



## UTT50P04

Preliminary

Power MOSFET

### -40V, -60A P-CHANNEL POWER MOSFET

#### DESCRIPTION

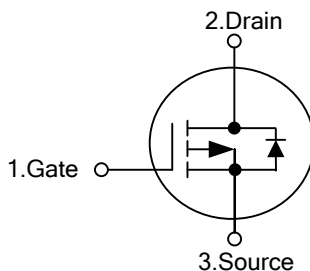
The UTC **UTT50P04** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance, and it can also withstand high energy in the avalanche.

This UTC **UTT50P04** is suitable for motor drivers, high-side switch and 12V board net, etc.

#### FEATURES

- \*  $V_{DS} = -40V$ ,
- \*  $I_D = -60A$
- \*  $R_{DS(ON)} = 0.0105\Omega @ V_{GS} = -10V, I_D = -30A$
- \* High Switching Speed

#### SYMBOL

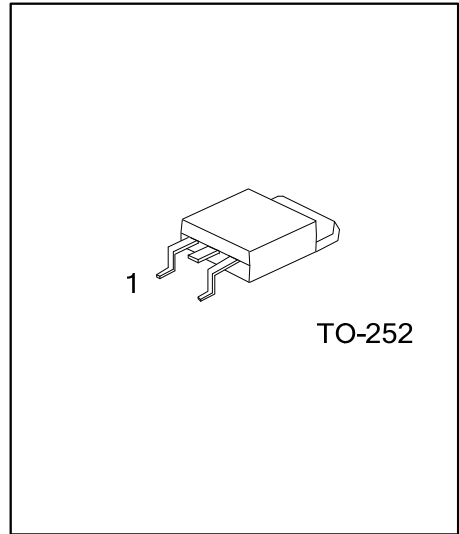


#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT50P04L-TN3-R	UTT50P04G-TN3-R	TO-252	G	D	S	Tape Reel

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

UTT50P04L-TN3-R		(1) Packing Type	(1) R: Tape Reel
		(2) Package Type	(2) TN3: TO-252
		(3) Lead Free	(3) G: Halogen Free, L: Lead Free



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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V <sub>DSS</sub>	-40	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Drain Current	Continuous (Note 2)	T <sub>C</sub> =25°C	I <sub>D</sub>	-60 (Note 3)	A
		T <sub>C</sub> =100°C		-43	A
	Pulsed		I <sub>DM</sub>	-100	A
Continuous Source Current (Diode Conduction)			I <sub>S</sub>	-60 (Note 3)	A
Avalanche Current			I <sub>AR</sub>	-40	A
Avalanche Energy			E <sub>AS</sub>	80	mJ
Power Dissipation (Note 2)		T <sub>C</sub> =25°C	P <sub>D</sub>	93.7 (Note 2)	W
		T <sub>A</sub> =25°C		3 (Note 1)	W
Junction Temperature			T <sub>J</sub>	-55~175	°C
Storage Temperature			T <sub>STG</sub>	-55~175	°C

Note: 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.

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient (Note 1)	$t \leq 10 \text{ sec.}$	$\theta_{JA}$	18	$^\circ\text{C/W}$
	Steady State		50	
Junction to Case		$\theta_{JC}$	1.6	

Notes: 1. Surface Mounted on 1"x1" FR4 Board.  
2. See SOA curve for voltage derating.  
3. Calculated based on maximum allowable Junction Temperature. Package limitation current is 50A.

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

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-40			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V			-1	μA
			V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			-50	
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V			+100	nA
	Reverse		V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note 1)		R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A		0.0105	0.013	Ω
			V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A, T <sub>J</sub> =125°C			0.020	
			V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A		0.017	0.022	
Forward Transconductance (Note 1)		g <sub>FS</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-30A	15			S
On State Drain Current (Note 1)		I <sub>D(ON)</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-50			A
DYNAMIC PARAMETERS (Note 2)							
Input Capacitance		C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-25V, f=1MHz		3120		pF
Output Capacitance		C <sub>OSS</sub>			440		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			320		pF
Gate Resistance		R <sub>G</sub>	f=1.0MHz		4.3		Ω
SWITCHING PARAMETERS (Note 2)							
Total Gate Charge (Note 3)		Q <sub>G</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-20V, I <sub>D</sub> =-50A		63	95	nC
Gate to Source Charge (Note 3)		Q <sub>GS</sub>			13		nC
Gate to Drain Charge (Note 3)		Q <sub>GD</sub>			16		nC
Turn-ON Delay Time (Note 3)		t <sub>D(ON)</sub>	V <sub>DD</sub> =-20V, V <sub>GEN</sub> =-10V, I <sub>D</sub> ≈-50A, R <sub>L</sub> =0.4 Ω, R <sub>g</sub> =2.5Ω		15	25	ns
Rise Time (Note 3)		t <sub>R</sub>			18	30	ns
Turn-OFF Delay Time (Note 3)		t <sub>D(OFF)</sub>			60	90	ns
Fall-Time (Note 3)		t <sub>F</sub>			47	70	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (T <sub>C</sub> =25°C)							
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>				-100	A
Drain-Source Diode Forward Voltage (Note 1)		V <sub>SD</sub>	I <sub>F</sub> =-50A, V <sub>GS</sub> =0V		-1.0	-1.5	V
Body Diode Reverse Recovery Time		t <sub>RR</sub>	I <sub>F</sub> =-50A, di/dt=100A/μs		36	55	ns

- Notes: 1. Pulse test; pulse width $\leq 300\mu\text{s}$ , duty cycle $\leq 2\%$ .  
 2. Guaranteed by design, not subject to production testing.  
 3. Independent of operating temperature.

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