Linear Voltage Regulator – 7805

Positive Fixed 5V Voltage Regulator in bare die form

Rev 1.0
19/04/19

Description

The 7805 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. The 7805 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:

- ±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 7905

Ordering Information

The following part suffixes apply:

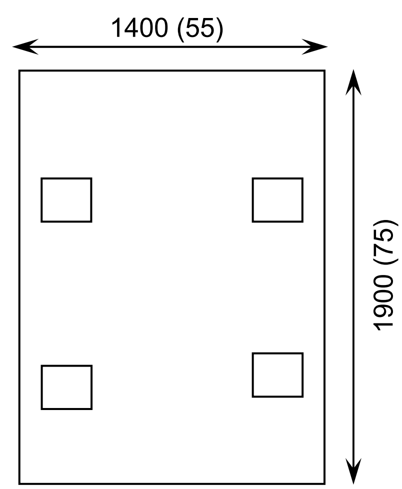
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "**H**" - MIL-STD-883 /2010B Visual Inspection
  + MIL-PRF-38534 Class H LAT
- "**K**" - MIL-STD-883 /2010A Visual Inspection (Space)
  + MIL-PRF-38534 Class K LAT

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:

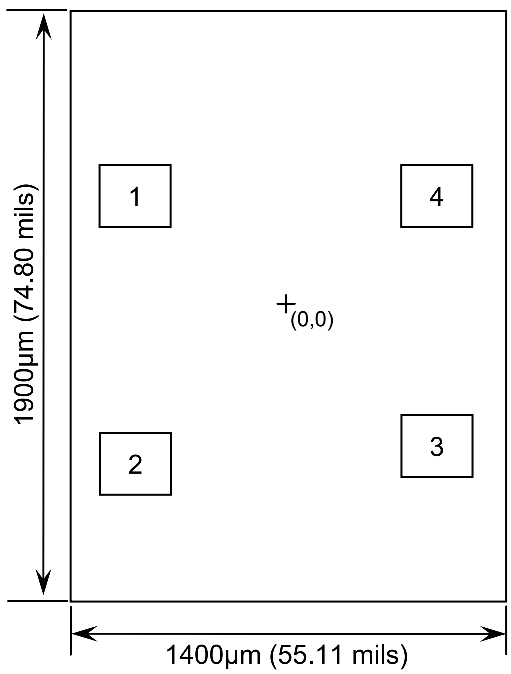
- Default – Die in Waffle Pack (100 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- Tape & Reel – On request
- In Metal or Ceramic package – On request

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	

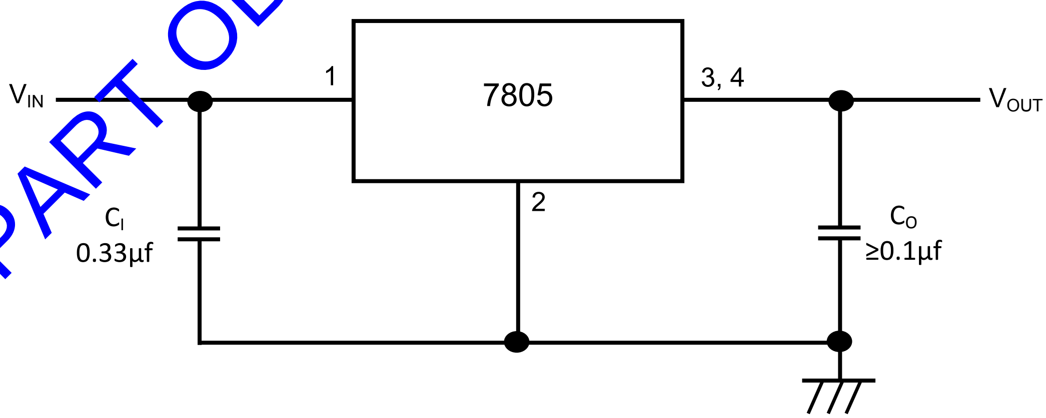
Rev 1.0
19/04/19

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.

Rev 1.0
19/04/19

Absolute Maximum Ratings

PARAMETER	SYMBOL	VALUE	UNIT
Input Voltage	V_{IN}	36	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, $T_{MIN} \leq T_J \leq T_{MAX}$ (unless noted otherwise)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	T_J = 25°C	4.80	5.00	5.20	V
		5mA ≤ I_{OUT} ≤ 1A, 7V ≤ V_{IN} ≤ 20V, P_D ≤ 15 Watts	4.75	5.00	5.25	
Line Regulation	ΔV_{OUT}	7.5V ≤ V_{IN} ≤ 20V	-	0.5	20	mV
		8V ≤ V_{IN} ≤ 12V	-	0.8	10	
Load Regulation	ΔV_{OUT}	5mA ≤ I_{OUT} ≤ 1A	-	1.3	25	
		5mA ≤ I_{OUT} ≤ 1.5A, T_J = 25°C	-	1.3	25	
Input Bias Current	I_B		-	3.2	6.5	mA
Input Bias Current Change	ΔI_B	7.5V ≤ V_{IN} ≤ 25V	-	0.3	1	mA
		5mA ≤ I_{OUT} ≤ 1A, T_J = 25°C	-	0.08	0.8	
Output Noise Voltage	V_n	10Hz ≤ f ≤ 100KHz, T_J = 25°C	-	10	-	µV/V_{OUT}
Ripple Rejection	RR	8V ≤ V_{IN} ≤ 18V, f = 120Hz,	-	68	-	dB
Dropout Voltage	$V_{IN} – V_{OUT}$	I_{OUT} = 1A, T_J = 25°C	-	2	-	V
Output Resistance	r_{OUT}	f = 1 kHz	-	0.9	-	mΩ
Short-Circuit Current Limit	I_{SC}	V_{IN} = 35V, T_A = 25°C	-	0.6	-	A
Peak Output Current	I_{MAX}	T_J = 25°C	-	2.2	-	A
Avg. Output Voltage Temp. Coefficient	TCV_{OUT}		-	-0.3	-	mV/°C

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

Typical Characteristics

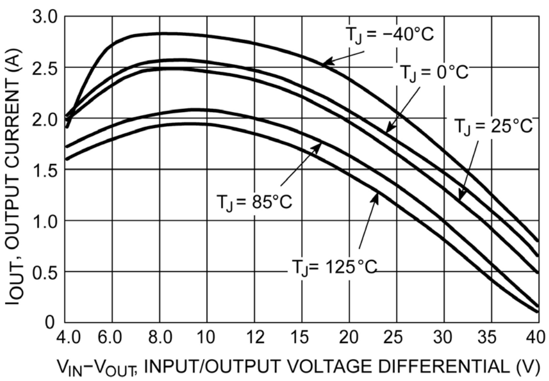


Figure 1 – Peak output current as a function of input/output differential voltage

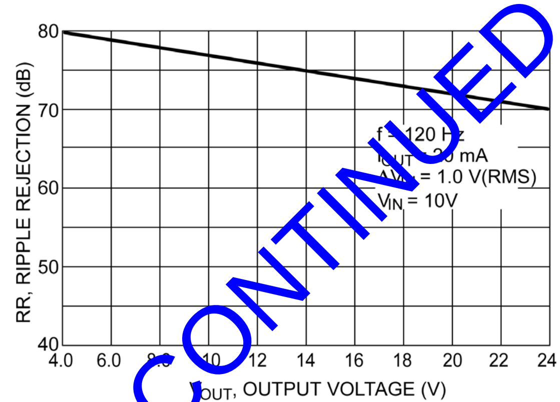


Figure 2 – Ripple rejection as a function of output voltage

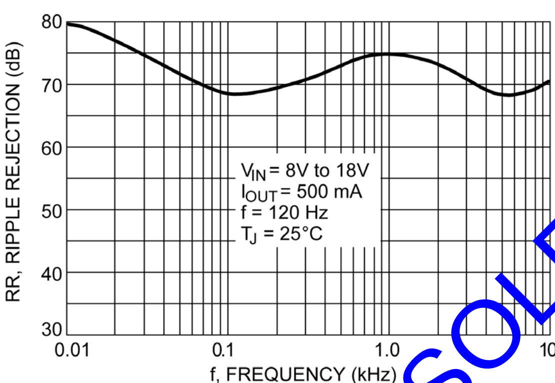


Figure 3 – Ripple rejection as a function of frequency

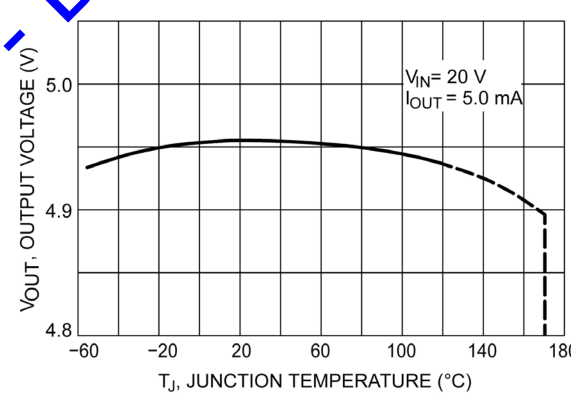


Figure 4 – Output voltage as a function of junction temperature

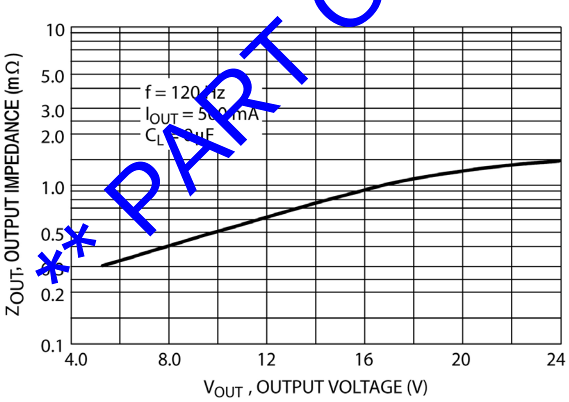


Figure 5 – Output impedance as a function of output Voltage

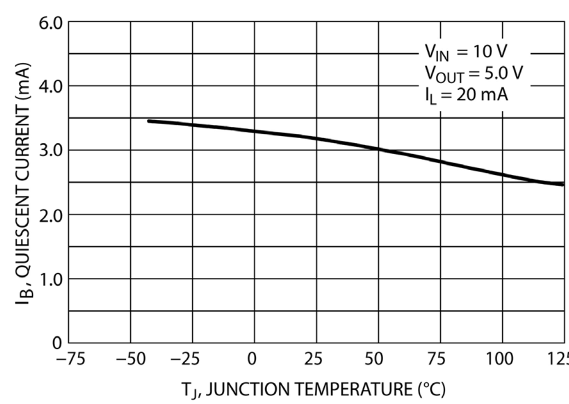


Figure 6 – Quiescent current as a function of temperature

Typical Characteristics

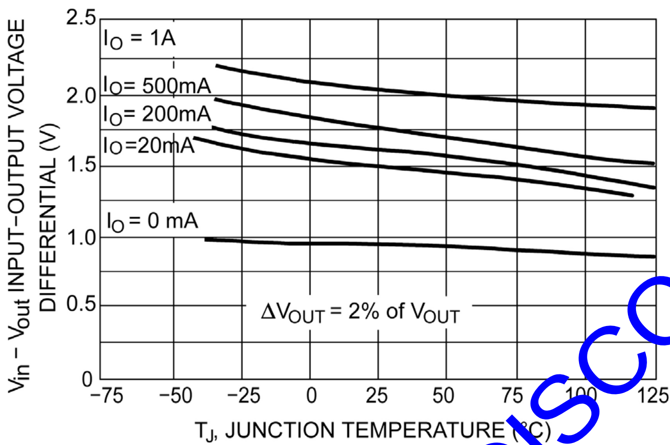


Figure 7 – Quiescent current as a function of temperature

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.