

# 5N60

Power MOSFET

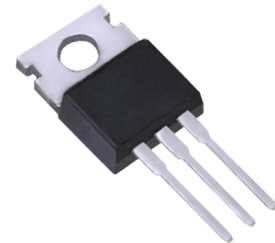
## 5A, 600V N-CHANNEL POWER MOSFET

### DESCRIPTION

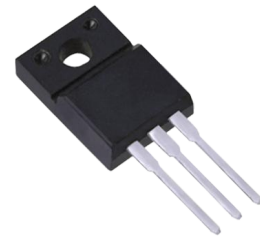
The UTC **5N60** is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

### FEATURES

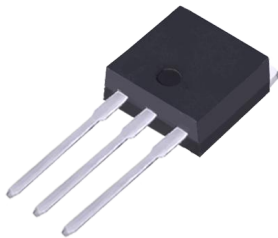
- \*  $R_{DS(ON)} < 2.2\Omega$  @  $V_{GS} = 10V, I_D = 2.5A$
- \* Ultra Low Gate Charge ( Typical 15 nC )
- \* Low Reverse Transfer Capacitance (  $C_{RSS} =$  Typical 6.5 pF )
- \* Fast Switching Capability
- \* Avalanche Energy Specified
- \* Improved dv/dt Capability High Ruggedness



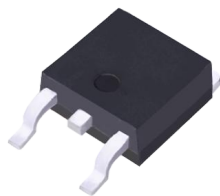
TO-220



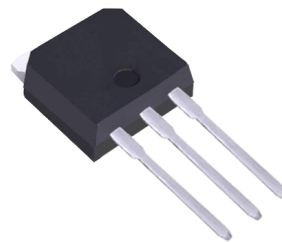
TO-220F



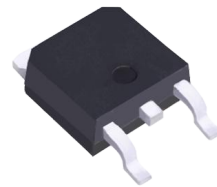
TO-262



TO-263



TO-251



TO-252

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	600	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Avalanche Current (Note 2)		$I_{AR}$	5	A
Continuous Drain Current		$I_D$	5	A
Pulsed Drain Current (Note 2)		$I_{DM}$	20	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	210	mJ
	Repetitive (Note 2)	$E_{AR}$	10	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	$P_D$	100	W
	TO-220F/TO-220F1		36	
	TO-220F3		38	
	TO-220F2		54	
	TO-251 / TO-252		28	
DFN5060-8				
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Operation Temperature		$T_{OPR}$	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Note: 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. Pulse width limited by  $T_{J(MAX)}$

3.  $L = 16.8\text{mH}$ ,  $I_{AS} = 5\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\ \Omega$ , 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	TO-220/TO-220F	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/ TO-220F2			
	TO-220F3			
	TO-251 / TO-252			
DFN5060-8			75	
Junction to Case	TO-220	$\theta_{JC}$	1.25	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		3.47	
	TO-220F3		3.28	
	TO-220F2		2.3	
	TO-251 / TO-252		4.46	
DFN5060-8				

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	600			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 600V, V_{GS} = 0V$			1	$\mu A$
Gate-Source Leakage Current	Forward	$I_{GSS}$			100	nA
	Reverse				-100	
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\mu A$ , Referenced to $25^\circ\text{C}$		0.6		$V/^\circ\text{C}$
<b>ON CHARACTERISTICS</b>						
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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 2.5A$		1.8	2.2	$\Omega$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$		515	670	pF
Output Capacitance	$C_{OSS}$			55	72	pF
Reverse Transfer Capacitance	$C_{RSS}$			6.5	8.5	pF
<b>SWITCHING CHARACTERISTICS</b>						
Total Gate Charge	$Q_G$	$V_{DS} = 480V, I_D = 5A,$ $V_{GS} = 10V$ (Note 1, 2)		15	19	nC
Gate-Source Charge	$Q_{GS}$			2.5		nC
Gate-Drain Charge	$Q_{GD}$			6.6		nC
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 300V, I_D = 5A,$ $R_G = 25\Omega$ (Note 1, 2)		10	30	ns
Turn-On Rise Time	$t_R$			42	90	ns
Turn-Off Delay Time	$t_{D(OFF)}$			38	85	ns
Turn-Off Fall Time	$t_F$			46	100	ns
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				5	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				20	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 5A$			1.4	V
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_S = 5A,$ $dI_F/dt = 100A/\mu s$ (Note 1)		300		ns
Reverse Recovery Charge	$Q_{rr}$			2.2		$\mu C$

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

2. Essentially independent of operating temperature

## ■ TYPICAL CHARACTERISTICS

