Linear Voltage Regulator – 7905AC

Negative Fixed 5V Voltage Regulator in bare die form

Rev 1.0
19/04/19

Description

The 7905AC 5V 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 7905AC 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:

- ±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 7805AC

Ordering Information

The following part suffixes apply:

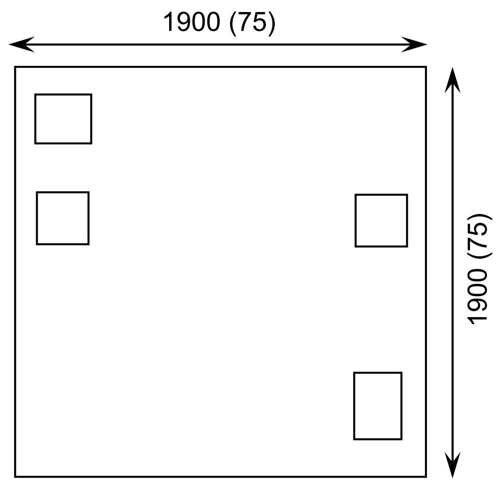
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "**H**" - MIL-STD-883 /2010B Visual Inspection
  + MIL-PRF-38534 Class H LAT
- "**K**" - MIL-STD-883 /2010A Visual Inspection (Space)
  + MIL-PRF-38534 Class K LAT

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)	1900 x1900 75 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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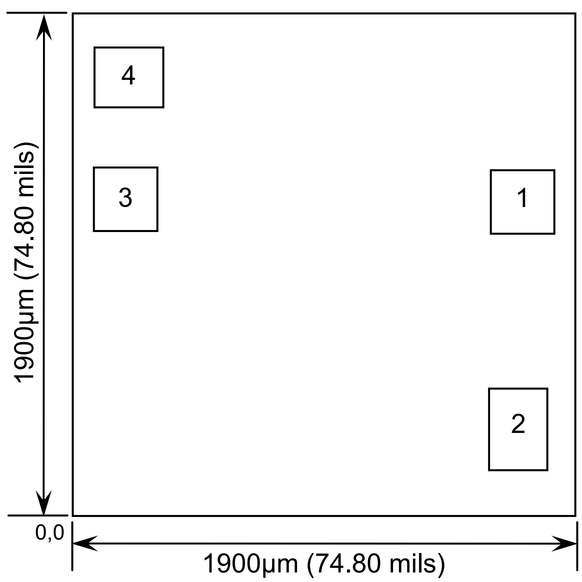
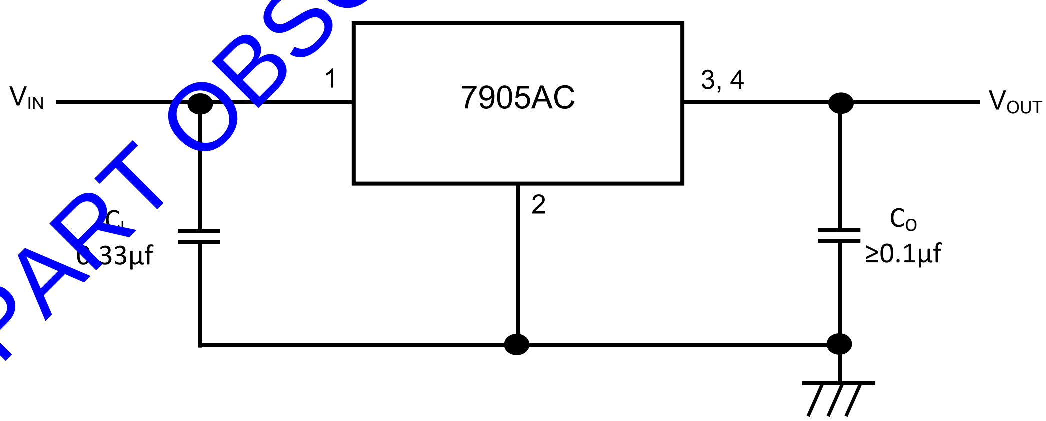
Pad Layout and Functions



PAD	FUNCTION	COORDINATES (µm)	
		X	Y
1	V_{IN}	1.575	1.074
2	GND	1.572	0.188
3	V_{OUT}	0.088	1.059
4	V_{OUT}	0.088	1.553
CONNECT CHIP BACK TO V_{IN}			

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.

Absolute Maximum Ratings

PARAMETER	SYMBOL	VALUE	UNIT
Input Voltage	V_{IN}	-35	V
Power Dissipation[1]	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=0.33μF, C_O=0.1μf, $T_{MIN} \le T_J \le T_{MAX}$(unless noted otherwise)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	T_J = 25°C	-4.90	-5.00	-5.10	V
		5mA ≤ I_{OUT} ≤ 1A, -7.5V ≥ V_{IN} ≥ -20V, P_D ≤ 15 Watts	-4.80	-5.00	-5.20	
Line Regulation	ΔV_{OUT}	-8V ≥ V_{IN} ≥ -12V, I_{OUT} = 1A, T_J= 25°C	-	2	25	mV
		-8V ≥ V_{IN} ≥ -12V, I_{OUT} = 1A	-	7	50	
		-7.5V ≥ V_{IN} ≥ -25V, I_{OUT} = 0.5A	-	7	50	
		-7V ≥ V_{IN} ≥ -20V, I_{OUT} = 1A, T_J= 25°C	-	6	50	
Load Regulation	ΔV_{OUT}	5mA ≤ I_{OUT} ≤ 1.5A, T_J= 25°C	-	11	100	
		250mA ≤ I_{OUT} ≤ 750mA	-	4	50	
		5mA ≤ I_{OUT} ≤ 1A	-	9	100	
Input Bias Current	I_B		-	4.3	7.8	mA
Input Bias Current Change	ΔI_B	-7.5V ≥ V_{IN} ≥ -25V	-	-	1.3	mA
		5mA ≤ I_{OUT} ≤ 1A	-	-	0.5	
		5mA ≤ I_{OUT} ≤ 1.5A, T_J = 25°C	-	-	0.5	
Output Noise Voltage	V_n	10Hz ≤ f ≤ 100KHz, T_J = 25°C	-	40	-	μV/V_{OUT}
Ripple Rejection	RR	I_{OUT} = 20mA, f = 120Hz,	-	70	-	dB
Dropout Voltage	$V_{IN} – V_{OUT}$	I_{OUT} = 1A, T_J = 25°C	-	2	-	V
Peak Output Current	I_{MAX}	T_J = 25°C	-	2.1	-	A
Avg. Output Voltage Temp. Coefficient	TCV_{OUT}	I_{OUT} = 5mA, 0°C ≤ T_J ≤ +125°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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Typical Characteristics

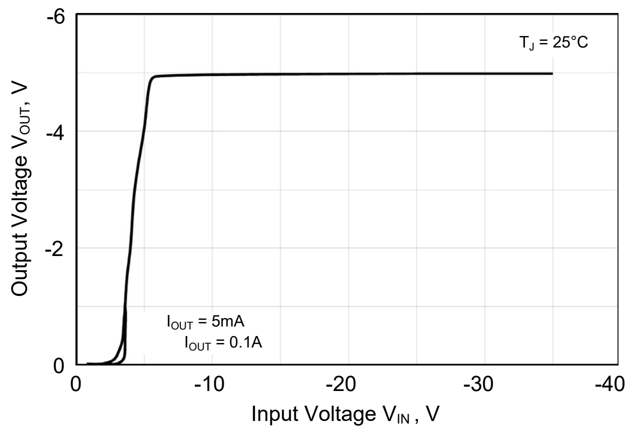

Figure 1 – Dropout Characteristics

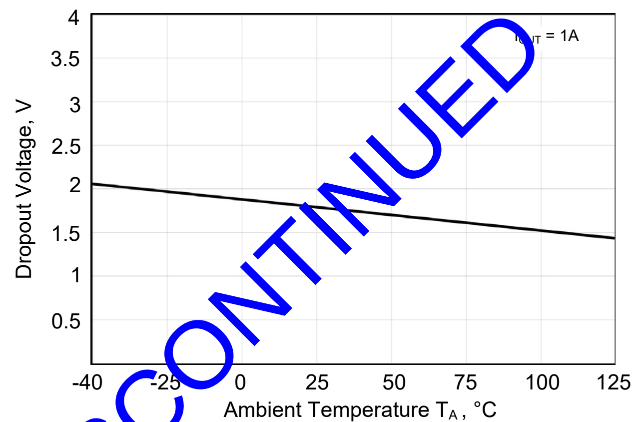

Figure 2 – Dropout Voltage Versus Temperature

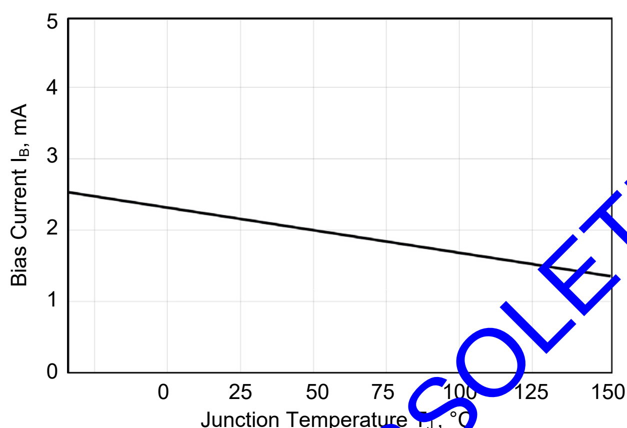

Figure 3 – Bias Current Versus Temperature

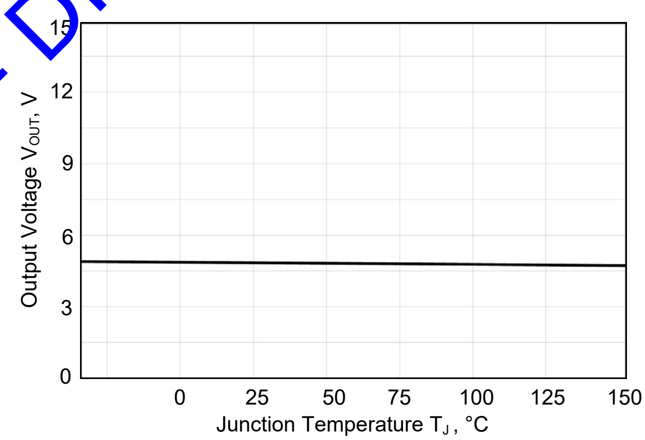

Figure 4 – Output Voltage Versus Temperature

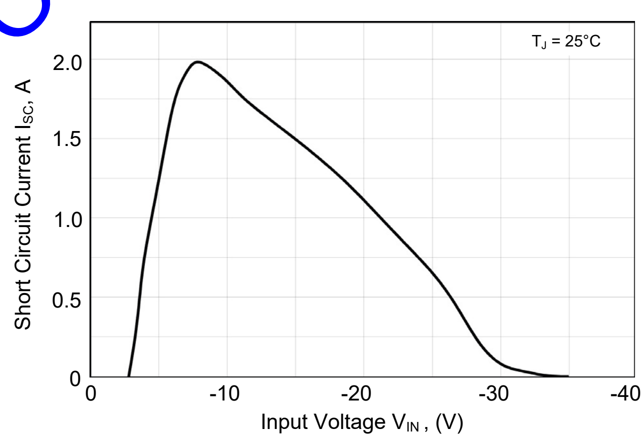

Figure 5 – Short-Circuit Current Versus Input Voltage