Linear Voltage Regulator – 7809AC

Positive Fixed 9V Voltage Regulator in bare die form

Rev 1.0
19/04/19

Description

The 7809AC 9V 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 7809AC 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:

- ±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 7909AC

Ordering Information

The following part suffixes apply:

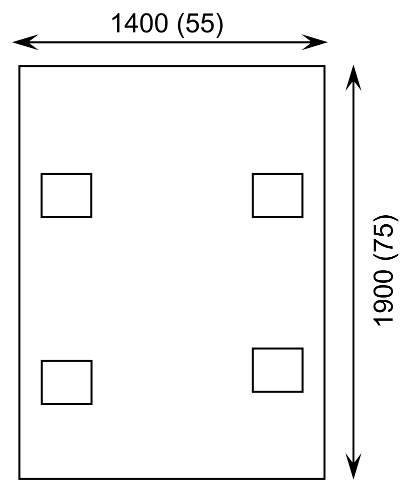
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "**H**" - MIL-STD-883 /2010B Visual Inspection
  + MIL-PRF-38534 Class H LAT
- "**K**" - MIL-STD-883 /2010A Visual Inspection (Space)
  + MIL-PRF-38534 Class K LAT

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 1.1µm	
Back Metal Composition	Ti/Ni/Ag 1.2 µm	

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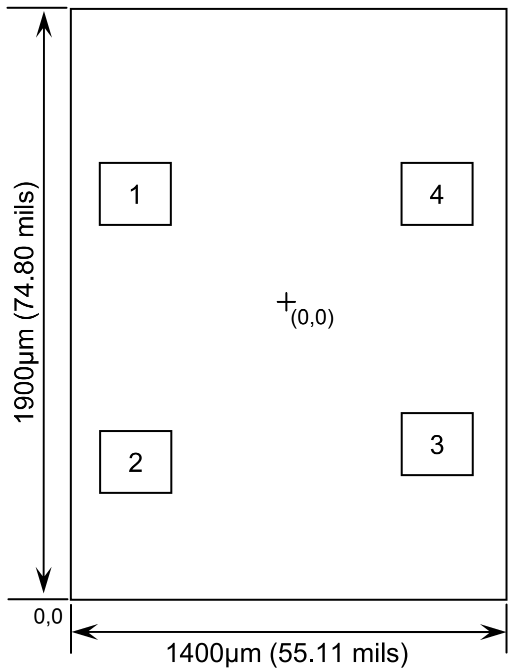
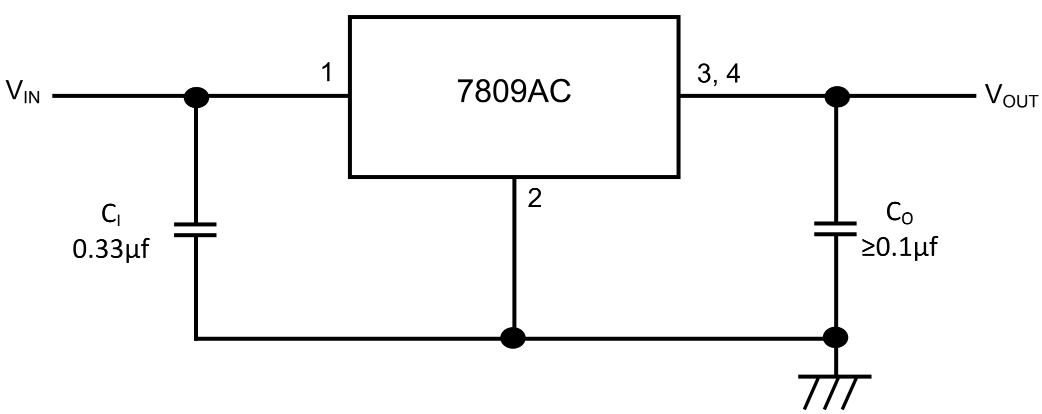
Pad Layout and Functions



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.

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Absolute Maximum Ratings[1]

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}	7	25	V
Output Current	I_{OUT}	-	1.5	A
Operating Temperature Range	T_J	-55	125	°C

DC Electrical Characteristics, V_I =15V, I_{OUT}=500mA,C_I=0.33µF, C_O=0.1µf, $T_{MIN} \leq T_J \leq T_{MAX}$(unless noted otherwise)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	T_J = 25°C, I_{OUT} = 1A	8.82	9.0	9.18	9.35
		5mA ≤ I_{OUT} ≤ 1A, 11.5V ≤ V_{IN} ≤ 24V, P_D ≤ 15 Watts	8.65	9.0	9.35	
Line Regulation	ΔV_{OUT}	11.5V ≤ V_{IN} ≤ 26V	-	6.2	16	mV
		12V ≤ V_{IN} ≤ 17V, I_{OUT} = 1A	-	1.8	7	
		11.5V ≤ V_{IN} ≤ 24V, I_{OUT} =1A,T_J=25°C	-	5.2	16	
Load Regulation	ΔV_{OUT}	5mA ≤ I_{OUT} ≤ 1.5A, T_J = 25°C	-	-	25	
		5mA ≤ I_{OUT} ≤ 1A	-	-	25	
		250mA ≤ I_{OUT} ≤ 750mA	-	-	15	
Input Bias Current	I_B		-	3.3	6	mA
Input Bias Current Change	ΔI_B	11.5V ≤ V_{IN} ≤ 26V	-	-	0.8	mA
		11.5V ≤ V_{IN} ≤ 24V, I_{OUT} =1A,T_J=25°C	-	-	0.8	
		5mA ≤ I_{OUT} ≤ 1A	-	-	0.5	
Output Noise Voltage	V_n	10Hz ≤ f ≤ 100KHz, T_J = 25°C	-	10	-	µV/V_{OUT}
Ripple Rejection	RR	11.5V ≤ V_{IN} ≤ 21.5V, f = 120Hz,	56	61	-	dB
Dropout Voltage	$V_{IN} – V_{OUT}$	I_{OUT} = 1A, T_J = 25°C	-	2	-	V
Output Resistance	r_{OUT}	f = 1 kHz, I_{OUT} = 1A	-	1.0	-	mΩ
Short-Circuit Current Limit	I_{SC}	V_{IN} = 35V, T_A = 25°C	-	0.2	-	A
Peak Output Current	I_{MAX}	T_J = 25°C	-	2.2	-	A
Avg. Output Voltage Temp. Coefficient	TCV_{OUT}		-	-0.5	-	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 & assembly method. Max power dissipation is internally limited by the die.

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Typical Characteristics

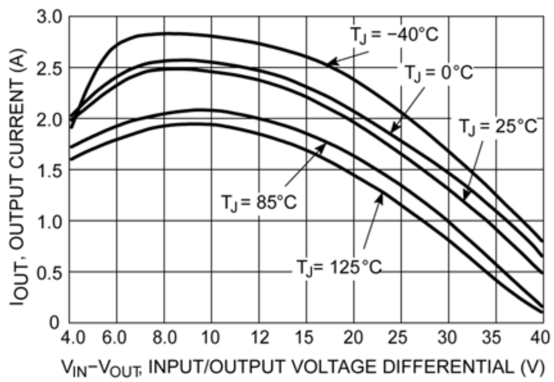

Figure 1 – Peak output current as a function of input/output differential voltage

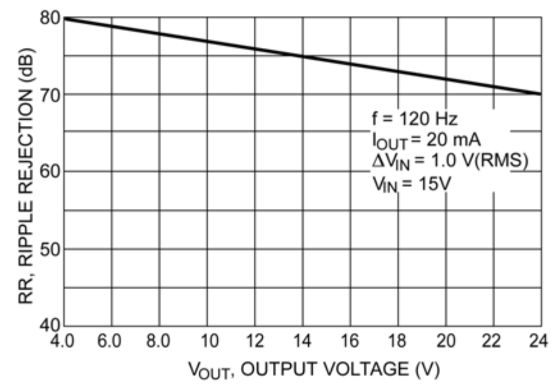

Figure 2 – Ripple rejection as a function of output voltage

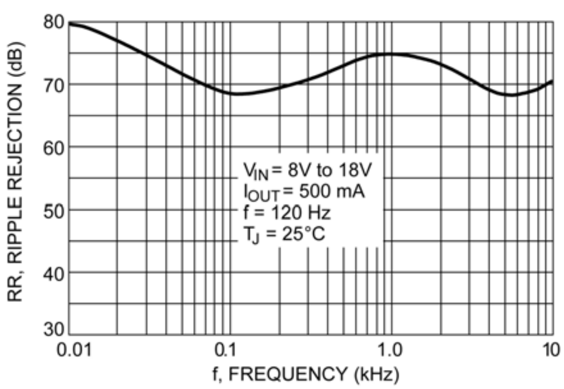

Figure 3 – Ripple rejection as a function of frequency

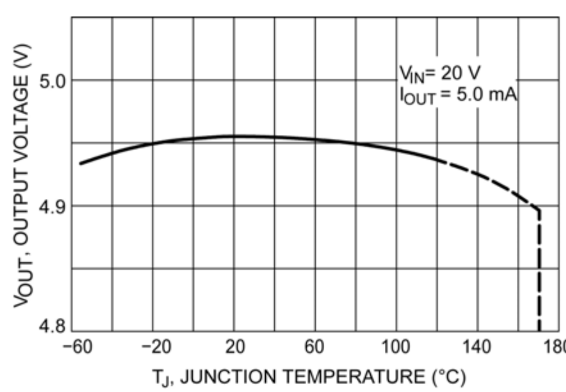

Figure 4 – Output voltage as a function of junction temperature

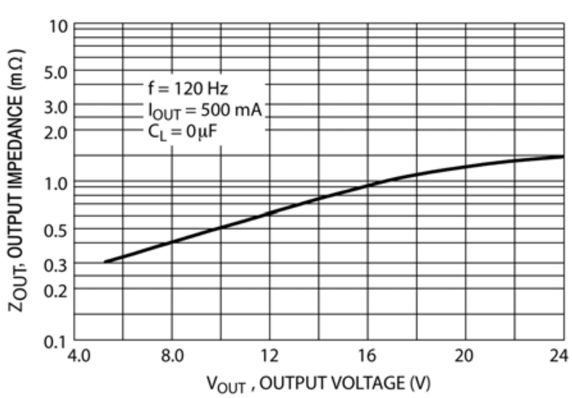

Figure 5 – Output impedance as a function of output Voltage

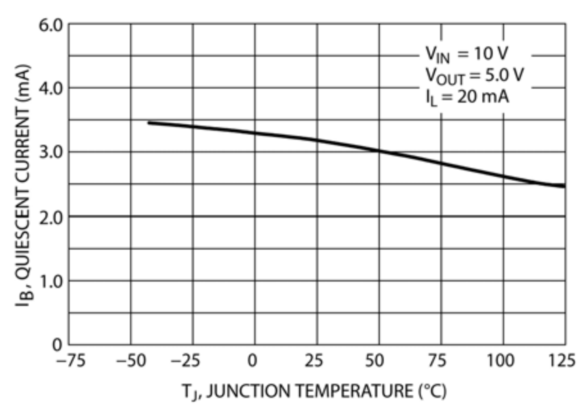

Figure 6 – Quiescent current as a function of temperature

Typical Characteristics

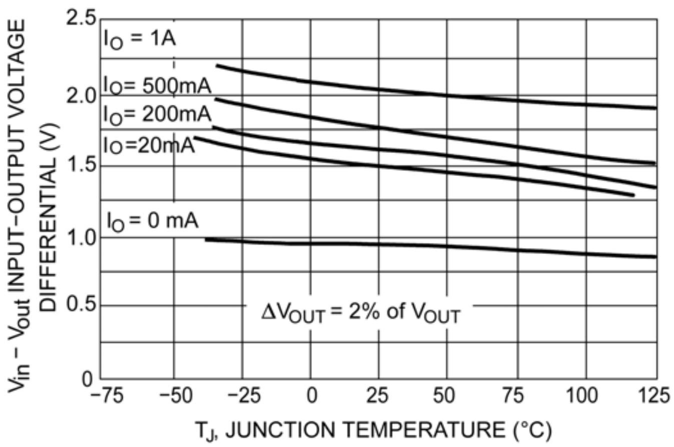

Figure 7 – Input/Output differential voltage as a function of junction temperature