

## 30V P-Channel Enhancement Mode MOSFET

### DESCRIPTION

power effect transistor which is produced using high cell density advanced trench technology.

The high density process is especially able to minimize on-state resistance. These devices are especially suited for low voltage application power management DC-DC converters.

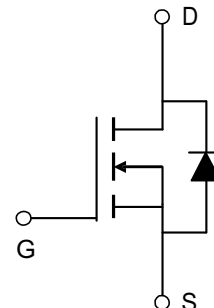
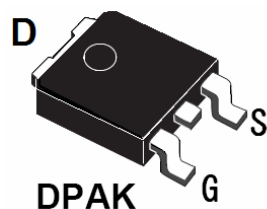
### FEATURE

- 30V/-80 A,  $R_{DS(ON)}=5.0m\Omega$  (typ.)@VGS= -20V
- 30V/-55A,  $R_{DS(ON)}=6.0m\Omega$  (typ.)@VGS= -10V
- Super high design for extremely low  $R_{DS(ON)}$
- Exceptional on-resistance and Maximum DC current capability
- Full RoHS compliance
- TO252 package design
- 100% UIS Tested
- 100% Rg tested

### APPLICATIONS

- Power Management
- DC/DC Converter
- Load Switch

### PIN CONFIGURATION



## PART NUMBER INFORMATION

|                        |   |
|------------------------|---|
| UP80P03AA- <u>BB</u> C | A= Package Code<br>T: TO-252<br>BB=Handing Code<br>TR: Tape&Reel<br>C=Lead Plating Code<br>G: Green Product<br>P: Pb free |
|------------------------|---|

## ORDERING INFORMATION

| Part Number   | Package Code | Package | Shipping    |
|---------------|--------------|---------|-------------|
| UP80P03AT-TRG | T            | TO-252  | 2500EA/ T&R |

- ※ Year Code : 0~9
- ※ Week Code : A~Z(1-26); a~z(27~52)
- ※ G : Green Product. This product is RoHS compliant.

## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless otherwise noted )

| Symbol   | Parameter   | Max.         | Units |
|--|---|--------------|-------|
| V <sub>DS</sub>                                  | Drain-to-Source Voltage   | -30          | V     |
| V <sub>GS</sub>                                  | Gate-to-Source Voltage  | ± 25         |       |
| I <sub>D</sub> @ T <sub>A</sub> = 25°C           | Continuous Drain Current, V <sub>GS</sub> @ 10V                   | -15          | A     |
| I <sub>D</sub> @ T <sub>A</sub> = 70°C           | Continuous Drain Current, V <sub>GS</sub> @ 10V                   | -12          |       |
| I <sub>D</sub> @ T <sub>C</sub> (Bottom) = 25°C  | Continuous Drain Current, V <sub>GS</sub> @ 10V                   | -80          |       |
| I <sub>D</sub> @ T <sub>C</sub> (Bottom) = 100°C | Continuous Drain Current, V <sub>GS</sub> @ 10V                   | -55          |       |
| I <sub>D</sub> @ T <sub>C</sub> = 25°C           | Continuous Drain Current, V <sub>GS</sub> @ 10V (Package Limited) | -70          |       |
| I <sub>DM</sub>                                  | Pulsed Drain Current  | -200         |       |
| P <sub>D</sub> @T <sub>A</sub> = 25°C            | Power Dissipation   | 2.5          | W     |
| P <sub>D</sub> @T <sub>C</sub> (Bottom) = 25°C   | Power Dissipation   | 90           |       |
|  | Linear Derating Factor  | 0.03         | W/°C  |
| T <sub>J</sub><br>T <sub>STG</sub>               | Operating Junction and<br>Storage Temperature Range               | -55 to + 150 | °C    |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress rating only and functional device operation is not implied.

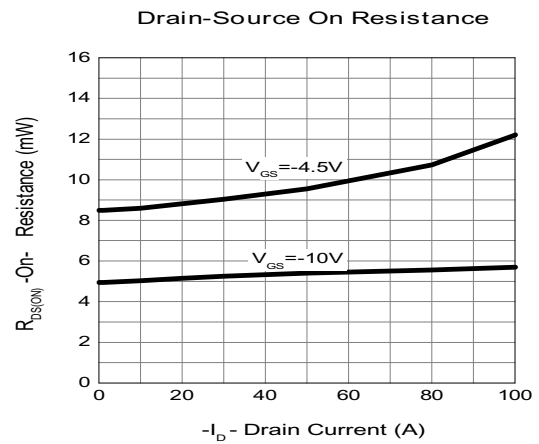
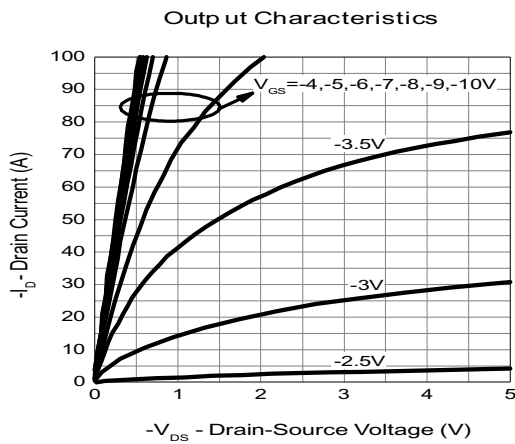
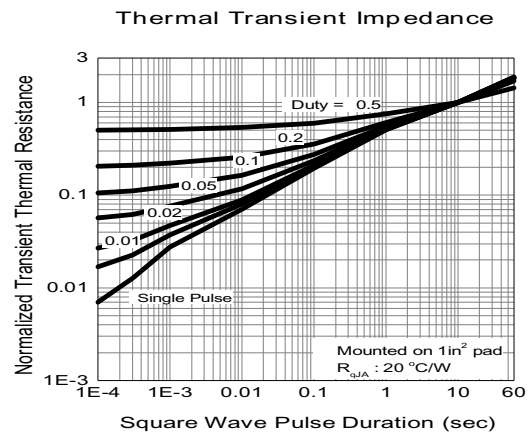
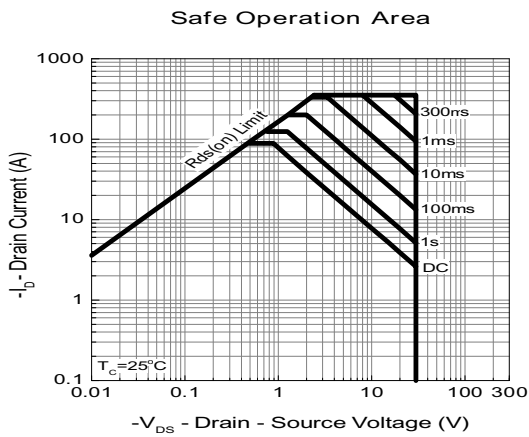
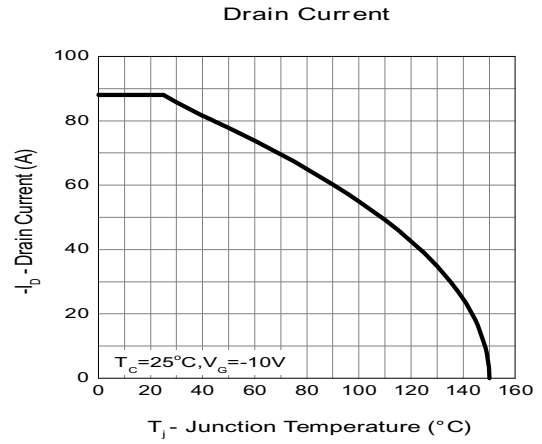
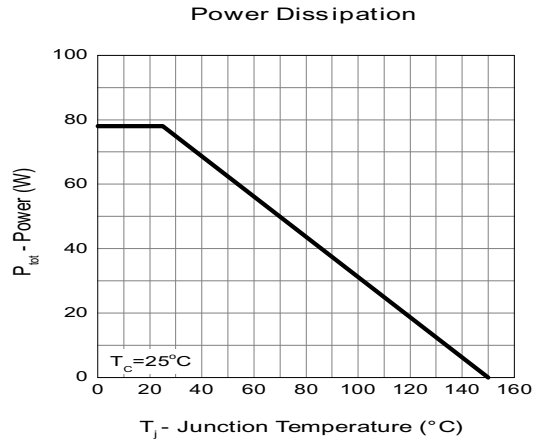
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$  Unless otherwise noted)

| Symbol                    | Parameter                       | Condition  | Min  | Typ  | Max       | Unit       |
|---------------------------|---------------------------------|--|------|------|-----------|------------|
| <b>Static Parameters</b>  |                                 |  |      |      |           |            |
| $V_{(BR)DSS}$             | Drain-Source Breakdown Voltage  | $V_{GS}=0V, I_D = -250\mu A$                                       | -30  |      |           | V          |
| $V_{GS(th)}$              | Gate Threshold Voltage          | $V_{DS}=V_{GS}, I_D = -250\mu A$                                   | -1.0 |      | -2.5      | V          |
| $I_{GSS}$                 | Gate Leakage Current            | $V_{DS}=0V, V_{GS}=\pm 25V$  |      |      | $\pm 100$ | nA         |
| $I_{DSS}$                 | Zero Gate Voltage Drain Current | $V_{DS}=-24V, V_{GS}=0$  |      |      | -1        | uA         |
|                           |                                 | $V_{DS}=-24V, V_{GS}=0$<br>$T_J=85^{\circ}\text{C}$                |      |      | -5        |            |
| $R_{DS(ON)}$              | Drain-Source On-Resistance      | $V_{GS}=-20V, I_D = -20 A$   |      | 5.0  | 6.0       | m $\Omega$ |
|                           |                                 | $V_{GS} = -10V, I_D = -20 A$                                       |      | 6.0  | 8.0       |            |
| <b>Source-Drain Diode</b> |                                 |  |      |      |           |            |
| $V_{SD}$                  | Diode Forward Voltage           | $I_S = -1 A, V_{GS}=0V$  |      | 0.7  | 1.3       | V          |
| <b>Dynamic Parameters</b> |                                 |  |      |      |           |            |
| $Q_g$                     | Total Gate Charge               | $V_{DS} = -15V$<br>$V_{GS} = -10V$<br>$I_D = -20 A$                |      | 53   |           | nC         |
| $Q_{gs}$                  | Gate-Source Charge              |  |      | 23   |           |            |
| $Q_{gd}$                  | Gate-Drain Charge               |  |      | 13   |           |            |
| $C_{iss}$                 | Input Capacitance               | $V_{DS} = -15V$<br>$V_{GS}=0V$<br>$f=1\text{MHz}$                  |      | 2886 |           | pF         |
| $C_{oss}$                 | Output Capacitance              |  |      | 640  |           |            |
| $C_{rss}$                 | Reverse Transfer Capacitance    |  |      | 440  |           |            |
| $T_{d(on)}$               | Turn-On Time                    | $V_{DS} = -15V$<br>$R_L = 0.75$<br>$V_{GEN} = -10V$<br>$R_G = 3.0$ |      | 19   |           | nS         |
| $T_r$                     |                                 |  |      | 15   |           |            |
| $T_{d(off)}$              | Turn-Off Time                   |  |      | 52   |           |            |
| $T_f$                     |                                 |  |      | 17   |           |            |

Note: 1. Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$

2. Static parameters are based on package level with recommended wire bonding

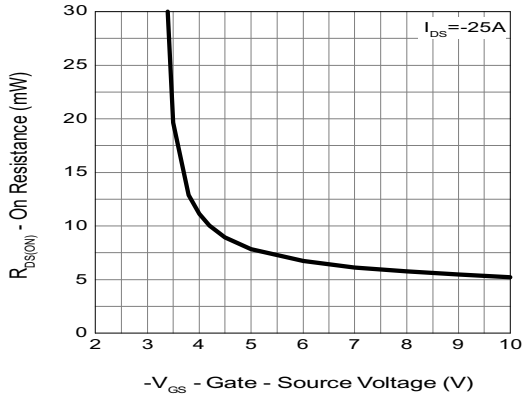
## TYPICAL CHARACTERISTICS (25°C Unless Note)



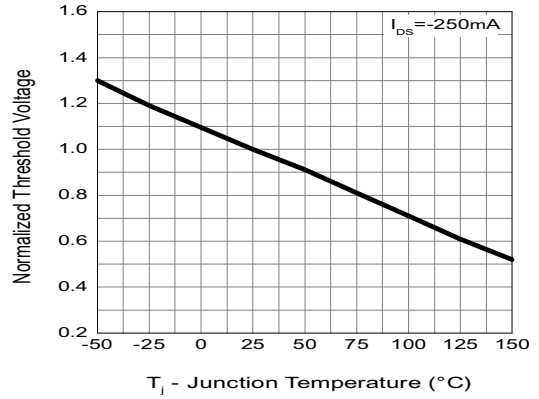


## TYPICAL CHARACTERISTICS (cont inuous )

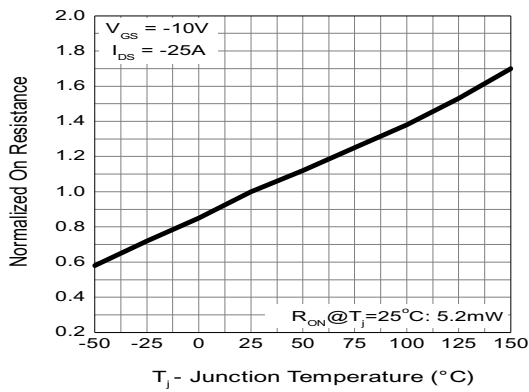
Gate-Source On Resistance



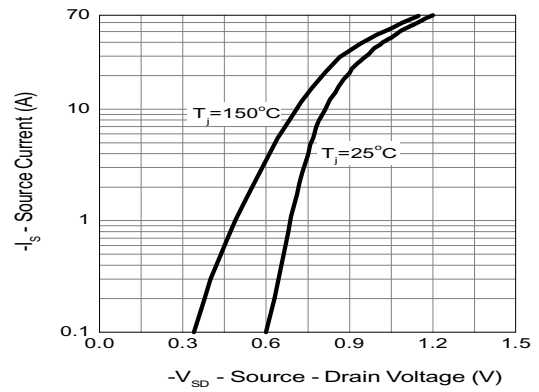
Gate Threshold Voltage



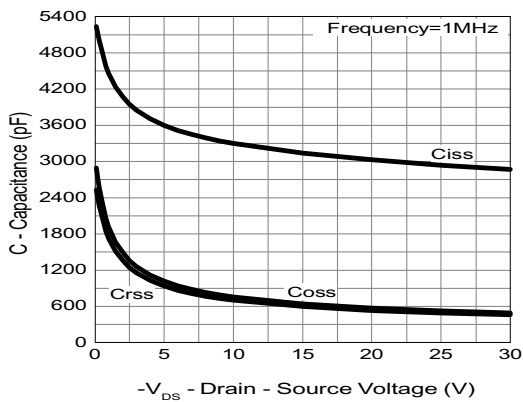
Drain-Source On Resistance



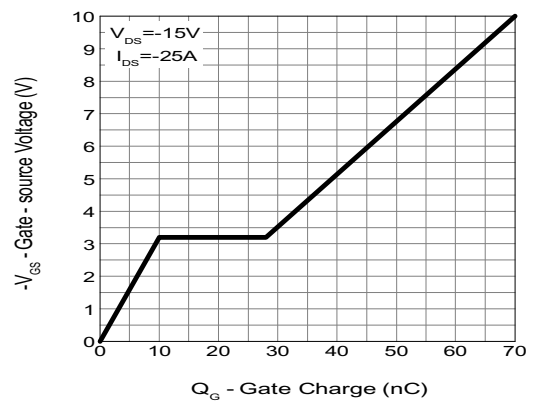
Source-Drain Diode Forward



Capacitance



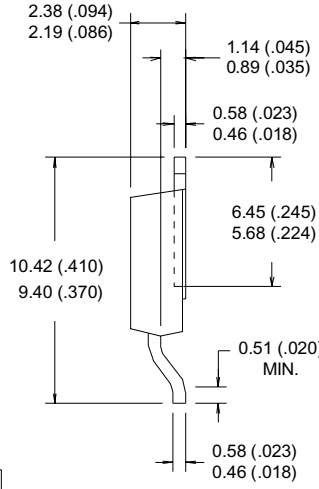
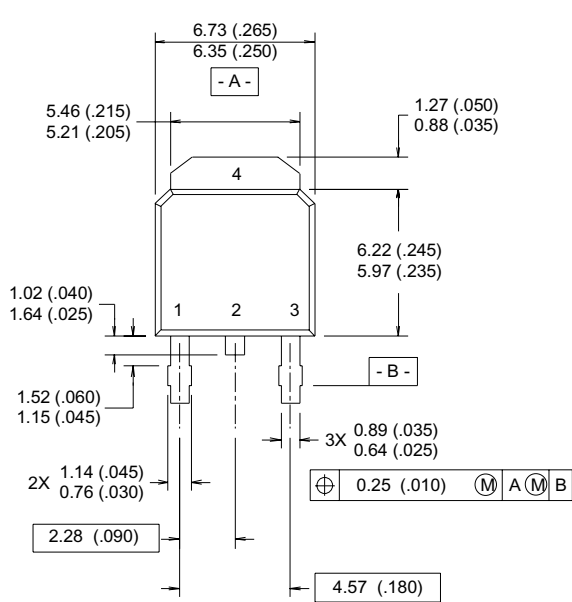
Gate Charge





## TO-252 Outline Package Dimension

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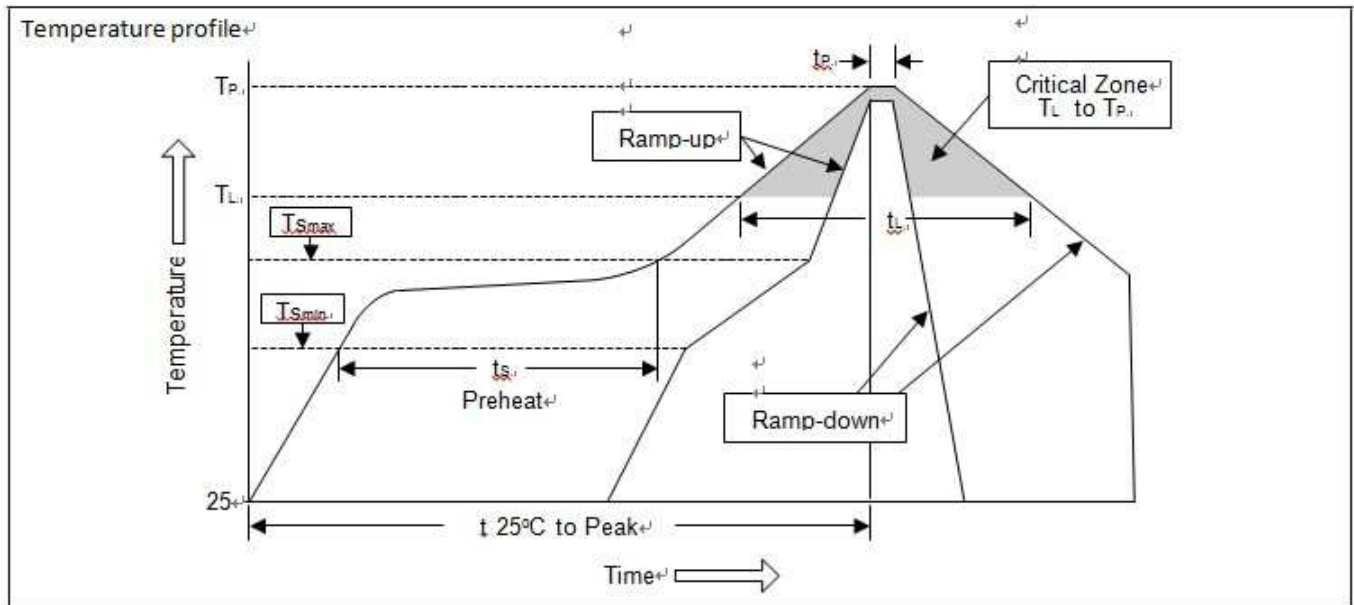
LEAD ASSIGNMENTS  
1 - GATE  
2 - DRAIN  
3 - SOURCE  
4 - DRAIN

- NOTES:
- 1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
  - 2 CONTROLLING DIMENSION : INCH.
  - 3 CONFORMS TO JEDEC OUTLINE TO-252AA.
  - 4 DIMENSIONS SHOWN ARE BEFORE SOLDER DIP, SOLDER DIP MAX. +0.16 (.006).

## SOLDERING METHODS FOR UNIVERCHIP

Storage environment Temperature=10°C~35°C Humidity=65%±15%

Reflow soldering of surface mount device



| Profile Feature                                      | Sn-Pb Eutectic Assembly | Pb free Assembly |
|--|-------------------------|------------------|
| Average ramp-up rate ( $T_L$ to $T_P$ )              | <3°C/sec                | <3°C/sec         |
| Preheat  |                         |                  |
| -Temperature Min ( $T_{Smin}$ )                      | 100°C                   | 150°C            |
| -Temperature Max ( $T_{Smax}$ )                      | 150°C                   | 200°C            |
| -Time (min to max) ( $t_s$ )                         | 60~120 sec              | 60~180 sec       |
| $T_{Smax}$ to $T_L$                                  |                         |                  |
| -Ramp-up Rate  | <3°C/sec                | <3°C/sec         |
| Time maintained above                                |                         |                  |
| -Temperature ( $T_L$ )                               | 183°C                   | 217°C            |
| -Time ( $t_L$ )                                      | 60~150 sec              | 60~150 sec       |
| Peak Temperature ( $T_P$ )                           | 240°C+0/-5°C            | 260°C+0/-5°C     |
| Time within 5°C of actual Peak Temperature ( $t_p$ ) | 10~30 sec               | 20~40 sec        |
| Ramp-down Rate                                       | <6°C/sec                | <6°C/sec         |
| Time 25°C to Peak Temperature                        | <6 minutes              | <6 minutes       |



Flow (wave) soldering (solder dipping)

| Product        | Peak Temperature | Dipping Time |
|----------------|------------------|--------------|
| Pb device      | 245°C±5°C        | 5sec±1sec    |
| Pb-Free device | 260°C+0/-5°C     | 5sec±1sec    |



This integrated circuit can be damaged by ESD. Universal Chip Corporation recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedure can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.