

**UTT40P04**

Preliminary

**Power MOSFET****40V, 50A P-CHANNEL  
POWER MOSFET**

## ■ DESCRIPTION

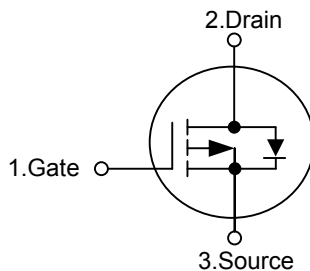
The UTC **UTT40P04** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance. It can also withstand high energy in the avalanche.

This UTC **UTT40P04** is suitable for Inverter or Power supplies.

## ■ FEATURES

\*  $R_{DS(ON)} < 12.3m\Omega$  @  $V_{GS} = -10V$ ,  $I_D = -12.7A$ ,  
 $R_{DS(ON)} < 18m\Omega$  @  $V_{GS} = -4.5V$ ,  $I_D = -10.4A$

## ■ SYMBOL

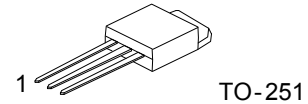


## ■ ORDERING INFORMATION

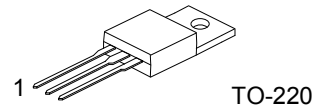
| Ordering Number |                 | Package | Pin Assignment |   |   | Packing |
|-----------------|-----------------|---------|----------------|---|---|---------|
| Lead Free       | Halogen Free    |         | 1              | 2 | 3 |         |
| UTT40P04L-TA3-T | UTT40P04G-TA3-T | TO-220  | G              | D | S | Tube    |
| UTT40P04L-TM3-T | UTT40P04G-TM3-T | TO-251  | G              | D | S | Tube    |

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

|                 |                                                    |                                                                                  |
|-----------------|----------------------------------------------------|----------------------------------------------------------------------------------|
| UTT40P04L-TA3-T | (1)Packing Type<br>(2)Package Type<br>(3)Lead Free | (1) T: Tube<br>(2) TA3: TO-220, TM3: TO-251<br>(3) G: Halogen Free, L: Lead Free |
|-----------------|----------------------------------------------------|----------------------------------------------------------------------------------|



TO-251



TO-220

■ ABSOLUTE MAXIMUM RATINGS ( $T_C=25^{\circ}\text{C}$ , 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           | Package limited | I <sub>D</sub>   | -50      | A    |
|                                         |                      | Silicon limited |                  | -58      | A    |
|                                         | Pulsed               |                 | I <sub>DM</sub>  | -100     | A    |
| Single Pulsed Avalanche Energy (Note 2) |                      |                 | E <sub>AS</sub>  | 337      | mJ   |
| Power Dissipation                       | T <sub>C</sub> =25°C | TO-220          | P <sub>D</sub>   | 125      | W    |
|                                         |                      | TO-251          |                  | 55       |      |
|                                         | T <sub>A</sub> =25°C | TO-220          |                  | 2        |      |
|                                         |                      | TO-251          |                  | 1.1      |      |
| Junction Temperature                    |                      |                 | T <sub>J</sub>   | -55~+150 | °C   |
| Storage Temperature                     |                      |                 | T <sub>STG</sub> | -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. Starting  $T_J = 25^{\circ}\text{C}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 15\text{A}$ ,  $V_{DD} = 40\text{V}$ ,  $V_{GS} = 10\text{V}$ .

■ THERMAL DATA

| PARAMETER           |        | SYMBOL        | RATINGS | UNIT                 |
|---------------------|--------|---------------|---------|----------------------|
| Junction to Ambient | TO-220 | $\theta_{JA}$ | 62.5    | $^{\circ}\text{C/W}$ |
|                     | TO-251 |               | 110     |                      |
| Junction to Case    | TO-220 | $\theta_{JC}$ | 1       | $^{\circ}\text{C/W}$ |
|                     | TO-251 |               | 2.27    |                      |

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

| 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> =-32V, V <sub>GS</sub> =0V                           |     |      | -1   | μA   |
| 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  | -1.8 | -3   | V    |
| Static Drain-Source On-State Resistance |         | R <sub>DS(ON)</sub> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-12.7A                        |     | 10.1 | 12.3 | mΩ   |
|                                         |         |                     | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10.4A                       |     | 14.5 | 18.0 | mΩ   |
|                                         |         |                     | V <sub>GS</sub> =-10V, I <sub>D</sub> =-12.7A, T <sub>J</sub> =125°C |     | 15.3 | 18.7 | mΩ   |
| DYNAMIC PARAMETERS                      |         |                     |                                                                      |     |      |      |      |
| Input Capacitance                       |         | C <sub>ISS</sub>    | V <sub>GS</sub> =0V, V <sub>DS</sub> =-20V, f=1.0MHz                 |     | 2085 | 2775 | pF   |
| Output Capacitance                      |         | C <sub>OSS</sub>    |                                                                      |     | 360  | 480  | pF   |
| Reverse Transfer Capacitance            |         | C <sub>RSS</sub>    |                                                                      |     | 210  | 310  | pF   |
| Gate Resistance                         |         | R <sub>G</sub>      | f=1.0MHz                                                             |     | 4.6  |      | Ω    |

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

| PARAMETER                                       | SYMBOL              | TEST CONDITIONS                                                                            | MIN | TYP  | MAX  | UNIT |
|-------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------|-----|------|------|------|
| SWITCHING PARAMETERS                            |                     |                                                                                            |     |      |      |      |
| Total Gate Charge                               | Q <sub>G</sub>      | V <sub>GS</sub> =0~-10V, V <sub>DD</sub> =-20V, I <sub>D</sub> =-12.7A                     |     | 36   | 50   | nC   |
|                                                 |                     | V <sub>GS</sub> =0~-5V, V <sub>DD</sub> =-20V, I <sub>D</sub> =-12.7A                      |     | 19   | 27   | nC   |
| Gate to Source Charge                           | Q <sub>GS</sub>     | V <sub>DD</sub> =-20V, I <sub>D</sub> =-12.7A                                              |     | 7    |      | nC   |
| Gate to Drain Charge                            | Q <sub>GD</sub>     |                                                                                            |     | 8    |      | nC   |
| Turn-ON Delay Time                              | t <sub>D(ON)</sub>  | V <sub>DD</sub> =-20V, I <sub>D</sub> =-12.7A, R <sub>GEN</sub> =6Ω, V <sub>GS</sub> =-10V |     | 10   | 19   | ns   |
| Rise Time                                       | t <sub>R</sub>      |                                                                                            |     | 7    | 13   | ns   |
| Turn-OFF Delay Time                             | t <sub>D(OFF)</sub> |                                                                                            |     | 38   | 60   | ns   |
| Fall-Time                                       | t <sub>F</sub>      |                                                                                            |     | 15   | 27   | ns   |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS |                     |                                                                                            |     |      |      |      |
| Drain-Source Diode Forward Voltage              | V <sub>SD</sub>     | I <sub>S</sub> =-12.7A, V <sub>GS</sub> =0V (Note 1)                                       |     | -0.8 | -1.2 | V    |
| Body Diode Reverse Recovery Time                | t <sub>RR</sub>     | I <sub>F</sub> =-12.7A, di/dt=100A/μs                                                      |     | 29   | 44   | ns   |
| Body Diode Reverse Recovery Charge              | Q <sub>RR</sub>     |                                                                                            |     | 26   | 40   | μC   |

Notes: 1. Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty cycle < 2.0%.

2. Starting  $T_J = 25^\circ\text{C}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 15\text{A}$ ,  $V_{DD} = 40\text{V}$ ,  $V_{GS} = 10\text{V}$ .

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