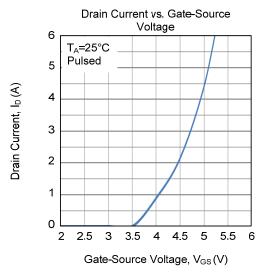


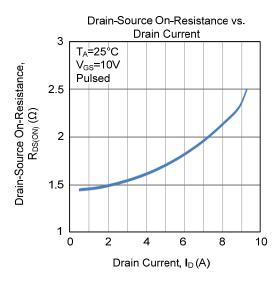


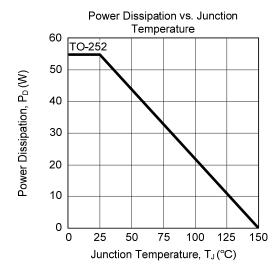
## **■ TYPICAL CHARACTERISTICS (Cont.)**

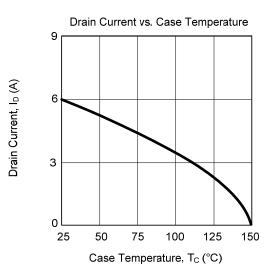




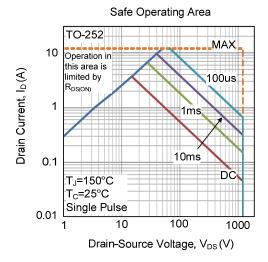








# **■ TYPICAL CHARACTERISTICS (Cont.)**



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