

Power MOSFET

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

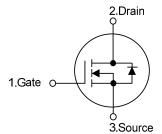
DESCRIPTION

The UTC 5N60-HC is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications of switching power supplies and adaptors.

FEATURES

- * $R_{DS(ON)}$ < 1.9 Ω @ V_{GS} = 10 V, I_D = 2.5 A
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

-**SYMBOL**

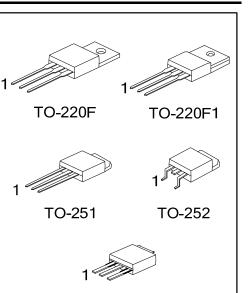


ORDERING INFORMATION

	Ordering Number		Deekege	Pin Assignment			Deaking	
	Lead Free	Halogen Free	Package	1	2	3	Packing	
	5N60L-TF1-T	5N60G-TF1-T	TO-220F1	G	D	S	Tube	
	5N60L-TF3-T	5N60G-TF3-T	TO-220F	G	D	S	Tube	
	5N60L-TM3-T	5N60G-TM3-T	TO-251	G	D	S	Tube	
	5N60L-TN3-R	5N60G-TN3-R	TO-252	G	D	S	Tape Reel	
	5N60L-TMN2-T	5N60G-TMN2-T	TO-251NS2	G	D	S	Tube	
Noto: Din Assignment: C: Coto D: Drain S: Source								

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

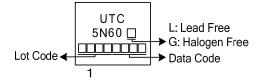
5N60G-TF1-T (1)Packing Type (2)Package Type (3)Green Package	 (1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TF3: TO-220F, TM3: TO-251 TN3: TO-252, TMS2: TO-251NS2 (3) G: Halogen Free and Lead Free, L: Lead Free 				
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TO-251NS2

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MARKING





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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage	ge		600	V	
Gate-Source Voltage		V _{GSS}	±30	V	
Continuous Drain Current		I _D	5	А	
Pulsed Drain Current (Note 2)		I _{DM}	20	А	
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	85	mJ	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.2	V/ns	
	TO-220F/TO-220F1		36	W	
Power Dissipation	TO-251/TO-252 TO-251NS2	P _D	54	W	
Junction Temperature		TJ	+150	°C	
Storage Temperature	·		-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 = 16.8mH, I_{AS} = 3.18A, V_{DD} = 50V, R_G = 25 Ω , Starting T_J = 25°C

4. $I_{SD} \le 5.0A$, di/dt $\le 200A/\mu s$, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25^{\circ}C$

THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT	
	TO-220F/TO-220F1		62.5	°C/W	
Junction to Ambient	TO-251/TO-252 TO-251NS2	θ_{JA}	110	°C/W	
	TO-220F/TO-220F1	-252 θ _{JC}	3.47	°C/W	
Junction to Case	TO-251/TO-252 TO-251NS2		2.3	°C/W	



PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS	OTWIDOL					
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250µA	600			V
Drain-Source Leakage Current	I _{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			10	μA
Forward		$V_{GS} = 30V, V_{DS} = 0V$			100	nA
Gate- Source Leakage Current Reverse	GSS	$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
ON CHARACTERISTICS	•					
Gate Threshold Voltage	V _{GS(TH)}	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	$V_{GS} = 10V, I_D = 2.5A$			1.9	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	CISS			600		pF
Output Capacitance	C _{OSS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz		127		pF
Reverse Transfer Capacitance	C _{RSS}]		13		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G			18.2		nC
Gate-Source Charge	Q _{GS}	V_{DS} =100V, V_{GS} =10V, I_{D} =5.0A,		6		nC
Gate-Drain Charge	Q_{GD}	I _D =100μΑ (Note 1, 2)		5.6		nC
Turn-On Delay Time (Note 1)	t _{D(ON)}			11		ns
Turn-On Rise Time	t _R	V _{DD} =100V, V _{GS} =10V, I _D =5.0A,		10		ns
Turn-Off Delay Time	t _{D(OFF)}	R _G =25Ω (Note 1, 2)		55		ns
Turn-Off Fall Time	t _F			22		ns
DRAIN-SOURCE DIODE CHARACTERIS	TICS AND MA	XIMUM RATINGS				
Maximum Continuous Drain-Source Diode	L.				5	А
Forward Current	I _S				5	A
Maximum Pulsed Drain-Source Diode	I _{SM}				20	А
Forward Current	'SM				20	
Drain-Source Diode Forward Voltage	V _{SD}	I _S =5.0A , V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =5.0A , V _{GS} =0V di/dt=100A/µs		300		ns
Body Diode Reverse Recovery Charge	Qrr	15 0.017, VG5-0V dirdt-100A/µ3		1.77		μC

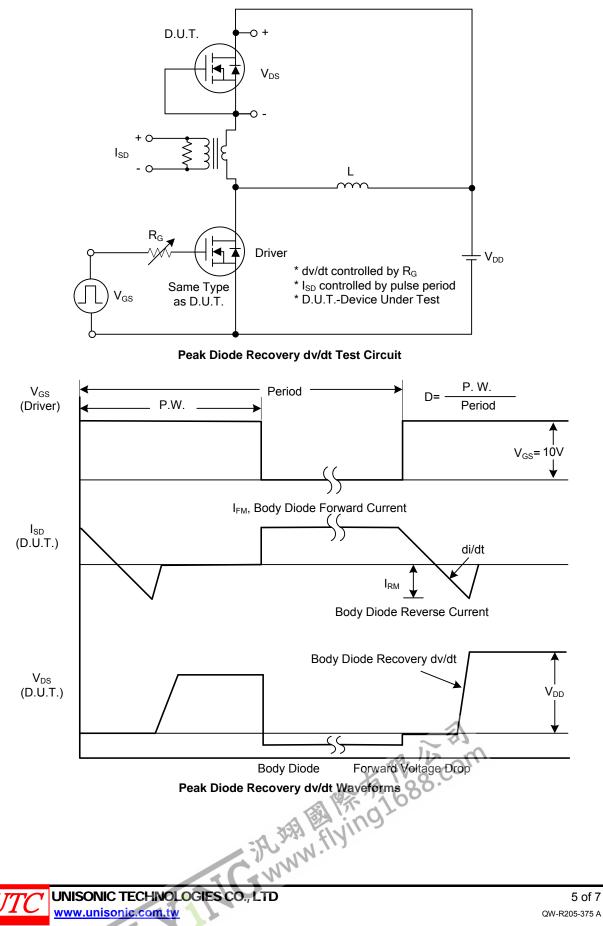
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

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

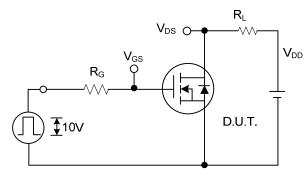
2. Essentially independent of operating temperature.



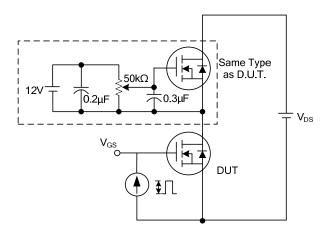
■ TEST CIRCUITS AND WAVEFORMS



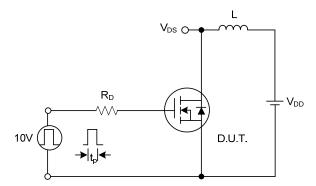
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



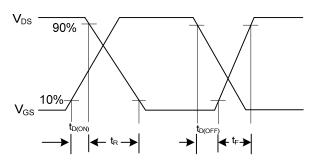


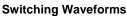


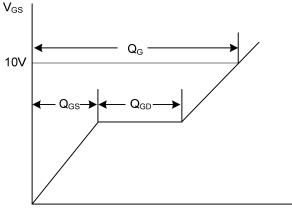
Gate Charge Test Circuit



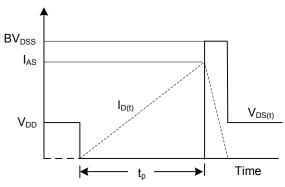
Unclamped Inductive Switching Test Circuit







Charge Gate Charge Waveform



Unclamped Inductive Switching Waveforms



Ciss

Capacitance Characteristics

Crss

10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Drain to Source Voltage, V_{DS} (V)

800

750

700

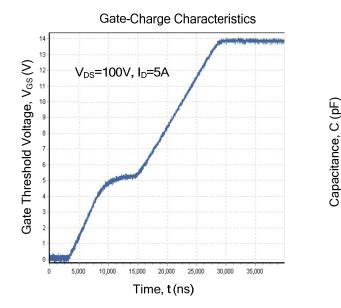
650

600

5

5N60-HC

TYPICAL CHARACTERISTICS



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