



# Linear Voltage Regulator – 7912AC

Negative Fixed 12V Voltage Regulator in bare die form

Rev 1.0  
19/04/19

## Description

The 7912AC 12V fixed 3-terminal negative 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. The 7912AC 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:

- $\pm 4\%$   $V_{OUT}$  tolerance over entire temperature range
- 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
- Positive voltage complement is 7812AC

## Ordering Information

The following part suffixes apply:

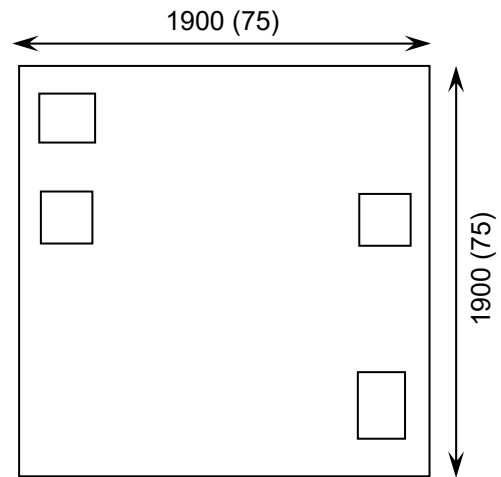
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "H" - MIL-STD-883 /2010B Visual Inspection + MIL-PRF-38534 Class H LAT
- "K" - MIL-STD-883 /2010A Visual Inspection (Space) + MIL-PRF-38534 Class K LAT

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)      | 1900 x1900<br>75 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 $\mu\text{m}$               |                       |

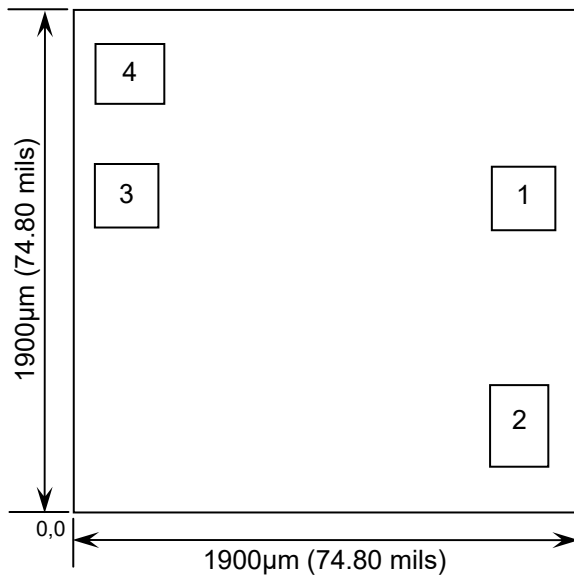




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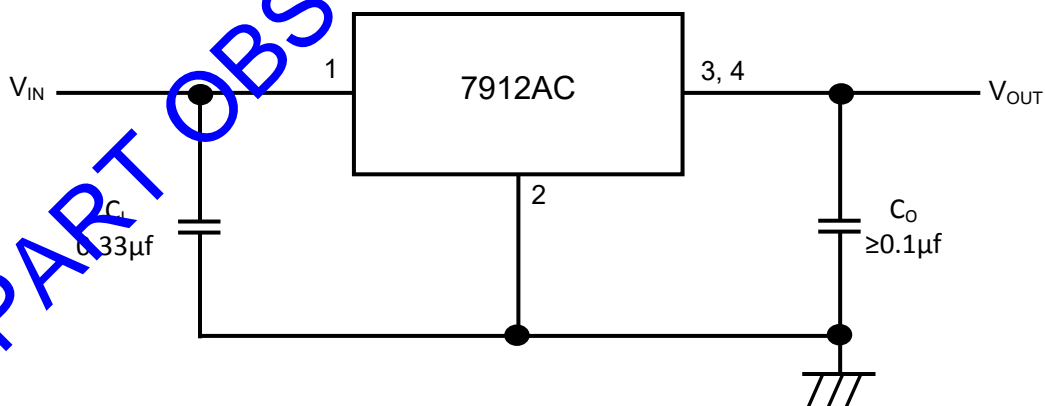
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## Pad Layout and Functions



| PAD                                  | FUNCTION        | COORDINATES (µm) |       |
|--------------------------------------|-----------------|------------------|-------|
|                                      |                 | X                | Y     |
| 1                                    | V <sub>IN</sub> | 1.575            | 1.074 |
| 2                                    | GN <sub>D</sub> | 1.572            | 0.188 |
| 3                                    | V <sub>OU</sub> | 0.088            | 1.059 |
| 4                                    | V <sub>OU</sub> | 0.088            | 1.553 |
| CONNECT CHIP BACK TO V <sub>IN</sub> |                 |                  |       |

## 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

| PARAMETER                      | SYMBOL    | VALUE              | UNIT |
|--------------------------------|-----------|--------------------|------|
| Input Voltage                  | $V_{IN}$  | -35                | V    |
| Power Dissipation <sup>1</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               | $V_{IN}$  | -25 | -25 | V    |
| Output Current              | $I_{OUT}$ | -   | 1.5 | A    |
| Operating Temperature Range | $T_J$     | -55 | 125 | °C   |

## DC Electrical Characteristics, $V_I = -19V, I_{OUT} = 500mA, C_i = 0.33\mu F, C_o = 0.1\mu f, T_{MIN} \leq T_J \leq T_{MAX}$ (unless noted otherwise)

| PARAMETER                             | SYMBOL             | TEST CONDITIONS  | MIN    | TYP  | MAX    | UNITS           |
|---------------------------------------|--------------------|--|--------|------|--------|-----------------|
| Output Voltage                        | $V_{OUT}$          | $T_J = 25^\circ C$   | -11.75 | -12  | -12.25 | V               |
|                                       |                    | $5mA \leq I_{OUT} \leq 1A,$<br>$-14.8V \geq V_{IN} \geq -27V, P_D \leq 15 \text{ Watts}$ | -11.50 | -    | -12.50 |                 |
| Line Regulation                       | $\Delta V_{OUT}$   | $-16V \geq V_{IN} \geq -22V, I_{OUT} = 1A, T_J = 25^\circ C$                             | -      | 6    | 60     | mV              |
|                                       |                    | $-16V \geq V_{IN} \geq -22V, I_{OUT} = 1A$   | -      | 24   | 120    |                 |
|                                       |                    | $-14.8V \geq V_{IN} \geq -30V, I_{OUT} = 0.5A$   | -      | 24   | 120    |                 |
|                                       |                    | $-14.5V \geq V_{IN} \geq -27V, I_{OUT} = 1A, T_J = 25^\circ C$                           | -      | 13   | 120    |                 |
| Load Regulation                       | $\Delta V_{OUT}$   | $5mA \leq I_{OUT} \leq 1.5A, T_J = 25^\circ C$   | -      | 46   | 150    |                 |
|                                       |                    | $250mA \leq I_{OUT} \leq 750mA$  | -      | 17   | 75     |                 |
|                                       |                    | $5mA \leq I_{OUT} \leq 1A$   | -      | 35   | 150    |                 |
| Input Bias Current                    | $I_B$              |  | -      | 4.3  | 7.8    | mA              |
| Input Bias Current Change             | $\Delta I_B$       | $-15V \geq V_{IN} \geq -30V$   | -      | -    | 0.8    | mA              |
|                                       |                    | $5mA \leq I_{OUT} \leq 1A$   | -      | -    | 0.5    |                 |
|                                       |                    | $5mA \leq I_{OUT} \leq 1.5A, T_J = 25^\circ C$   | -      | -    | 0.5    |                 |
| Output Noise Voltage                  | $V_n$              | $10Hz \leq f \leq 100KHz, T_J = 25^\circ C$  | -      | 75   | -      | $\mu V/V_{OUT}$ |
| Ripple Rejection                      | RR                 | $I_{OUT} = 20mA, f = 120Hz,$   | -      | 61   | -      | dB              |
| Dropout Voltage                       | $V_{IN} - V_{OUT}$ | $I_{OUT} = 1A, T_J = 25^\circ C$   | -      | 2    | -      | V               |
| Peak Output Current                   | $I_{MAX}$          | $T_J = 25^\circ C$   | -      | 2.1  | -      | A               |
| Avg. Output Voltage Temp. Coefficient | $TCV_{OUT}$        | $I_{OUT} = 5mA, 0^\circ C \leq T_J \leq +125^\circ C$                                    | -      | -1.0 | -      | mV/°C           |

1. Results in die form are dependent on die attach and assembly method. Max power dissipation is internally limited by the die.





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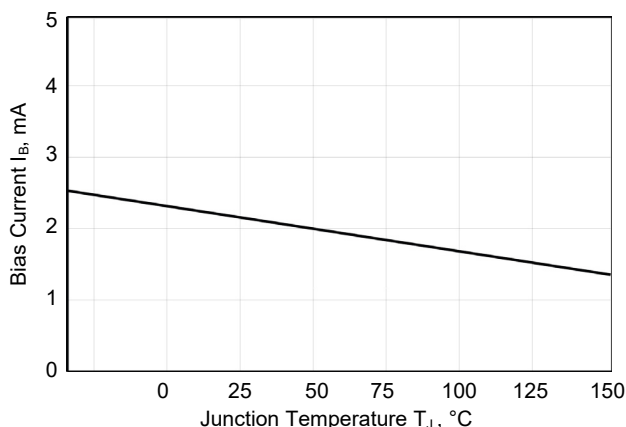


Figure 1 – Bias Current Versus Temperature

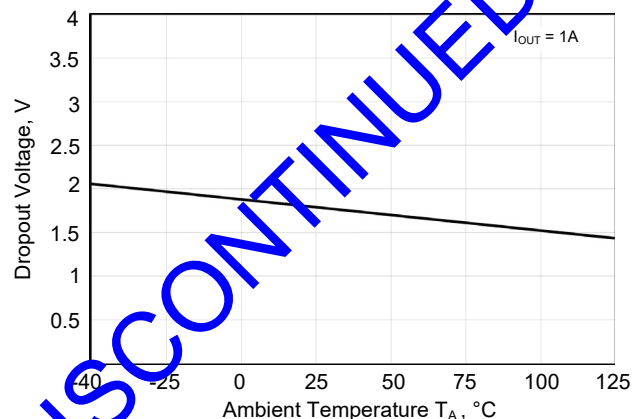


Figure 2 – Dropout Voltage Versus Temperature

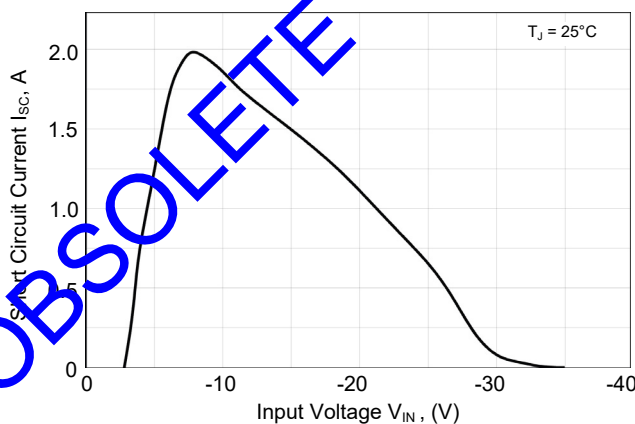


Figure 3 – Short-Circuit Current Versus Input Voltage

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