



# Linear Voltage Regulator – 7805AC

Positive Fixed 5V Voltage Regulator in bare die form

Rev 1.1  
19/02/24

## Description

The 7805AC 5V fixed 3-terminal positive voltage regulator delivers up to 1.5A of output current with adequate heat-sinking. The device is equipped with internal limiting, safe-area compensation + thermal shutdown features for overload immunity. 7805AC can be used with external components to obtain adjustable voltages or currents & can also be used as the power-pass element in precision high-current voltage regulators. No external components are needed other than to enhance performance or increase design flexibility.

## Features:

- $\pm 2\%$   $V_{OUT}$  tolerance at 25°C
- Greater than 1A output current capability
- Internal thermal overload protection
- Internal short-circuit current limit
- Output capacitor not essential for stability
- Full Military temperature range
- Negative voltage complement is 7905AC.

## Ordering Information

The following part suffixes apply:

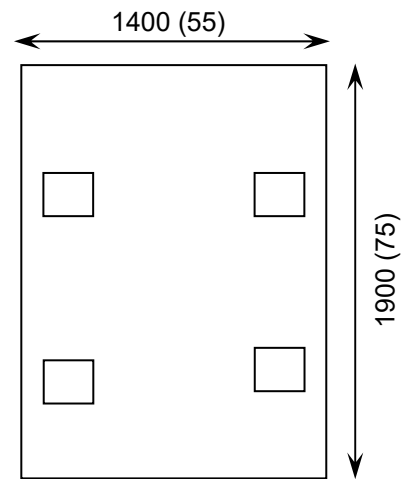
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "H" - MIL-STD-883 /2010B Visual Inspection + MIL-PRF-38534 Class H LAT
- "K" - MIL-STD-883 /2010A Visual Inspection (Space) + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

[www.siliconsupplies.com/quality/bare-die-lot-qualification](http://www.siliconsupplies.com/quality/bare-die-lot-qualification)

## Die Dimensions in $\mu\text{m}$ (mils)



## Supply Formats:

- Default – Die in Waffle Pack (100 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- Tape & Reel – On request
- In Metal or Ceramic package – On request

## Mechanical Specification

|                        |  |                       |
|------------------------|--|-----------------------|
| Die Size (Unsawn)      | 1400 x1900<br>55 x 75                    | $\mu\text{m}$<br>mils |
| Minimum Bond Pad Size  | 230 x 230<br>9.05 x 9.05                 | $\mu\text{m}$<br>mils |
| Die Thickness          | 280 ( $\pm 20$ )<br>11.02 ( $\pm 0.79$ ) | $\mu\text{m}$<br>mils |
| Top Metal Composition  | Al 1%Si 1.1 $\mu\text{m}$                |                       |
| Back Metal Composition | Ti/Ni/Ag 1.2 $\mu\text{m}$               |                       |

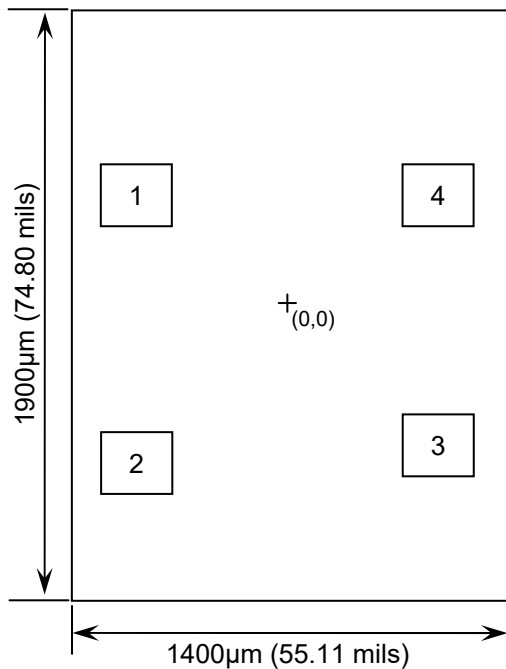




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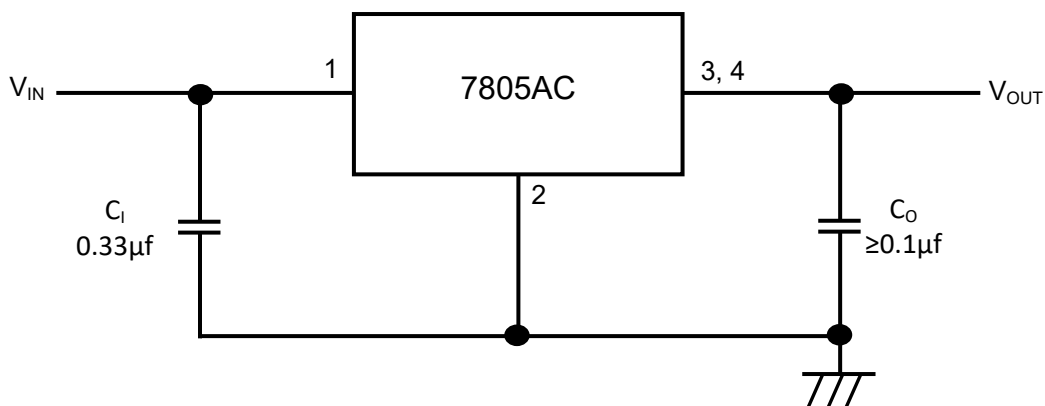
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## Pad Layout and Functions



| PAD                      | FUNCTION         | COORDINATES (µm) |      |
|--------------------------|------------------|------------------|------|
|                          |                  | X                | Y    |
| 1                        | V <sub>IN</sub>  | -610             | 247  |
| 2                        | GND              | -610             | -626 |
| 3                        | V <sub>OUT</sub> | 372              | -560 |
| 4                        | V <sub>OUT</sub> | 372              | 247  |
| CONNECT CHIP BACK TO GND |                  |                  |      |

## Typical Application



$C_i$  is required if the regulator is located an appreciable distance from power supply filter.  $C_o$  is not required for stability; however it does improve transient response. For optimum stability and transient response locate  $C_i$   $C_o$  as close as possible to the regulator. A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.





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## Absolute Maximum Ratings<sup>1</sup>

| PARAMETER                      | SYMBOL    | VALUE              | UNIT |
|--------------------------------|-----------|--------------------|------|
| Input Voltage                  | $V_{IN}$  | 36                 | V    |
| Power Dissipation <sup>2</sup> | $P_D$     | Internally Limited | W    |
| Operating Temperature Range    | -         | -55 to 150         | °C   |
| Maximum Junction Temperature   | $T_J$     | 150                | °C   |
| Storage Temperature            | $T_{STG}$ | -65 to 150         | °C   |

## Recommended Operating Conditions

| PARAMETER                   | SYMBOL    | MIN | MAX | UNIT |
|-----------------------------|-----------|-----|-----|------|
| Input Voltage               | $V_{IN}$  | 7   | 25  | V    |
| Output Current              | $I_{OUT}$ | -   | 1.5 | A    |
| Operating Temperature Range | $T_J$     | -55 | 125 | °C   |

## DC Electrical Characteristics, $V_I = 10V, I_{OUT} = 500mA, C_I = 0.33\mu F, C_O = 0.1\mu f, T_{MIN} \leq T_J \leq T_{MAX}$ (unless noted otherwise)

| PARAMETER                             | SYMBOL             | TEST CONDITIONS  | MIN  | TYP  | MAX  | UNITS           |
|---------------------------------------|--------------------|--|------|------|------|-----------------|
| Output Voltage                        | $V_{OUT}$          | $T_J = 25^\circ C, I_{OUT} = 1A$   | 4.90 | 5.00 | 5.10 | V               |
|                                       |                    | $5mA \leq I_{OUT} \leq 1A, 7V \leq V_{IN} \leq 20V, P_D \leq 15 \text{ Watts}$ | 4.80 | 5.00 | 5.20 |                 |
| Line Regulation                       | $\Delta V_{OUT}$   | $7.5V \leq V_{IN} \leq 25V$  | -    | -    | 100  | mV              |
|                                       |                    | $8V \leq V_{IN} \leq 12V, I_{OUT} = 1A$  | -    | -    | 50   |                 |
|                                       |                    | $8V \leq V_{IN} \leq 12V, I_{OUT} = 1A, T_J = 25^\circ C$                      | -    | -    | 50   |                 |
|                                       |                    | $7.3V \leq V_{IN} \leq 20V, I_{OUT} = 1A, T_J = 25^\circ C$                    | -    | -    | 100  |                 |
| Load Regulation                       | $\Delta V_{OUT}$   | $5mA \leq I_{OUT} \leq 1A$   | -    | -    | 100  | mV              |
|                                       |                    | $250mA \leq I_{OUT} \leq 750mA, T_J = 25^\circ C$                              | -    | -    | 50   |                 |
| Input Bias Current                    | $I_B$              | $I_{OUT} = 1A$   | -    | 3.2  | 6.0  | mA              |
| Input Bias Current Change             | $\Delta I_B$       | $8V \leq V_{IN} \leq 25V$  | -    | 0.3  | 0.8  | mA              |
|                                       |                    | $7.5V \leq V_{IN} \leq 20V, I_{OUT} = 1A, T_J = 25^\circ C$                    | -    | -    | 0.8  |                 |
|                                       |                    | $5mA \leq I_{OUT} \leq 1A$   | -    | 0.08 | 0.5  |                 |
| Output Noise Voltage                  | $V_n$              | $10Hz \leq f \leq 100KHz, T_J = 25^\circ C$                                    | -    | 10   | -    | $\mu V/V_{OUT}$ |
| Ripple Rejection                      | RR                 | $8V \leq V_{IN} \leq 18V, f = 120Hz,$  | 62   | 83   | -    | dB              |
| Dropout Voltage                       | $V_{IN} - V_{OUT}$ | $I_{OUT} = 1A, T_J = 25^\circ C$   | -    | 2    | -    | V               |
| Output Resistance                     | $r_{OUT}$          | $f = 1 \text{ kHz}$  | -    | 0.9  | -    | m $\Omega$      |
| Short-Circuit Current Limit           | $I_{SC}$           | $V_{IN} = 35V, T_A = 25^\circ C$   | -    | 0.2  | -    | A               |
| Peak Output Current                   | $I_{MAX}$          | $T_J = 25^\circ C$   | -    | 2.2  | -    | A               |
| Avg. Output Voltage Temp. Coefficient | $TCV_{OUT}$        |  | -    | -0.3 | -    | mV/°C           |

1. Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability. 2. Results in die form depend on die attach & assembly method. Max power dissipation is internally limited by the die.





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## Typical Characteristics

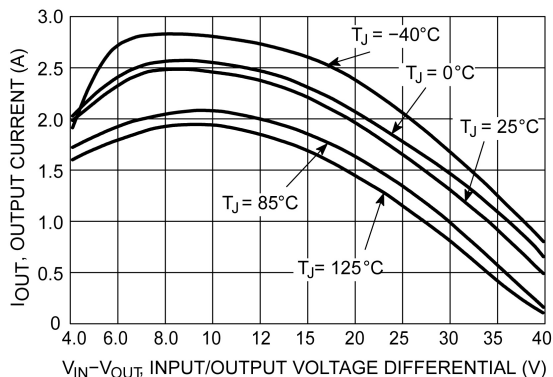


Figure 1 – Peak output current as a function of input/output differential voltage

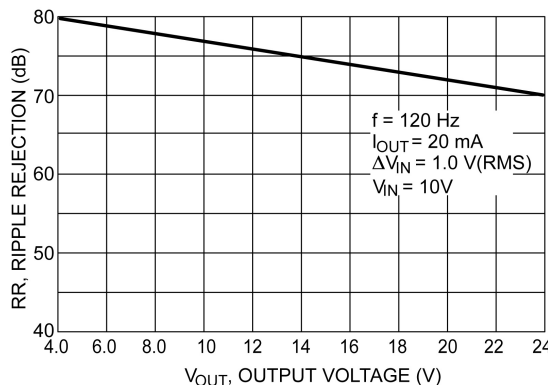


Figure 2 – Ripple rejection as a function of output voltage

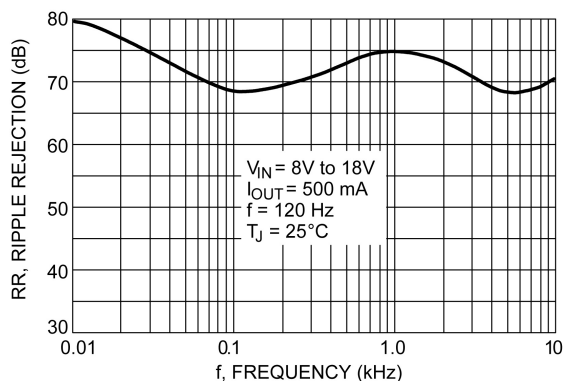


Figure 3 – Ripple rejection as a function of frequency

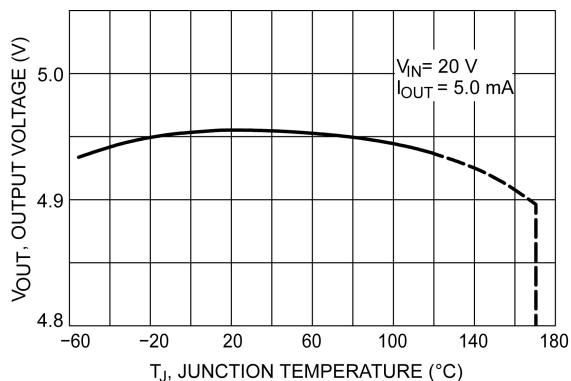


Figure 4 – Output voltage as a function of junction temperature

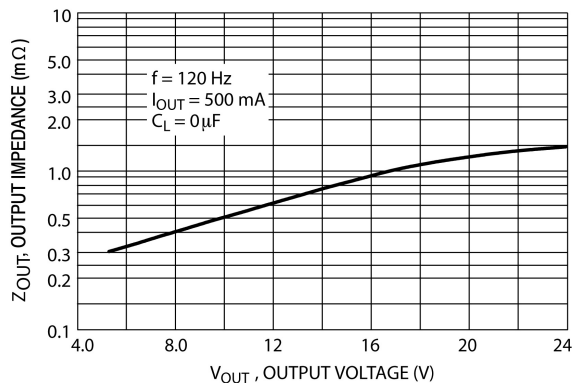


Figure 5 – Output impedance as a function of output Voltage

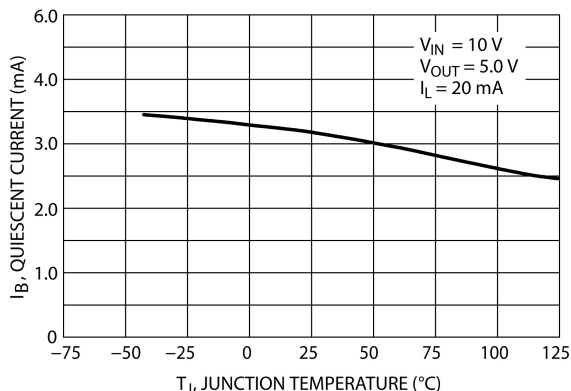


Figure 6 – Quiescent current as a function of temperature

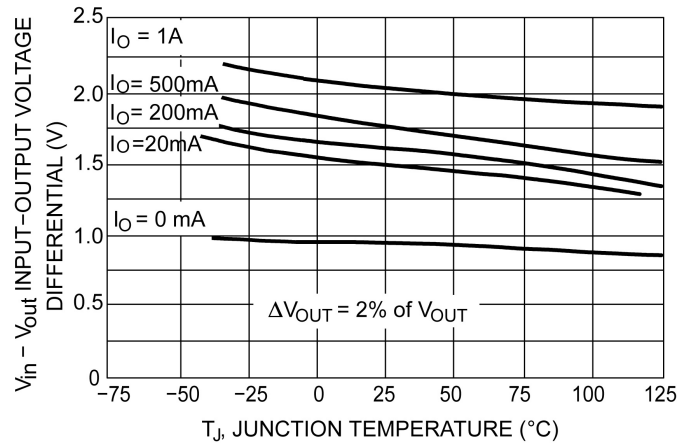




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**Figure 7** – Input/Output differential voltage as a function of junction temperature

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