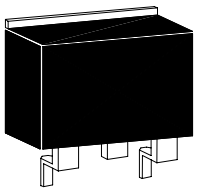
5A Low Dropout Positive Voltage Regulator

PL1084A-XXXF3



TO-263

Features

- Maximum Dropout Voltage 1.65V at 5A Output Current.
- Fast Transient Response.
- Extremely Tight Line and Load Regulation.
- Current Limiting and Thermal Protection.
- Adjustable Output Voltage or Fixed 1.5V, 1.8V,2.5V,3.3V,5.0V.
- Standard 3-Pin Power Packages.

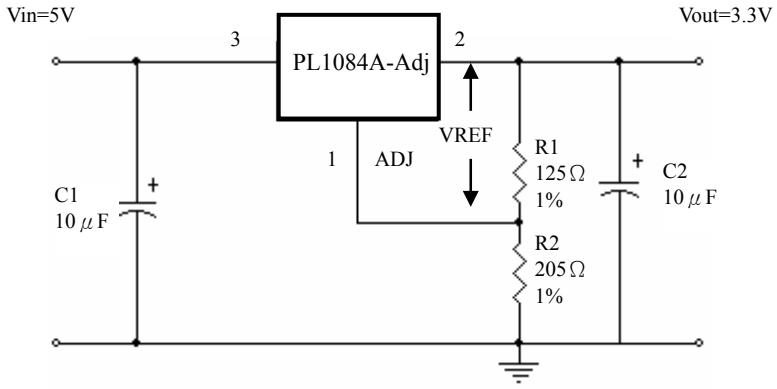
Description

The PL1084A-XXXF3 is a low dropout three terminal regulator with 5A output current capability. The output voltage is adjustable with the use of a resistor divider or fixed 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V. Dropout voltage is guaranteed to be at maximum of 1.5V with the maximum output current. Its low dropout voltage and fast transient response make it ideal for low voltage microprocessor applications. Current limit and thermal protection provide protection against any overload condition that would create excessive junction temperatures.

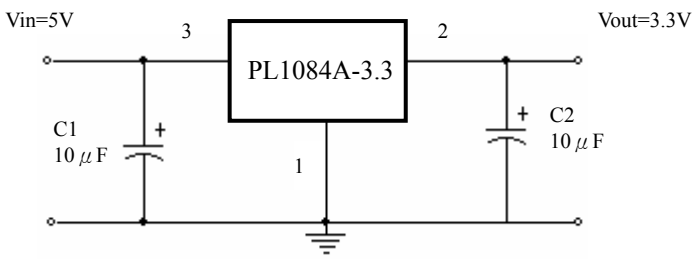
Applications

- Mother Board I/O Power Supplies.
- Microprocessor Power Supplies.
- High Current Regulator.
- Post Regulator for Switching Supply.

Typical Application Circuit



Adjustable Voltage Regulator



Fixed Voltage Regulator

Ordering Information

Device	Output Voltage
PL1084A-AdjF3	Adjustable
PL1084A-1.5F3	1.5V
PL1084A-1.8F3	1.8V
PL1084A-2.5F3	2.5V
PL1084A-3.3F3	3.3V
PL1084A-5.0F3	5.0V

Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
Vin	DC supply voltage	-0.3 to +12	V
P_D	Power Dissipation	Internally Limited	
T_{STG}	Storage Temperature	-65 ~ +150	℃
T_{OPR}	Operating Junction Temperature	0 ~ +150	℃

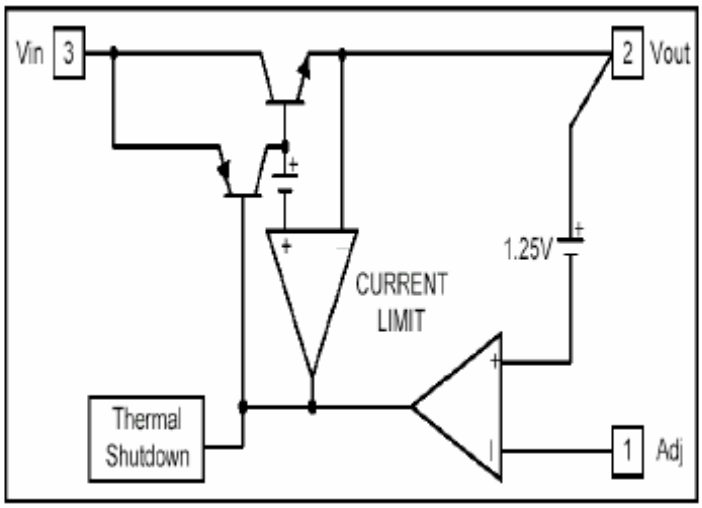
Electrical Characteristics (Io=10mA,Tj=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{REF}	Reference Voltage	Vin-Vout=1.5V	1.225	1.250	1.275	V
Vo	Output Voltage	PL1084A-1.5 3V≤Vin≤12V PL1084A-1.8 3.3V≤Vin≤12V PL1084A-2.5 4V≤Vin≤12V PL1084A-3.3 4.8V≤Vin≤12V PL1084A-5.0 6.5V≤Vin≤12V	1.470 1.764 2.450 3.235 4.900	1.500 1.800 2.500 3.300 5.000	1.530 1.836 2.550 3.365 5.100	V
ΔVo	Line Regulation	Fixed: Vout+1.5V≤Vin≤12V	-	-	0.2	%
ΔVo	Load Regulation(Note 1, 2)	Adj Vin=3.3V, 0≤Io≤5A	-	-	1	%
		PL1084A-1.5 Vin=3.0V, 0≤Io≤5A	-	12	15	mV
		PL1084A-1.8 Vin=3.3V, 0≤Io≤5A	-	15	18	
		PL1084A-2.5 Vin=4.0V, 0≤Io≤5A	-	20	25	
		PL1084A-3.3 Vin=5.0V, 0≤Io≤5A	-	26	33	
		PL1084A-5.0 Vin=8.0V, 0≤Io≤5A	-	40	50	
V_D	Dropout Voltage	Io=1A (ΔVout=1%V_{out})	-	1.18	1.25	V
		Io=2A (ΔVout=1%V_{out})		1.25	1.30	
		Io=5A (ΔVout=1%V_{out})	-	1.55	1.65	
Is	Current Limit	Vin-Vout=5V	5.1	-	-	A
I_{Adj}	Adjust Pin Current	Vin=12V, Io=10mA	-	55	100	μA
I_Q	Quiescent Current	Vin=12V, Io=0mA(fixed model)	-	-	12	mA
Ts	Temperature Stability	Io=10mA, 0°C≤Tj≤125°C	-	0.5	-	%
I_L	Minimum Load Current	Vin=5V(adjustable model)	-	5	10	mA
θ_{JA}	Thermal Resistance, Junction to Ambient(No Heat Sink; No air flow)		-	91	-	℃/W
θ_{JC}	Thermal Resistance, Junction to Case		-	10	-	℃/W

Note: 1. See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead =1/18" from the package.

2. Line and load regulation are guaranteed up to the maximum power dissipation of 15W. Power dissipation is determined by the difference between input and output and the output current. Guaranteed maximum power dissipation will not be over the full input/output range.

Block Diagram



Functional Description

Introduction

The PL1084A adjustable Low Dropout(LDO) regulator is a 3 terminal device that can easily be programmed with the addition of two external resistors to any voltages within the range of 1.25V to 2.5V. The PL1084A only needs 1.5V differential between Vin and Vout to maintain output regulation. In addition, the output voltage tolerances are also extremely tight and they include the transient response as part of the specification. For example, Intel VRE specification calls for a total of ±100mV including initial tolerance, load regulation and 0 to 5A load step. The PL1084A is specifically designed to meet the fast current transient needs as well as providing an accurate initial voltage, reducing the overall system cost with the need for fewer output capacitors.

Output Voltage Setting

The PL1084A can be programmed to any voltages in the range of 1.25V to 5V with the addition of R1 and R2 external resistors according to the following formula:
Vout=Vref(1+R2/R1)+Iadj*R2, where Vref=1.25V typically, Iadj=55μA typically

The PL1084A keeps a constant 1.25V between the output pin and the adjust pin. By placing a resistor R1 across these two pins, a constant current flows through R1, adding to the Iadj current requirement of the PL1084A. R1 is typically selected to be 121Ω resistor so that it automatically satisfies the minimum current requirement. Notice that since Iadj is typically in the range of 55μA, it only adds a small error to the output voltage and should only be considered when a very precise output voltage setting is required. For example, in a typical 3.3V application where R1=121Ω and R2=200Ω, the error due to Iadj is only 0.3% of the nominal set point.

Load Regulation

Since the PL1084A is only a 3 terminal device, it is not possible to provide true remote sensing of output voltage at the load. The best load regulation is achieved when the bottom side of R2 is connected to the load and the top side of R1 is connected directly to the case or the Vout pin of the regulator and not to the load. It is important to note that for high current applications, this can represent a significant percentage of the overall load regulation and one must keep the path from the regulator to the load as short as possible to minimize this effect.

Stability

The PL1084A requires the use of an output capacitor as part of the frequency compensation in order to make the regulator stable. For most applications, a minimum of 10μF aluminum electrolytic capacitor insures both stability and good transient response.

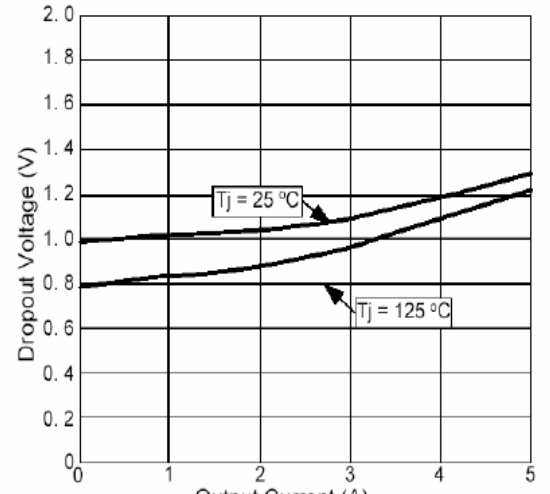
Thermal Design

The PL1084A incorporates an internal shutdown that protects the device when the junction temperature exceeds the maximum allowable junction temperature. Although this device can operate with junction temperatures in the range of 150℃, it is recommended that the selected heat sink be chosen such that during maximum continuous load operation, the junction temperature is kept below the temperature.

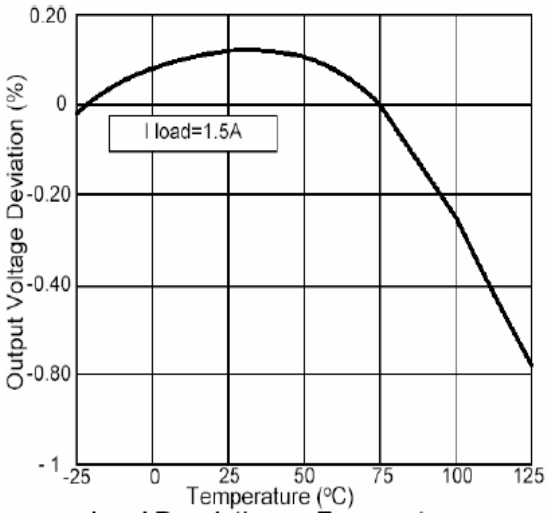
Layout Consideration

The output capacitors must be located as close to the Vout terminal of the device as possible. It is recommended to use a section of a layer of the PC board as a plane to connect the Vout pin to the output capacitors to prevent any high frequency oscillation that may result due to excess trace inductance.

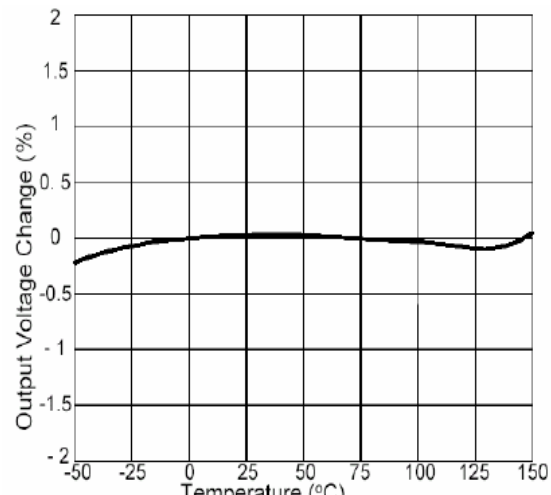
Characteristic Curves



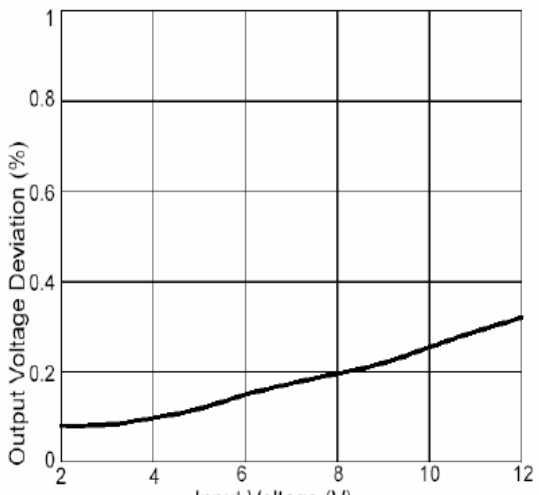
Dropout Voltage vs Output Current



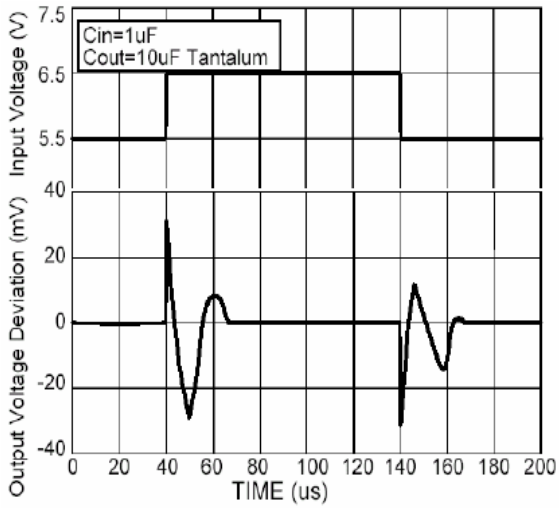
Load Regulation vs Temperature



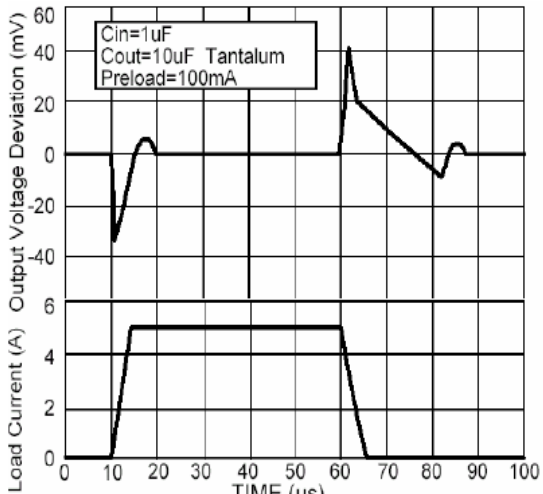
Percent Change in Output Voltage vs Temperature



Line Regulation

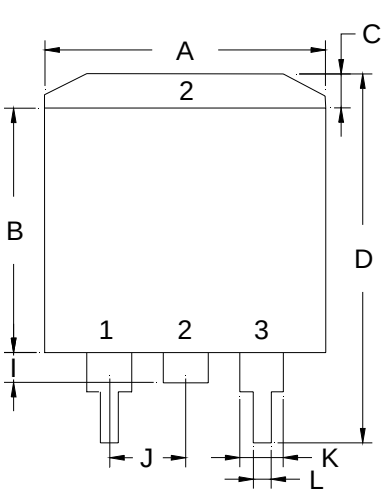


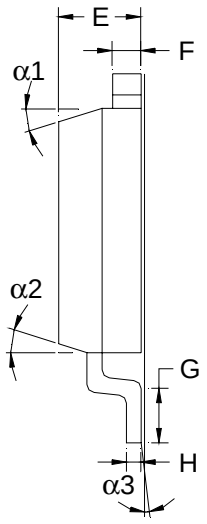
Line Transient Response



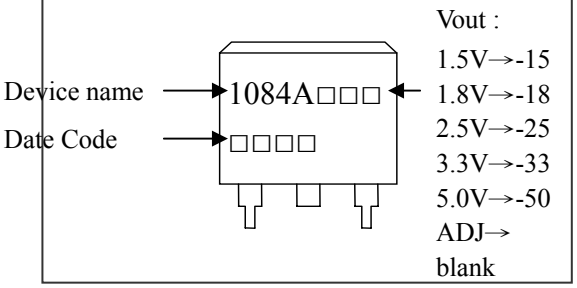
Load Transient Response

TO-263 Dimension





Marking :



Style : Pin 1.ADJ(GND) 2.Vout(TAB) 3.Vin

3-Lead Plastic Surface Mounted Package
CYStek Package Code : F3

*:Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.3800	0.4050	9.65	10.29	I	0.0500	0.0700	1.27	1.78
B	0.3300	0.3700	8.38	9.40	J	-	*0.1000	-	*2.54
C	-	0.0550	-	1.40	K	0.0450	0.0550	1.14	1.40
D	0.5750	0.6250	14.61	15.88	L	0.0200	0.0390	0.51	0.99
E	0.1600	0.1900	4.06	4.83	α1	-	-	6°	8°
F	0.0450	0.0550	1.14	1.40	α2	-	-	6°	8°
G	0.0900	0.1100	2.29	2.79	α3	-	-	0°	5°
H	0.0180	0.0290	0.46	0.74					

Notes : 1.Controlling dimension : millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material :

- Lead : 42 Alloy ; solder plating
- Mold Compound : Epoxy resin family, flammability solid burning class:UL94V-0

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