

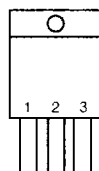
## THREE TERMINAL LOW DROPOUT VOLTAGE REGULATOR

## DESCRIPTION

$\mu$ PC2400A Series are low dropout regulators which have 1 A capable for the output current.  
These ICs are built-in the saturation protection circuit of the output transistor.

## FEATURES

- Built-in the saturation protection circuit of the output transistor.
- The capability of output current is 1 A
- High accuracy of output voltage.
  - $I \Delta V_{CL} \leq \pm 2 \% (T_J = 25^\circ\text{C})$
  - $I \Delta V_{CO} \leq \pm 3 \% (0^\circ\text{C} \leq T_J \leq 125^\circ\text{C})$
- Low dropout voltage.
  - $V_{DIF} \leq 1 \text{ V} (I_o \leq 1 \text{ A}, T_J \leq 125^\circ\text{C})$
- Built-in overcurrent protection circuit, thermal shut-down circuit.
- Built-in Safe Operating Area protection circuit.
- Compatible for  $\mu$ PC2400 Series.

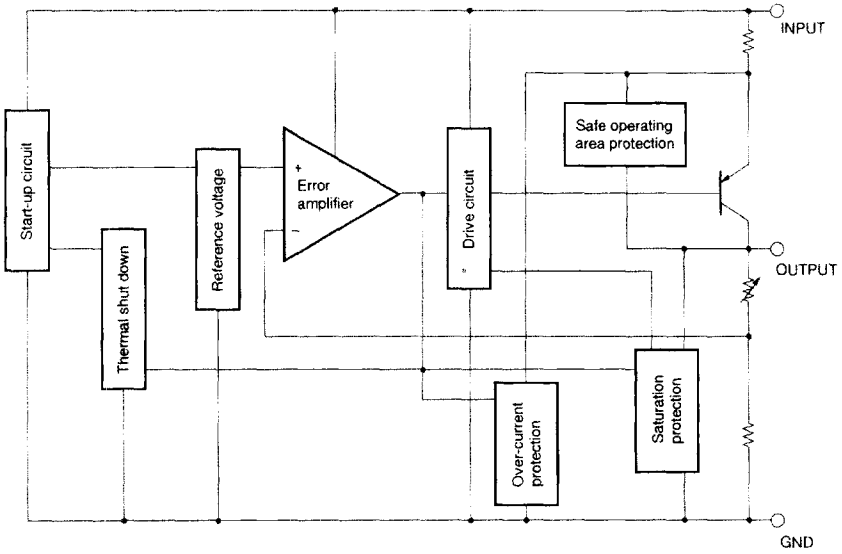
CONNECTION DIAGRAM  
(TOP VIEW)

1: INPUT  
2: GND  
3: OUTPUT

## ORDERING INFORMATION

| Output Voltage | Type Number     | Package                     |
|----------------|-----------------|-----------------------------|
| 5 V            | $\mu$ PC2405AHF | MP-45G<br>(Isolated TO-220) |
| 6 V            | $\mu$ PC2406AHF |                             |
| 7 V            | $\mu$ PC2407AHF |                             |
| 8 V            | $\mu$ PC2408AHF |                             |
| 9 V            | $\mu$ PC2409AHF |                             |
| 10 V           | $\mu$ PC2410AHF |                             |
| 12 V           | $\mu$ PC2412AHF |                             |
| 15 V           | $\mu$ PC2415AHF |                             |
| 18 V           | $\mu$ PC2418AHF |                             |

BLOCK DIAGRAM

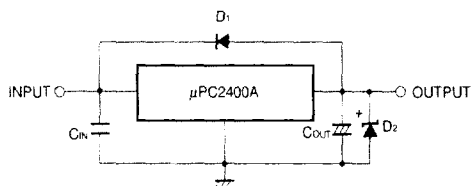


**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, Unless otherwise specified.)**

| PARAMETER                                | SYMBOL                                  | RATING         | UNIT |
|--|---|----------------|------|
| Input Voltage                            | V <sub>IN</sub>                         | 36             | V    |
| Internal Power Dissipation               | P <sub>T</sub> (T <sub>C</sub> = 25 °C) | 15 <i>Note</i> | W    |
| Operating Ambient Temperature Range      | T <sub>A</sub>                          | -20 to +85     | °C   |
| Operating Junction Temperature Range     | T <sub>J</sub>                          | -20 to +150    | °C   |
| Storage Temperature Range                | T <sub>stg</sub>                        | -55 to +150    | °C   |
| Thermal Resistance (Junction to Case)    | R <sub>th(j-c)</sub>                    | 5.0            | °C/W |
| Thermal Resistance (Junction to Ambient) | R <sub>th(j-a)</sub>                    | 65             | °C/W |

**Note** Internally limited

**TYPICAL CONNECTION**



C<sub>IN</sub> : 0.1 to 0.47 μF.

C<sub>OUT</sub> : More than 47 μF.

D<sub>1</sub> : Need for V<sub>O</sub> > V<sub>IN</sub>.

D<sub>2</sub> : Need for V<sub>O</sub> < GND.

**RECOMMENDED OPERATING CONDITIONS**

| PARAMETER                            | SYMBOL          | TYPE NUMBER | MIN. | TYP. | MAX. | UNIT |
|--------------------------------------|-----------------|-------------|------|------|------|------|
| Input Voltage                        | V <sub>IN</sub> | μPC2405AHF  | 6    | 9    | 20   | V    |
|                                      |                 | μPC2406AHF  | 7    | 10   | 21   |      |
|                                      |                 | μPC2407AHF  | 8    | 11   | 22   |      |
|                                      |                 | μPC2408AHF  | 9    | 13   | 23   |      |
|                                      |                 | μPC2409AHF  | 10   | 14   | 24   |      |
|                                      |                 | μPC2410AHF  | 11   | 15   | 25   |      |
|                                      |                 | μPC2412AHF  | 13   | 18   | 27   |      |
|                                      |                 | μPC2415AHF  | 16   | 22   | 27   |      |
|                                      |                 | μPC2418AHF  | 19   | 25   | 28   |      |
| Output Current                       | I <sub>O</sub>  | All         | 0    |      | 1    | A    |
| Operating Ambient Temperature Range  | T <sub>A</sub>  | All         | -20  |      | +85  | °C   |
| Operating Junction Temperature Range | T <sub>J</sub>  | All         | -20  |      | +125 | °C   |

**ELECTRICAL CHARACTERISTICS**

μPC2405A (V<sub>IN</sub> = 9 V, I<sub>o</sub> = 500 mA, T<sub>J</sub> = 25 °C, Unless otherwise specified)

| PARAMETER                                 | SYMBOL               | MIN. | TYP. | MAX. | UNIT              | TEST CONDITIONS  |
|---|----------------------|------|------|------|-------------------|--|
| Output Voltage                            | V <sub>O</sub>       | 4.9  | 5.0  | 5.1  | V                 | 6 V ≤ V <sub>IN</sub> ≤ 20 V, 5 mA ≤ I <sub>o</sub> ≤ 500 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C |
|   |                      | 4.85 |      | 5.15 |                   |  |
|   |                      | 4.85 |      | 5.15 |                   |  |
| Line Regulation                           | REG <sub>IN</sub>    |      | 6    | 50   | mV                | 6.5 V ≤ V <sub>IN</sub> ≤ 20 V   |
| Load Regulation                           | REG <sub>L</sub>     |      | 3    | 50   | mV                | 5 mA ≤ I <sub>o</sub> ≤ 1 A  |
| Quiescent Current                         | I <sub>BIAS</sub>    |      | 2.3  | 3.2  | mA                | I <sub>o</sub> = 0   |
|   |                      |      | 9    | 60   |                   | I <sub>o</sub> = 1 A   |
| Start-up Current                          | I <sub>BIAS(S)</sub> |      |      | 15   | mA                | V <sub>IN</sub> = 4.5 V, I <sub>o</sub> = 0 mA   |
|   |                      |      |      | 75   |                   | V <sub>IN</sub> = 4.5 V, I <sub>o</sub> = 1 A  |
| Quiescent Current Change                  | ΔI <sub>BIAS</sub>   |      |      | 20   | mA                | 6.5 V ≤ V <sub>IN</sub> ≤ 20 V, I <sub>o</sub> = 1 A   |
| Output Noise Voltage                      | V <sub>n</sub>       |      | 90   |      | μV <sub>rms</sub> | 10 Hz ≤ f ≤ 100 kHz  |
| Ripple Rejection                          | R <sub>R</sub>       | 59   | 64   |      | dB                | f = 120 Hz, 6.5 V ≤ V <sub>IN</sub> ≤ 16.5 V   |
| Dropout Voltage                           | V <sub>DIF</sub>     |      | 0.5  | 1.0  | V                 | I <sub>o</sub> = 1 A, 0 °C ≤ T <sub>J</sub> ≤ 125 °C   |
| Short Circuit Current                     | I <sub>Oshort</sub>  |      | 1.2  |      | A                 | V <sub>IN</sub> = 20 V   |
| Peak Output Current                       | I <sub>Opeak</sub>   | 1.65 | 2.2  | 3.1  | A                 |  |
| Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT  |      | -0.4 |      | mV/°C             | I <sub>o</sub> = 5 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C  |

μPC2406A (V<sub>IN</sub> = 10 V, I<sub>o</sub> = 500 mA, T<sub>J</sub> = 25 °C, Unless otherwise specified)

| PARAMETER                                 | SYMBOL               | MIN. | TYP. | MAX. | UNIT              | TEST CONDITIONS  |
|---|----------------------|------|------|------|-------------------|--|
| Output Voltage                            | V <sub>O</sub>       | 5.88 | 6.0  | 6.12 | V                 | 7 V ≤ V <sub>IN</sub> ≤ 21 V, 5 mA ≤ I <sub>o</sub> ≤ 500 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C |
|   |                      | 5.82 |      | 6.18 |                   |  |
|   |                      | 5.82 |      | 6.18 |                   |  |
| Line Regulation                           | REG <sub>IN</sub>    |      | 7    | 60   | mV                | 7.5 V ≤ V <sub>IN</sub> ≤ 21 V   |
| Load Regulation                           | REG <sub>L</sub>     |      | 4    | 60   | mV                | 5 mA ≤ I <sub>o</sub> ≤ 1 A  |
| Quiescent Current                         | I <sub>BIAS</sub>    |      | 2.3  | 3.2  | mA                | I <sub>o</sub> = 0   |
|   |                      |      | 9    | 60   |                   | I <sub>o</sub> = 1 A   |
| Start-up Current                          | I <sub>BIAS(S)</sub> |      |      | 15   | mA                | V <sub>IN</sub> = 5.5 V, I <sub>o</sub> = 0 mA   |
|   |                      |      |      | 75   |                   | V <sub>IN</sub> = 5.5 V, I <sub>o</sub> = 1 A  |
| Quiescent Current Change                  | ΔI <sub>BIAS</sub>   |      |      | 20   | mA                | 7.5 V ≤ V <sub>IN</sub> ≤ 21 V, I <sub>o</sub> = 1 A   |
| Output Noise Voltage                      | V <sub>n</sub>       |      | 110  |      | μV <sub>rms</sub> | 10 Hz ≤ f ≤ 100 kHz  |
| Ripple Rejection                          | R <sub>R</sub>       | 58   | 63   |      | dB                | f = 120 Hz, 7.5 V ≤ V <sub>IN</sub> ≤ 17.5 V   |
| Dropout Voltage                           | V <sub>DIF</sub>     |      | 0.5  | 1.0  | V                 | I <sub>o</sub> = 1 A, 0 °C ≤ T <sub>J</sub> ≤ 125 °C   |
| Short Circuit Current                     | I <sub>Oshort</sub>  |      | 1.2  |      | A                 | V <sub>IN</sub> = 21 V   |
| Peak Output Current                       | I <sub>Opeak</sub>   | 1.65 | 2.2  | 3.1  | A                 |  |
| Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT  |      | 0.4  |      | mV/°C             | I <sub>o</sub> = 5 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C  |

μPC2407A (V<sub>IN</sub> = 11 V, I<sub>o</sub> = 500 mA, T<sub>J</sub> = 25 °C, Unless otherwise specified)

| PARAMETER                                 | SYMBOL               | MIN. | TYP. | MAX. | UNIT              | TEST CONDITIONS   |
|---|----------------------|------|------|------|-------------------|---|
| Output Voltage                            | V <sub>O</sub>       | 6.86 | 7.0  | 7.14 | V                 | 8 V ≤ V <sub>IN</sub> ≤ 22 V, 5 mA ≤ I <sub>o</sub> ≤ 500 mA,<br>0 °C ≤ T <sub>J</sub> ≤ 125 °C |
|   |                      | 6.79 |      | 7.21 |                   |   |
|   |                      | 6.79 |      | 7.21 |                   |   |
| Line Regulation                           | REG <sub>IN</sub>    |      | 8    | 70   | mV                | 8.5 V ≤ V <sub>IN</sub> ≤ 22 V  |
| Load Regulation                           | REG <sub>L</sub>     |      | 4    | 70   | mV                | 5 mA ≤ I <sub>o</sub> ≤ 1 A   |
| Quiescent Current                         | I <sub>BIAS</sub>    |      | 2.3  | 3.2  | mA                | I <sub>o</sub> = 0  |
|   |                      |      | 9    | 60   |                   | I <sub>o</sub> = 1 A  |
| Start-up Current                          | I <sub>BIAS(S)</sub> |      |      | 15   | mA                | V <sub>IN</sub> = 6.5 V, I <sub>o</sub> = 0 mA  |
|   |                      |      |      | 75   |                   | V <sub>IN</sub> = 6.5 V, I <sub>o</sub> = 1 A   |
| Quiescent Current Change                  | ΔI <sub>BIAS</sub>   |      |      | 20   | mA                | 8.5 V ≤ V <sub>IN</sub> ≤ 22 V, I <sub>o</sub> = 1 A  |
| Output Noise Voltage                      | V <sub>n</sub>       |      | 130  |      | μV <sub>rms</sub> | 10 Hz ≤ f ≤ 100 kHz   |
| Ripple Rejection                          | R <sub>R</sub>       | 57   | 62   |      | dB                | f = 120 Hz, 8.5 V ≤ V <sub>IN</sub> ≤ 18.5 V  |
| Dropout Voltage                           | V <sub>DIF</sub>     |      | 0.5  | 1.0  | V                 | I <sub>o</sub> = 1 A, 0 °C ≤ T <sub>J</sub> ≤ 125 °C  |
| Short Circuit Current                     | I <sub>short</sub>   |      | 1.2  |      | A                 | V <sub>IN</sub> = 22 V  |
| Peak Output Current                       | I <sub>Opeak</sub>   | 1.65 | 2.2  | 3.1  | A                 |   |
| Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT  |      | 0.4  |      | mV/°C             | I <sub>o</sub> = 5 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C   |

μPC2408A (V<sub>IN</sub> = 13 V, I<sub>o</sub> = 500 mA, T<sub>J</sub> = 25 °C, Unless otherwise specified)

| PARAMETER                                 | SYMBOL               | MIN. | TYP. | MAX. | UNIT              | TEST CONDITIONS   |
|---|----------------------|------|------|------|-------------------|---|
| Output Voltage                            | V <sub>O</sub>       | 7.85 | 8.0  | 8.15 | V                 | 9 V ≤ V <sub>IN</sub> ≤ 23 V, 5 mA ≤ I <sub>o</sub> ≤ 500 mA,<br>0 °C ≤ T <sub>J</sub> ≤ 125 °C |
|   |                      | 7.75 |      | 8.25 |                   |   |
|   |                      | 7.75 |      | 8.25 |                   |   |
| Line Regulation                           | REG <sub>IN</sub>    |      | 9    | 80   | mV                | 9.5 V ≤ V <sub>IN</sub> ≤ 23 V  |
| Load Regulation                           | REG <sub>L</sub>     |      | 5    | 80   | mV                | 5 mA ≤ I <sub>o</sub> ≤ 1 A   |
| Quiescent Current                         | I <sub>BIAS</sub>    |      | 2.3  | 3.2  | mA                | I <sub>o</sub> = 0  |
|   |                      |      | 9    | 60   |                   | I <sub>o</sub> = 1 A  |
| Start-up Current                          | I <sub>BIAS(S)</sub> |      |      | 15   | mA                | V <sub>IN</sub> = 7.5 V, I <sub>o</sub> = 0 mA  |
|   |                      |      |      | 75   |                   | V <sub>IN</sub> = 7.5 V, I <sub>o</sub> = 1 A   |
| Quiescent Current Change                  | ΔI <sub>BIAS</sub>   |      |      | 20   | mA                | 9.5 V ≤ V <sub>IN</sub> ≤ 23 V, I <sub>o</sub> = 1 A  |
| Output Noise Voltage                      | V <sub>n</sub>       |      | 150  |      | μV <sub>rms</sub> | 10 Hz ≤ f ≤ 100 kHz   |
| Ripple Rejection                          | R <sub>R</sub>       | 56   | 61   |      | dB                | f = 120 Hz, 9.5 V ≤ V <sub>IN</sub> ≤ 19.5 V  |
| Dropout Voltage                           | V <sub>DIF</sub>     |      | 0.5  | 1.0  | V                 | I <sub>o</sub> = 1 A, 0 °C ≤ T <sub>J</sub> ≤ 125 °C  |
| Short Circuit Current                     | I <sub>short</sub>   |      | 1.2  |      | A                 | V <sub>IN</sub> = 23 V  |
| Peak Output Current                       | I <sub>Opeak</sub>   | 1.6  | 2.2  | 3.05 | A                 |   |
| Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT  |      | 0.5  |      | mV/°C             | I <sub>o</sub> = 5 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C   |

μPC2409A (V<sub>IN</sub> = 14 V, I<sub>o</sub> = 500 mA, T<sub>J</sub> = 25 °C, Unless otherwise specified)

| PARAMETER                                 | SYMBOL               | MIN. | TYP. | MAX. | UNIT              | TEST CONDITIONS   |
|---|----------------------|------|------|------|-------------------|---|
| Output Voltage                            | V <sub>O</sub>       | 8.82 | 9.0  | 9.18 | V                 | 10 V ≤ V <sub>IN</sub> ≤ 24 V, 5 mA ≤ I <sub>o</sub> ≤ 500 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C |
|   |                      | 8.73 |      | 9.27 |                   |   |
|   |                      | 8.73 |      | 9.27 |                   |   |
| Line Regulation                           | REG <sub>N</sub>     |      | 11   | 90   | mV                | 10.5 V ≤ V <sub>IN</sub> ≤ 24 V   |
| Load Regulation                           | REG <sub>L</sub>     |      | 5    | 90   | mV                | 5 mA ≤ I <sub>o</sub> ≤ 1 A   |
| Quiescent Current                         | I <sub>BIAS</sub>    |      | 2.4  | 3.2  | mA                | I <sub>o</sub> = 0  |
|   |                      |      | 9    | 60   |                   | I <sub>o</sub> = 1 A  |
| Start-up Current                          | I <sub>BIAS(S)</sub> |      |      | 15   | mA                | V <sub>IN</sub> = 8.5 V, I <sub>o</sub> = 0 mA  |
|   |                      |      |      | 75   |                   | V <sub>IN</sub> = 8.5 V, I <sub>o</sub> = 1 A   |
| Quiescent Current Change                  | ΔI <sub>BIAS</sub>   |      |      | 20   | mA                | 10.5 V ≤ V <sub>IN</sub> ≤ 24 V, I <sub>o</sub> = 1 A   |
| Output Noise Voltage                      | V <sub>n</sub>       |      | 170  |      | μV <sub>rms</sub> | 10 Hz ≤ f ≤ 100 kHz   |
| Ripple Rejection                          | R <sub>R</sub>       | 55   | 60   |      | dB                | f = 120 Hz, 10.5 V ≤ V <sub>IN</sub> ≤ 20.5 V   |
| Dropout Voltage                           | V <sub>DIF</sub>     |      | 0.5  | 1.0  | V                 | I <sub>o</sub> = 1 A, 0 °C ≤ T <sub>J</sub> ≤ 125 °C  |
| Short Circuit Current                     | I <sub>Oshort</sub>  |      | 1.0  |      | A                 | V <sub>IN</sub> = 24 V  |
| Peak Output Current                       | I <sub>Opeak</sub>   | 1.6  | 2.2  | 3.05 | A                 |   |
| Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT  |      | 0.9  |      | mV/°C             | I <sub>o</sub> = 5 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C   |

μPC2410A (V<sub>IN</sub> = 15 V, I<sub>o</sub> = 500 mA, T<sub>J</sub> = 25 °C, Unless otherwise specified)

| PARAMETER                                 | SYMBOL               | MIN. | TYP. | MAX. | UNIT              | TEST CONDITIONS   |
|---|----------------------|------|------|------|-------------------|---|
| Output Voltage                            | V <sub>O</sub>       | 9.8  | 10   | 10.2 | V                 | 11 V ≤ V <sub>IN</sub> ≤ 25 V, 5 mA ≤ I <sub>o</sub> ≤ 500 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C |
|   |                      | 9.7  |      | 10.3 |                   |   |
|   |                      | 9.7  |      | 10.3 |                   |   |
| Line Regulation                           | REG <sub>N</sub>     |      | 12   | 100  | mV                | 11.5 V ≤ V <sub>IN</sub> ≤ 25 V   |
| Load Regulation                           | REG <sub>L</sub>     |      | 6    | 100  | mV                | 5 mA ≤ I <sub>o</sub> ≤ 1 A   |
| Quiescent Current                         | I <sub>BIAS</sub>    |      | 2.4  | 3.2  | mA                | I <sub>o</sub> = 0  |
|   |                      |      | 9    | 60   |                   | I <sub>o</sub> = 1 A  |
| Start-up Current                          | I <sub>BIAS(S)</sub> |      |      | 15   | mA                | V <sub>IN</sub> = 9.5 V, I <sub>o</sub> = 0 mA  |
|   |                      |      |      | 75   |                   | V <sub>IN</sub> = 9.5 V, I <sub>o</sub> = 1 A   |
| Quiescent Current Change                  | ΔI <sub>BIAS</sub>   |      |      | 20   | mA                | 11.5 V ≤ V <sub>IN</sub> ≤ 25 V, I <sub>o</sub> = 1 A   |
| Output Noise Voltage                      | V <sub>n</sub>       |      | 190  |      | μV <sub>rms</sub> | 10 Hz ≤ f ≤ 100 kHz   |
| Ripple Rejection                          | R <sub>R</sub>       | 54   | 59   |      | dB                | f = 120 Hz, 11.5 V ≤ V <sub>IN</sub> ≤ 21.5 V   |
| Dropout Voltage                           | V <sub>DIF</sub>     |      | 0.5  | 1.0  | V                 | I <sub>o</sub> = 1 A, 0 °C ≤ T <sub>J</sub> ≤ 125 °C  |
| Short Circuit Current                     | I <sub>Oshort</sub>  |      | 1.0  |      | A                 | V <sub>IN</sub> = 25 V  |
| Peak Output Current                       | I <sub>Opeak</sub>   | 1.6  | 2.2  | 3.05 | A                 |   |
| Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT  |      | 0.8  |      | mV/°C             | I <sub>o</sub> = 5 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C   |

$\mu$ PC2412A ( $V_{IN} = 18\text{ V}$ ,  $I_o = 500\text{ mA}$ ,  $T_J = 25\text{ }^\circ\text{C}$ , Unless otherwise specified)

| PARAMETER                                 | SYMBOL                | MIN.  | TYP. | MAX.  | UNIT                 | TEST CONDITIONS  |
|---|-----------------------|-------|------|-------|----------------------|--|
| Output Voltage                            | $V_o$                 | 11.75 | 12   | 12.25 | V                    | 13 V $\leq V_{IN} \leq 27\text{ V}$ , 5 mA $\leq I_o \leq 500\text{ mA}$ ,<br>0 $^\circ\text{C} \leq T_J \leq 125\text{ }^\circ\text{C}$ |
|   |                       | 11.65 |      | 12.35 |                      |  |
|   |                       | 11.65 |      | 12.35 |                      |  |
| Line Regulation                           | $REG_{IN}$            |       | 14   | 120   | mV                   | 14 V $\leq V_{IN} \leq 27\text{ V}$  |
| Load Regulation                           | $REG_L$               |       | 7    | 120   | mV                   | 5 mA $\leq I_o \leq 1\text{ A}$  |
| Quiescent Current                         | $I_{BIAS}$            |       | 2.4  | 3.2   | mA                   | $I_o = 0$  |
|   |                       |       | 10   | 60    |                      | $I_o = 1\text{ A}$   |
| Start-up Current                          | $I_{BIAS(S)}$         |       |      | 15    | mA                   | $V_{IN} = 11.5\text{ V}$ , $I_o = 0\text{ mA}$   |
|   |                       |       |      | 75    |                      | $V_{IN} = 11.5\text{ V}$ , $I_o = 1\text{ A}$  |
| Quiescent Current Change                  | $\Delta I_{BIAS}$     |       |      | 20    | mA                   | 14 V $\leq V_{IN} \leq 27\text{ V}$ , $I_o = 1\text{ A}$   |
| Output Noise Voltage                      | $V_n$                 |       | 230  |       | $\mu\text{V}_{rms}$  | 10 Hz $\leq f \leq 100\text{ kHz}$   |
| Ripple Rejection                          | R-R                   | 53    | 58   |       | dB                   | f = 120 Hz, 14 V $\leq V_{IN} \leq 24\text{ V}$  |
| Dropout Voltage                           | $V_{DIF}$             |       | 0.5  | 1.0   | V                    | $I_o = 1\text{ A}$ , 0 $^\circ\text{C} \leq T_J \leq 125\text{ }^\circ\text{C}$  |
| Short Circuit Current                     | $I_{Cshort}$          |       | 0.8  |       | A                    | $V_{IN} = 27\text{ V}$   |
| Peak Output Current                       | $I_{Opeak}$           | 1.58  | 2.2  | 3.03  | A                    |  |
| Temperature Coefficient of Output Voltage | $\Delta V_o/\Delta T$ |       | 0.8  |       | mV/ $^\circ\text{C}$ | $I_o = 5\text{ mA}$ , 0 $^\circ\text{C} \leq T_J \leq 125\text{ }^\circ\text{C}$   |

 $\mu$ PC2415A ( $V_{IN} = 22\text{ V}$ ,  $I_o = 500\text{ mA}$ ,  $T_J = 25\text{ }^\circ\text{C}$ , Unless otherwise specified)

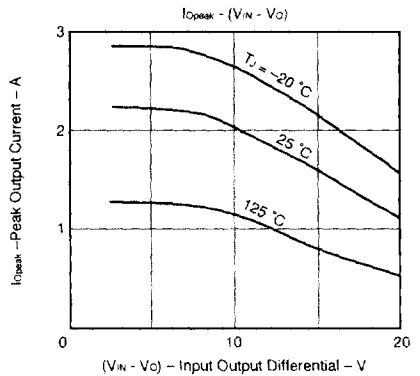
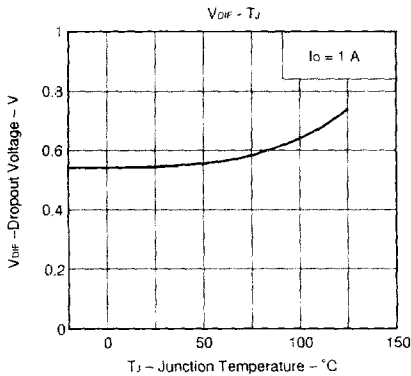
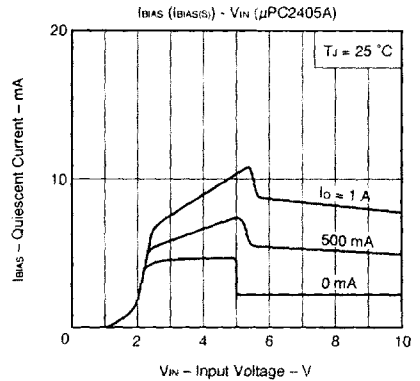
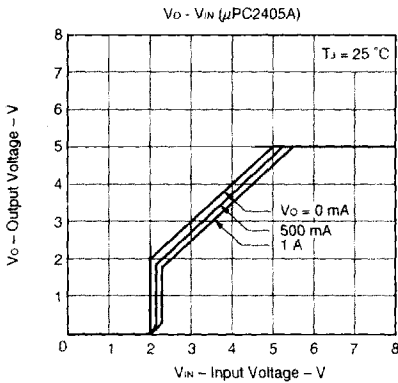
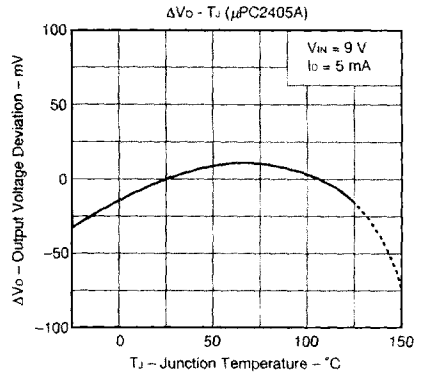
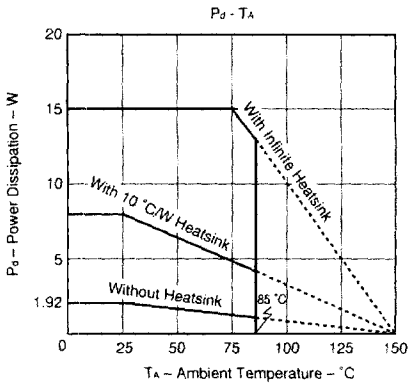
| PARAMETER                                 | SYMBOL                | MIN.  | TYP. | MAX.  | UNIT                 | TEST CONDITIONS  |
|---|-----------------------|-------|------|-------|----------------------|--|
| Output Voltage                            | $V_o$                 | 14.7  | 15   | 15.3  | V                    | 16 V $\leq V_{IN} \leq 27\text{ V}$ , 5 mA $\leq I_o \leq 500\text{ mA}$ ,<br>0 $^\circ\text{C} \leq T_J \leq 125\text{ }^\circ\text{C}$ |
|   |                       | 14.55 |      | 15.45 |                      |  |
|   |                       | 14.55 |      | 15.45 |                      |  |
| Line Regulation                           | $REG_{IN}$            |       | 18   | 150   | mV                   | 17 V $\leq V_{IN} \leq 27\text{ V}$  |
| Load Regulation                           | $REG_L$               |       | 9    | 150   | mV                   | 5 mA $\leq I_o \leq 1\text{ A}$  |
| Quiescent Current                         | $I_{BIAS}$            |       | 2.5  | 3.2   | mA                   | $I_o = 0$  |
|   |                       |       | 10   | 60    |                      | $I_o = 1\text{ A}$   |
| Start-up Current                          | $I_{BIAS(S)}$         |       |      | 15    | mA                   | $V_{IN} = 14.5\text{ V}$ , $I_o = 0\text{ mA}$   |
|   |                       |       |      | 75    |                      | $V_{IN} = 14.5\text{ V}$ , $I_o = 1\text{ A}$  |
| Quiescent Current Change                  | $\Delta I_{BIAS}$     |       |      | 20    | mA                   | 17 V $\leq V_{IN} \leq 27\text{ V}$ , $I_o = 1\text{ A}$   |
| Output Noise Voltage                      | $V_n$                 |       | 290  |       | $\mu\text{V}_{rms}$  | 10 Hz $\leq f \leq 100\text{ kHz}$   |
| Ripple Rejection                          | R-R                   | 51    | 56   |       | dB                   | f = 120 Hz, 17 V $\leq V_{IN} \leq 27\text{ V}$  |
| Dropout Voltage                           | $V_{DIF}$             |       | 0.5  | 1.0   | V                    | $I_o = 1\text{ A}$ , 0 $^\circ\text{C} \leq T_J \leq 125\text{ }^\circ\text{C}$  |
| Short Circuit Current                     | $I_{Cshort}$          |       | 0.8  |       | A                    | $V_{IN} = 27\text{ V}$   |
| Peak Output Current                       | $I_{Opeak}$           | 1.55  | 2.2  | 3.0   | A                    |  |
| Temperature Coefficient of Output Voltage | $\Delta V_o/\Delta T$ |       | 1.6  |       | mV/ $^\circ\text{C}$ | $I_o = 5\text{ mA}$ , 0 $^\circ\text{C} \leq T_J \leq 125\text{ }^\circ\text{C}$   |

μPC2418A (V<sub>IN</sub> = 25 V, I<sub>o</sub> = 500 mA, T<sub>J</sub> = 25 °C, Unless otherwise specified)

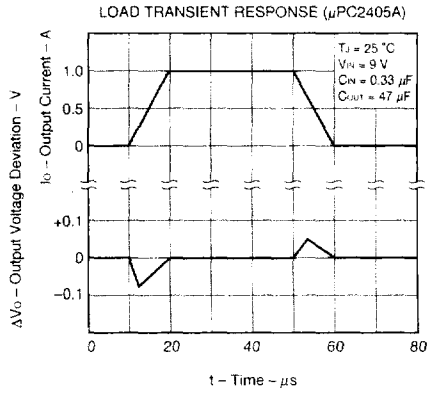
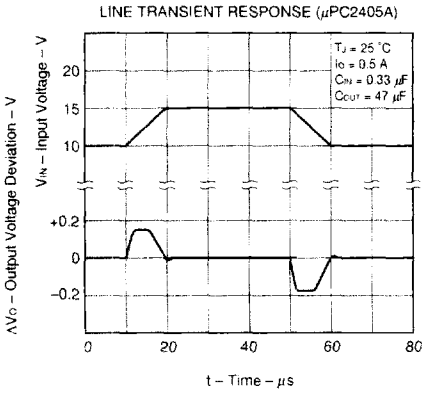
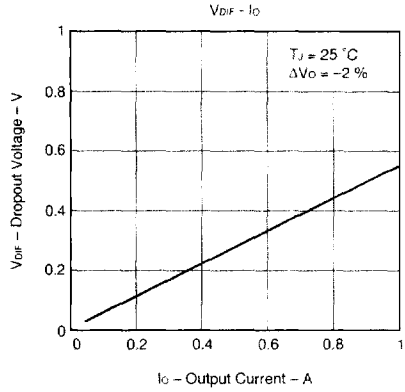
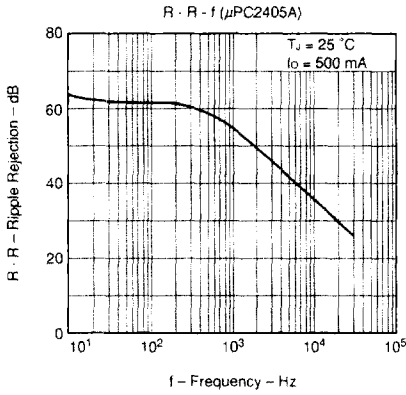
| PARAMETER                                 | SYMBOL               | MIN.  | TYP. | MAX.  | UNIT              | TEST CONDITIONS  |
|---|----------------------|-------|------|-------|-------------------|--|
| Output Voltage                            | V <sub>O</sub>       | 17.64 | 18   | 18.36 | V                 | 19 V ≤ V <sub>IN</sub> ≤ 28 V, 5 mA ≤ I <sub>o</sub> ≤ 500 mA,<br>0 °C ≤ T <sub>J</sub> ≤ 125 °C |
|   |                      | 17.46 |      | 18.54 |                   |  |
|   |                      | 17.46 |      | 18.54 |                   |  |
| Line Regulation                           | REG <sub>IN</sub>    |       | 22   | 180   | mV                | 20 V ≤ V <sub>IN</sub> ≤ 28 V  |
| Load Regulation                           | REG <sub>L</sub>     |       | 11   | 180   | mV                | 5 mA ≤ I <sub>o</sub> ≤ 1 A  |
| Quiescent Current                         | I <sub>BIAS</sub>    |       | 2.5  | 3.2   | mA                | I <sub>o</sub> = 0   |
|   |                      |       | 10   | 60    |                   | I <sub>o</sub> = 1 A   |
| Start-up Current                          | I <sub>BIAS(S)</sub> |       |      | 15    | mA                | V <sub>IN</sub> = 17.5 V, I <sub>o</sub> = 0 mA  |
|   |                      |       |      | 75    |                   | V <sub>IN</sub> = 17.5 V, I <sub>o</sub> = 1 A   |
| Quiescent Current Change                  | ΔI <sub>BIAS</sub>   |       |      | 20    | mA                | 20 V ≤ V <sub>IN</sub> ≤ 28 V, I <sub>o</sub> = 1 A  |
| Output Noise Voltage                      | V <sub>n</sub>       |       | 350  |       | μV <sub>rms</sub> | 10 Hz ≤ f ≤ 100 kHz  |
| Ripple Rejection                          | R <sub>R</sub>       | 49    | 54   |       | dB                | f = 120 Hz, 20 V ≤ V <sub>IN</sub> ≤ 28 V  |
| Dropout Voltage                           | V <sub>DF</sub>      |       | 0.5  | 1.0   | V                 | I <sub>o</sub> = 1 A, 0 °C ≤ T <sub>J</sub> ≤ 125 °C   |
| Short Circuit Current                     | I <sub>OSHORT</sub>  |       | 0.8  |       | A                 | V <sub>IN</sub> = 28 V   |
| Peak Output Current                       | I <sub>OPEAK</sub>   | 1.55  | 2.2  | 3.0   | A                 |  |
| Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT  |       | 2.5  |       | mV/°C             | I <sub>o</sub> = 5 mA, 0 °C ≤ T <sub>J</sub> ≤ 125 °C  |



TYPICAL CHARACTERISTICS



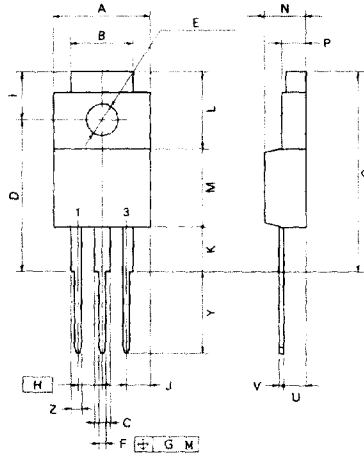
TYPICAL CHARACTERISTICS



PACKAGE DIMENSIONS (Unit: mm)

μPC2400AHF Series

3PIN PLASTIC SIP (MP-45G)



P3HF-254B-1

NOTE

Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

| ITEM | MILLIMETERS           | INCHES                   |
|------|-----------------------|--------------------------|
| A    | 10.4 MAX.             | 0.410 MAX.               |
| B    | 7.0                   | 0.276                    |
| C    | 1.2 MIN.              | 0.047 MIN.               |
| D    | 17.0 <sup>+0.3</sup>  | 0.669 <sup>-0.013</sup>  |
| E    | φ3.3 <sup>-0.2</sup>  | φ0.130 <sup>+0.008</sup> |
| F    | 0.75 <sup>+0.10</sup> | 0.030 <sup>-0.004</sup>  |
| G    | 0.25                  | 0.010                    |
| H    | 2.54 (T.P.)           | 0.100 (T.P.)             |
| I    | 5.0 <sup>+0.3</sup>   | 0.197 <sup>-0.012</sup>  |
| J    | 2.66 MAX.             | 0.105 MAX.               |
| K    | 4.8 MIN.              | 0.188 MIN.               |
| L    | 8.5                   | 0.335                    |
| M    | 8.5                   | 0.335                    |
| N    | 4.5 <sup>+0.2</sup>   | 0.177 <sup>+0.008</sup>  |
| P    | 2.8 <sup>+0.2</sup>   | 0.110 <sup>+0.009</sup>  |
| Q    | 22.4 MAX.             | 0.882 MAX.               |
| U    | 2.4 <sup>+0.5</sup>   | 0.094 <sup>+0.021</sup>  |
| V    | 0.85 <sup>-0.10</sup> | 0.026 <sup>-0.004</sup>  |
| Y    | 8.9 <sup>+0.7</sup>   | 0.350 <sup>+0.028</sup>  |
| Z    | 1.0 MIN.              | 0.039 MIN.               |

**RECOMMENDED SOLDERING CONDITIONS**

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

**TYPES OF THROUGH HOLE MOUNT DEVICE**

**μPC2400AHF Series**

| Soldering Process | Soldering Conditions  | Symbol |
|-------------------|---|--------|
| Wave soldering    | Solder temperature: 260 °C or below.<br>Flow Time: 10 seconds or below. |        |

**REFERENCE**

| Document Name  | Document No. |
|--|--------------|
| NEC semiconductor device reliability/quality control system. | IEI-1212     |
| Quality grade on NEC semiconductor devices.                  | IEI-1209     |
| Semiconductor device mounting technology manual.             | IEI-1207     |
| Semiconductor device package manual.                         | IEI-1213     |
| Guide to quality assurance for semiconductor devices.        | MEI-1202     |
| Semiconductor selection guide.                               | MF-1134      |