



Linear Voltage Regulator – 7812

Positive Fixed 12V Voltage Regulator in bare die form

Rev 1.0
19/04/19

Description

The 7812 12V 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. The 7812 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:

- $\pm 5\%$ 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
- Negative voltage complement is 7912

Ordering Information

The following part suffixes apply:

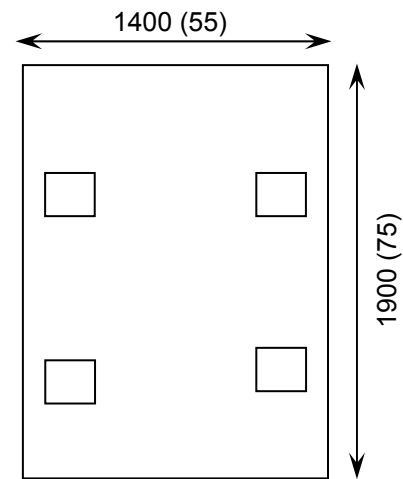
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "H" - MIL-STD-883 /2010B Visual Inspection + MIL-PRF-38534 Class H LAT
- "K" - MIL-STD-883 /2010A Visual Inspection (Space) + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com/quality/bare-die-lot-qualification

Die Dimensions in μm (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 55 x 75 | μm mils |
| Minimum Bond Pad Size | 230 x 230 9.05 x 9.05 | μm mils |
| Die Thickness | 280 (± 20) 11.02 (± 0.79) | μm mils |
| Top Metal Composition | Al 1%Si 1.1 μm | |
| Back Metal Composition | Ti/Ni/Ag 1.2 μm | |

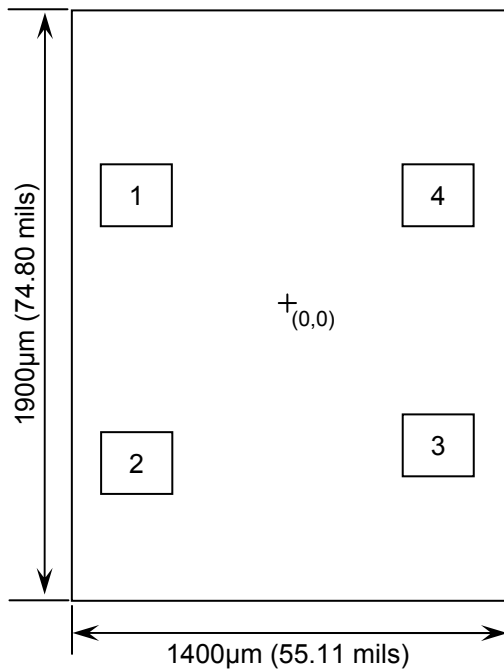




Linear Voltage Regulator – 7812

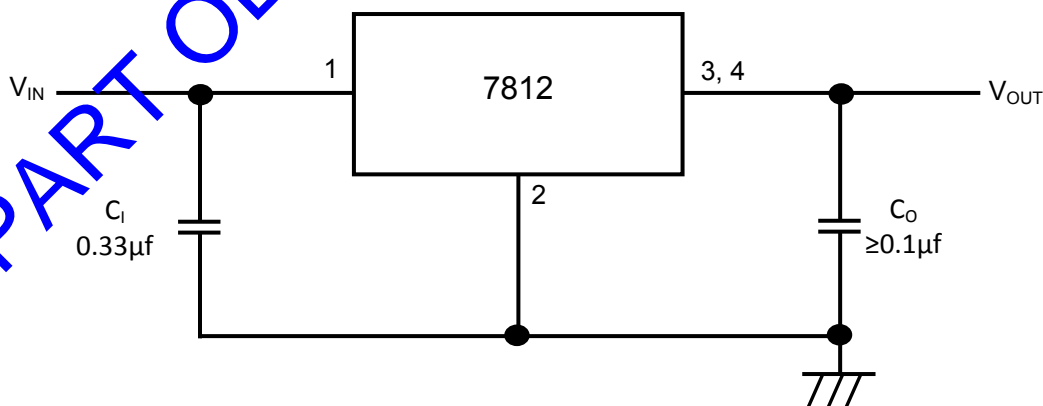
Rev 1.0
19/04/19

Pad Layout and Functions



| PAD | FUNCTION | COORDINATES (µm) | |
|--------------------------|------------------|------------------|------|
| | | X | Y |
| 1 | V _{IN} | -610 | 247 |
| 2 | GND | -610 | -626 |
| 3 | V _{OUT} | 372 | -560 |
| 4 | V _{OUT} | 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.





Linear Voltage Regulator – 7812

Rev 1.0
19/04/19

Absolute Maximum Ratings¹

| PARAMETER | SYMBOL | VALUE | UNIT |
|--------------------------------|-----------|--------------------|------|
| Input Voltage | V_{IN} | 36 | V |
| Power Dissipation ² | 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} | 11.5 | 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} | $T_J = 25^\circ C$ | 11.5 | 12 | 12.5 | V |
| | | $5mA \leq I_{OUT} \leq 1A$, $14.5V \leq V_{IN} \leq 27V$, $P_D \leq 15$ Watts | 11.4 | 12 | 12.6 | |
| Line Regulation | ΔV_{OUT} | $14.5V \leq V_{IN} \leq 30V$, $T_J = 25^\circ C$ | - | 3.8 | 24 | mV |
| | | $16V \leq V_{IN} \leq 22V$, $T_J = 25^\circ C$ | - | 0.3 | 24 | |
| | | $14.8V \leq V_{IN} \leq 27V$, $I_{OUT}=1A$, $T_J = 25^\circ C$ | - | - | 48 | |
| Load Regulation | ΔV_{OUT} | $5mA \leq I_{OUT} \leq 1.5A$, $T_J = 25^\circ C$ | - | 8.1 | 60 | |
| Input Bias Current | I_B | | - | 3.4 | 6.5 | mA |
| Input Bias Current Change | ΔI_B | $14.5V \leq V_{IN} \leq 30V$, $I_{OUT}=1A$, $T_J = 25^\circ C$ | - | - | 0.7 | mA |
| | | $15V \leq V_{IN} \leq 30V$ | - | - | 0.8 | |
| | | $5mA \leq I_{OUT} \leq 1A$ | - | - | 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 | $15V \leq V_{IN} \leq 25V$, $f = 120Hz$ | 55 | 60 | - | dB |
| Dropout Voltage | $V_{IN} - V_{OUT}$ | $I_{OUT} = 1A$, $T_J = 25^\circ C$ | - | 2 | - | V |
| Output Resistance | r_{OUT} | $f = 1 kHz$ | - | 1.1 | - | m Ω |
| 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} | | - | -0.8 | - | 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 are dependent on die attach and assembly method. Max power dissipation is internally limited by the die.





Linear Voltage Regulator – 7812

Rev 1.0

19/04/19

Typical Characteristics

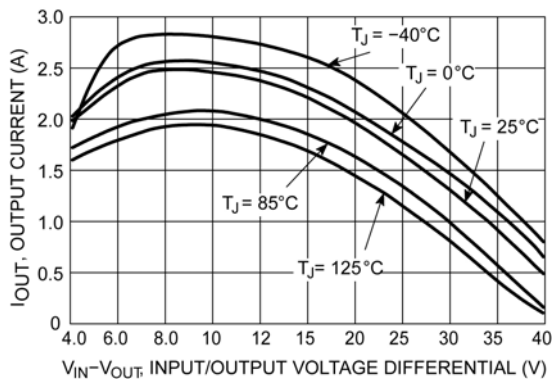


Figure 1 – Peak output current as a function of input/output differential voltage

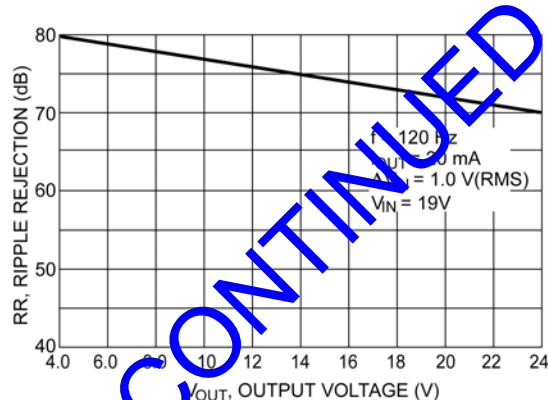


Figure 2 – Ripple rejection as a function of output voltage

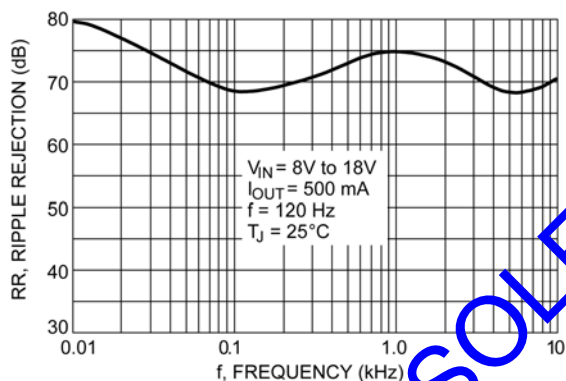


Figure 3 – Ripple rejection as a function of frequency

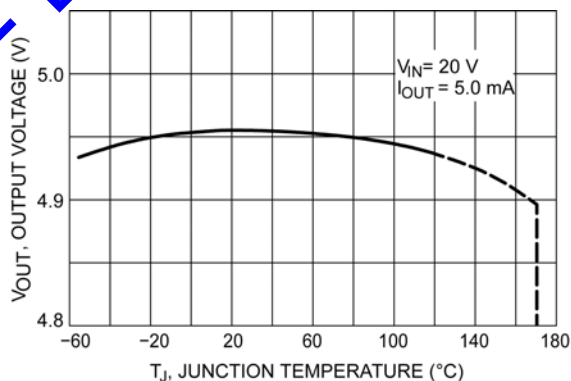


Figure 4 – Output voltage as a function of junction temperature

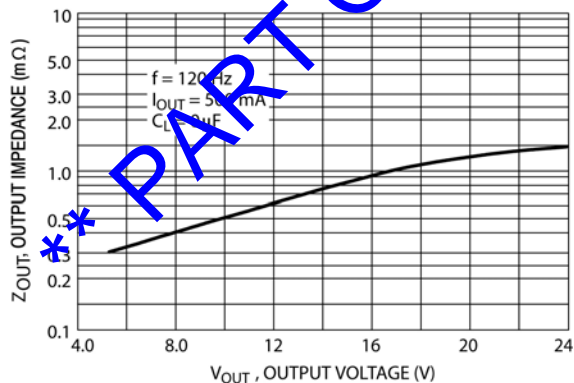


Figure 5 – Output impedance as a function of output Voltage

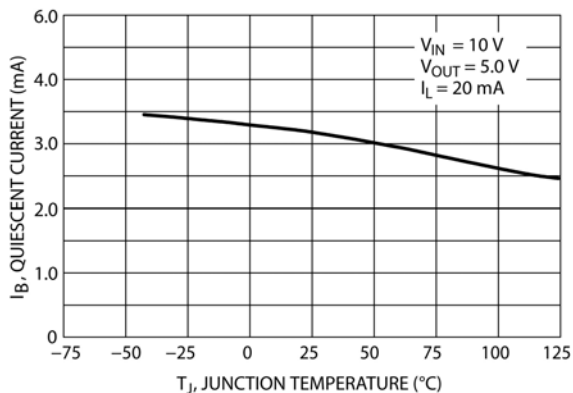


Figure 6 – Quiescent current as a function of temperature





Linear Voltage Regulator – 7812

Rev 1.0

19/04/19

Typical Characteristics

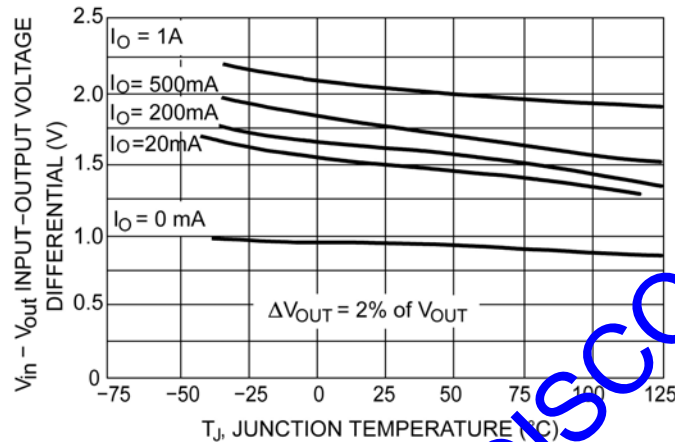


Figure 7 – Input/Output differential voltage as a function of junction temperature

DISCLAIMER: The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Silicon Supplies Ltd hereby disclaims any and all warranties and liabilities of any kind.

LIFE SUPPORT POLICY: Silicon Supplies Ltd components may be used in life support devices or systems only with the express written approval of Silicon Supplies Ltd, if a failure of such components can reasonably be expected to cause the failure of that life support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

