



## UTT60P03

Preliminary

Power MOSFET

### -60A, -30V, P-CHANNEL POWER MOSFETS

#### DESCRIPTION

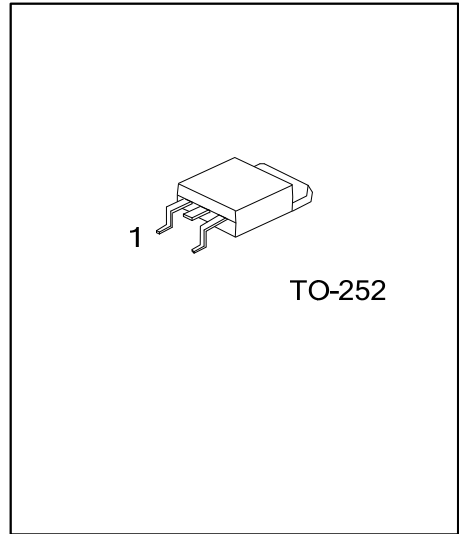
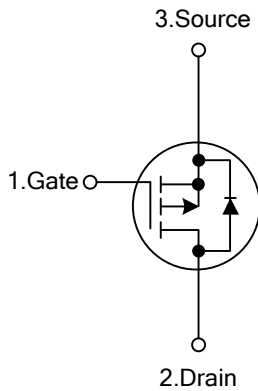
The UTC **UTT60P03** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance and it can also withstand high energy in the avalanche.

This UTC **UTT60P03** is suitable for switching converters, motor drivers, switching regulators and relay drivers.

#### FEATURES

- \*  $V_{DS} = -60V$
- \*  $I_D = -30A$
- \*  $R_{DS(ON)} = 0.027\Omega @ V_{GS} = -10V, I_D = -60A$
- \* High Switching Speed

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT60P03L-TN3-R	UTT60P03G-TN3-R	TO-252	G	D	S	Tape Reel

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

UTT60P03L-TN3-R (1) Packing Type (2) Package Type (3) Lead Free	(1) R: Tape Reel (2) TN3: TO-252 (3) G: Halogen Free, L: Lead Free
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■ ABSOLUTE MAXIMUM RATINGS ( $T_c=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage (Note 2)		$V_{DSS}$	-30	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	-60	A
	Pulsed (Note 2)	$I_{DM}$	240	A
Power Dissipation		$P_D$	45	W
Derate Above $25^\circ\text{C}$			0.36	W/ $^\circ\text{C}$
Junction Temperature		$T_J$	+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. Repetitive rating: Pulse width limited by maximum junction temperature

■ THERMAL CHARACTERISTICS

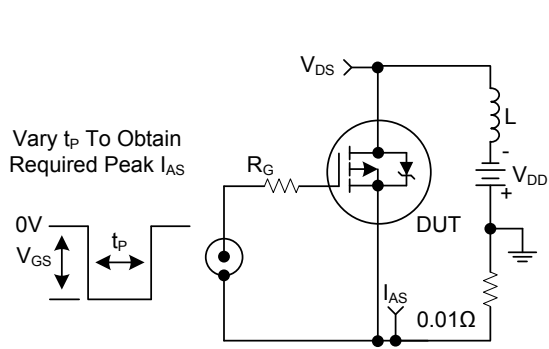
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	110	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	2.73	$^\circ\text{C}/\text{W}$

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

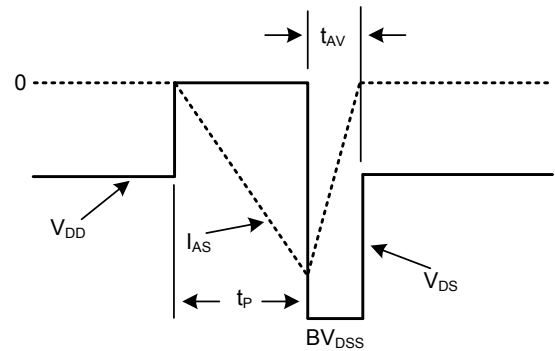
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-30			V	
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =Rated BV <sub>DSS</sub> , V <sub>GS</sub> =0V			-1	μA	
		V <sub>DS</sub> =0.8×Rated BV <sub>DSS</sub> , T <sub>C</sub> =150°C			-50		
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>				nA	
	Reverse						V <sub>GS</sub> =+20V
						-100	
		V <sub>GS</sub> =-20V				nA	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-2		-4	V	
Static Drain-Source On-State Resistance (Note)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-60A			0.027	Ω	
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-25V, f=1.0MHz		3000		pF	
Output Capacitance	C <sub>OSS</sub>			1500		pF	
Reverse Transfer Capacitance	C <sub>RSS</sub>			525		pF	
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> =0 ~ -20V	V <sub>DD</sub> =-24V, I <sub>D</sub> ≈-60A, R <sub>L</sub> =0.4Ω, I <sub>G(REF)</sub> =-3mA		190	230	nC
Gate Charge at 10V	Q <sub>G(10)</sub>	V <sub>GS</sub> =0 ~ -10V			100	120	nC
Threshold Gate Charge	Q <sub>G(TH)</sub>	V <sub>GS</sub> =0 ~ -2V			7.5	9	nC
Turn-On Time	t <sub>ON</sub>	V <sub>DD</sub> =15V, V <sub>GS</sub> =-10V, I <sub>D</sub> ≈60A, R <sub>L</sub> =0.25Ω, R <sub>G</sub> =2.5Ω			140	ns	
Turn-ON Delay Time	t <sub>D(ON)</sub>				20	ns	
Rise Time	t <sub>R</sub>				75	ns	
Turn-OFF Delay Time	t <sub>D(OFF)</sub>				35	ns	
Fall-Time	t <sub>F</sub>				40	ns	
Turn-Off Time	t <sub>OFF</sub>					115	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Drain-Source Diode Forward Voltage (Note )	V <sub>SD</sub>	I <sub>SD</sub> =-60A			-1.75	V	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	I <sub>SD</sub> =-60A, I <sub>SD</sub> /dt=100A/μs			200	ns	

Note: Pulse test: pulse width ≤ 300μs, duty cycle ≤ 2%.

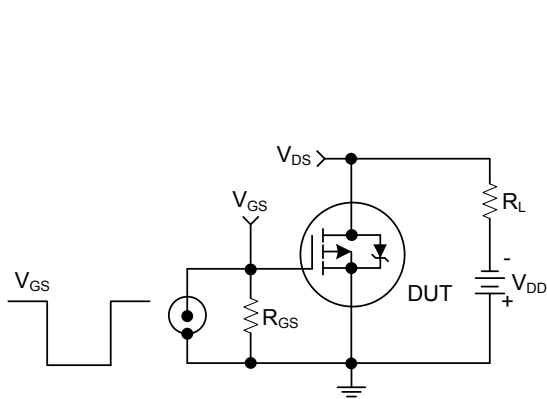
■ TEST CIRCUITS AND WAVEFORMS



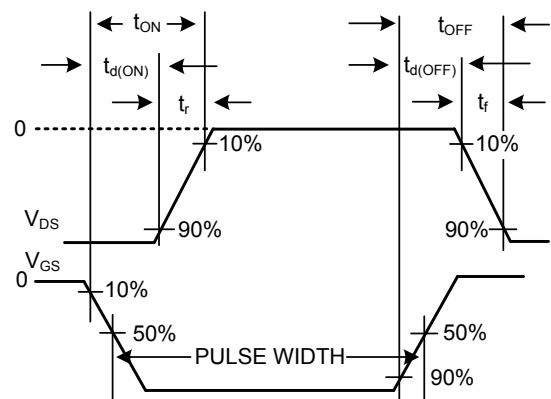
Unclamped Energy Test Circuit



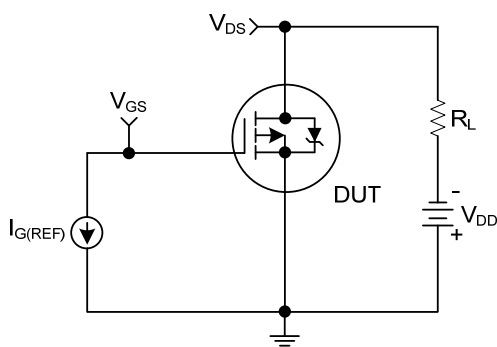
Unclamped Energy Waveform



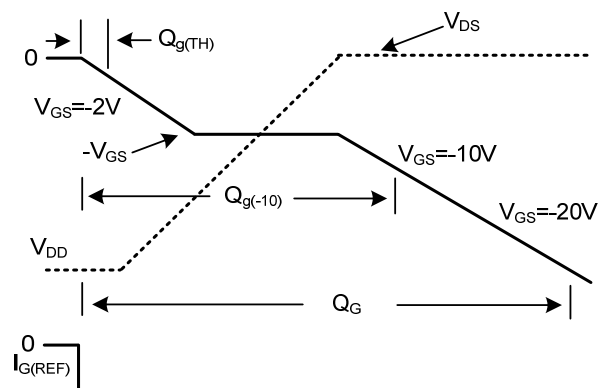
Switching Time Test Circuit



Resistive Switching Waveforms



Gate Charge Test Circuit



Gate Charge Waveforms

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