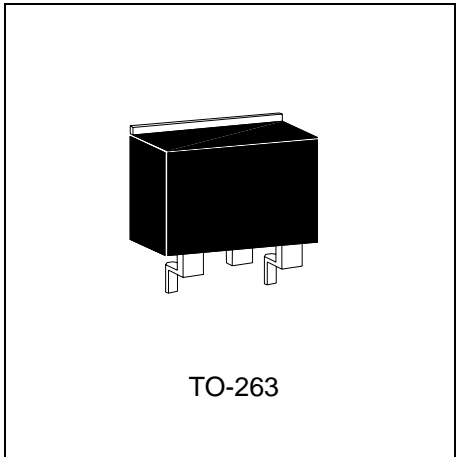


# 3A Low Dropout Positive Voltage Regulator

## PL1085-XXXXF3



### Features

- Dropout Voltage 1.4V at 3A Output Current.
- Fast Transient Response.
- Extremely Tight Line and Load Regulation.
- Built-in Thermal Shutdown Protection.
- Adjustable Output Voltage or Fixed 1.5V, 1.8V, 2.5V, 3.3V, 5.0V.
- Output Current Limiting.

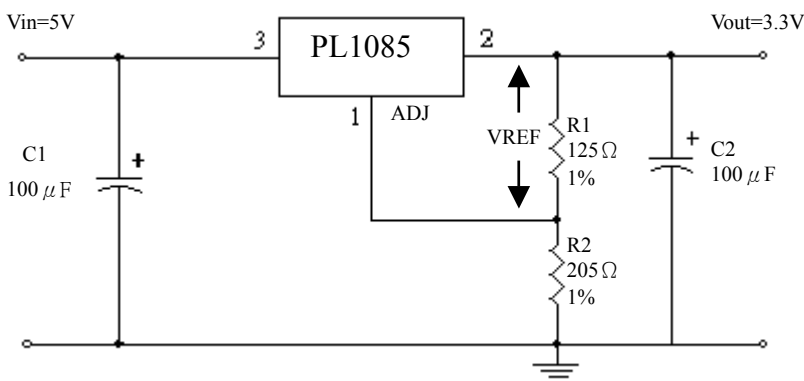
### Description

The PL1085-XXXXF3 is a low dropout three terminal regulator with 3A 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 1.4V 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



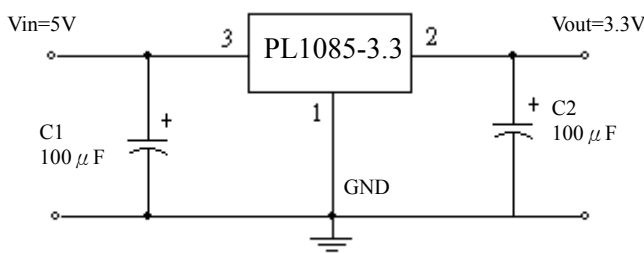
**Adjustable Voltage Regulator**

$$V_{REF} = V_{OUT} - V_{ADJ} = 1.25V(\text{typ})$$

$$V_{OUT} = V_{REF}(1 + R1/R2) + I_{ADJ} \times R2$$

$$I_{ADJ} = 55\mu A(\text{typ.})$$

(1) C1 needed if device is far away from filter capacitors.  
 (2) C2 required for stability.



**Fixed Voltage Regulator**



## Ordering Information

Device	Output Voltage	Device	Output Voltage
PL1085-AdjF3	Adjustable	PL1085-2.5F3	2.5V
PL1085-1.5F3	1.5V	PL1085-3.3F3	3.3V
PL1085-1.8F3	1.8V	PL1085-5.0F3	5.0V

## Absolute Maximum Ratings

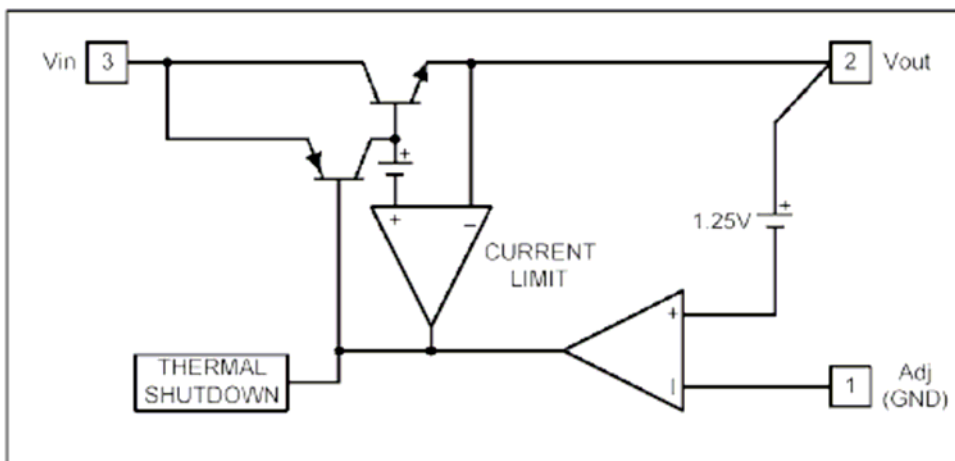
Symbol	Parameter	Ratings	Unit
V <sub>in</sub>	DC supply voltage	-0.3 to +12	V
P <sub>D</sub>	Power Dissipation	Internally Limited	
T <sub>STG</sub>	Storage Temperature	-65 ~ +150	°C
T <sub>OPR</sub>	Operation Junction Temperature	0 ~ +150	°C

## Electrical Characteristics (I<sub>o</sub>=10mA, T<sub>j</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V <sub>REF</sub>	Reference Voltage	PL1085-Adj, V <sub>in</sub> -V <sub>out</sub> =1.5V	1.225	1.250	1.275	V
V <sub>o</sub>	Output Voltage	PL1085-1.5, 3.0V ≤ V <sub>in</sub> ≤ 12V PL1085-1.8, 3.3V ≤ V <sub>in</sub> ≤ 12V PL1085-2.5, 4.0V ≤ V <sub>in</sub> ≤ 12V PL1085-3.3, 4.8V ≤ V <sub>in</sub> ≤ 12V PL1085-5.0, 6.5V ≤ V <sub>in</sub> ≤ 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
ΔV <sub>o</sub>	Line Regulation	Adj : 2.65V ≤ V <sub>in</sub> ≤ 12V Fixed : 1.5 + V <sub>out</sub> ≤ V <sub>in</sub> ≤ 12V	-	-	0.2	%
ΔV <sub>o</sub>	Load Regulation	PL1085-Adj, V <sub>in</sub> =3.3V, 0 ≤ I <sub>o</sub> ≤ 3A (Note 1, 2) PL1085-1.5, V <sub>in</sub> =3.0V, 0 ≤ I <sub>o</sub> ≤ 3A (Note 1, 2) PL1085-1.8, V <sub>in</sub> =3.3V, 0 ≤ I <sub>o</sub> ≤ 3A (Note 1, 2) PL1085-2.5, V <sub>in</sub> =4.0V, 0 ≤ I <sub>o</sub> ≤ 3A (Note 1, 2) PL1085-3.3, V <sub>in</sub> =5.0V, 0 ≤ I <sub>o</sub> ≤ 3A (Note 1, 2) PL1085-5.0, V <sub>in</sub> =8.0V, 0 ≤ I <sub>o</sub> ≤ 3A (Note 1, 2)	- - - - - -	- 12 15 20 26 40	1 15 18 25 33 50	% mV mV mV mV mV
I <sub>s</sub>	Current Limit	V <sub>in</sub> -V <sub>out</sub> =5V	3.1	-	-	A
I <sub>Adj</sub>	Adjust Pin Current	Adjustable model, V <sub>in</sub> =12V, I <sub>out</sub> =10mA	-	55	100	μA
I <sub>Q</sub>	Quiescent Current	Fixed model, V <sub>in</sub> =12V, I <sub>o</sub> =0mA	-	-	12	mA
T <sub>s</sub>	Temperature Stability	I <sub>o</sub> =10mA, 0°C ≤ T <sub>j</sub> ≤ 125°C	-	0.5	-	%
I <sub>L</sub>	Minimum Load Current	Adjustable model, V <sub>in</sub> =5V	-	5	10	mA
	Thermal Regulation	T <sub>A</sub> =25°C, 30ms pulse	-	0.008	0.04	%/W
RR	Ripple Rejection Ratio	V <sub>in</sub> -V <sub>out</sub> =3V, I <sub>o</sub> =3A, f=120Hz, C <sub>OUT</sub> =25μF, tantalum	60	70	-	dB
V <sub>D</sub>	Dropout Voltage	I <sub>o</sub> =3A (ΔV <sub>OUT</sub> =1%V <sub>OUT</sub> )	-	1.3	1.4	V
R <sub>th, j-a</sub>	Thermal Resistance, Junction to Ambient	No heat sink, no air flow	-	91	-	°C/W
R <sub>th, j-c</sub>	Thermal Resistance, Junction to Case	Control Circuitry/Power Transistor	-	10	-	°C/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 in input and output and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range.

## Block Diagram



## Functional Description

### Introduction

The PL1085 adjustable or fixed-mode Low Dropout (LDO) regulator is a 3 terminal device which can easily be programmed by internal mask change to any voltage within the range of 1.25V to  $V_{in} - 1.4V$ . The PL1085 only needs 1.4V differential between  $V_{in}$  and  $V_{out}$  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  $\pm 100mV$  including initial tolerance, load regulation and 0 to 3A load step. The PL1085 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.

### Load Regulation

Since the PL1085 is only a 3 terminal device, it is not possible to provide true remote sensing of output voltage at the load. But it can supply good load regulation by internal feedback bypass the external loss such as adjustable mode.

### Stability

The PL1085 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  $10\mu F$  aluminum electrolytic capacitor insures both stability and good transient response.

### Thermal Design

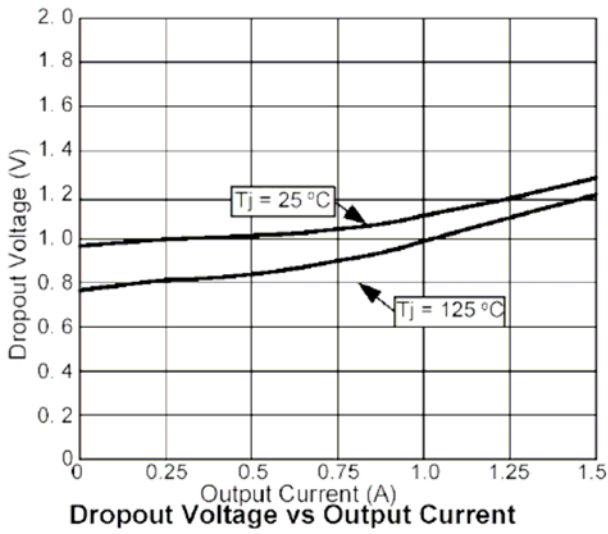
The PL1085 incorporates an internal shutdown that protects the device when the junction temperature exceeds the maximum allowable junction temperature. Although this device can operate with junction temperatures in the range of  $150^{\circ}C$ , it is recommended that the selected heat sink be chosen such that during maximum continuous load operation, the junction temperature is kept below the temperature.

### Layout Consideration

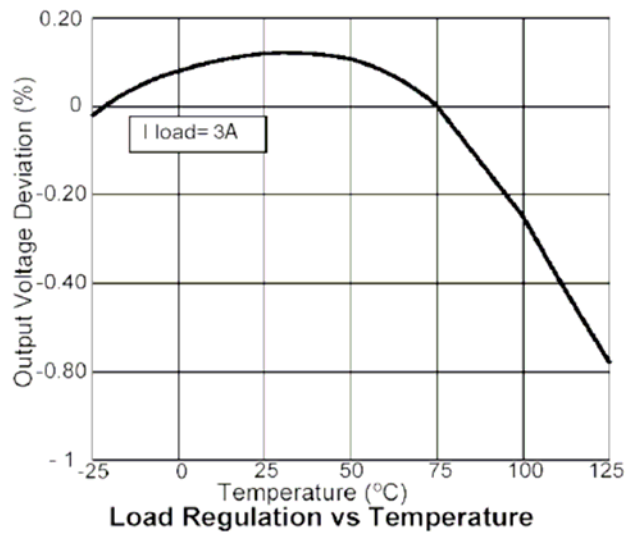
The output capacitors must be located as close to the  $V_{out}$  terminal of the device as possible. It is recommended to use a section of a layer of the PC board as a plane to connect the  $V_{out}$  pin to the output capacitors to prevent any high frequency oscillation that may result due to excess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



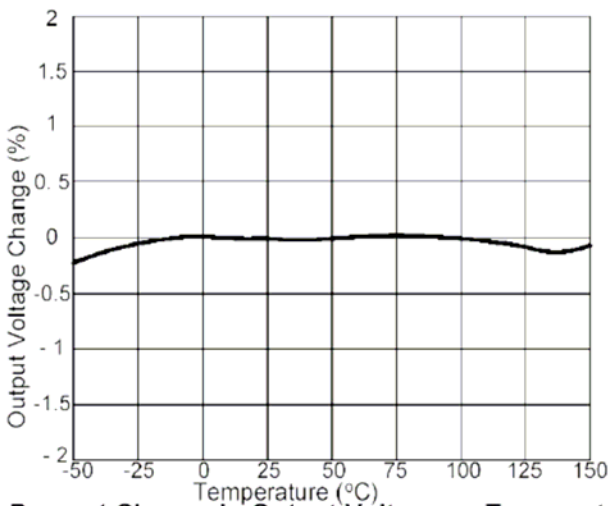
### Characteristic Curves



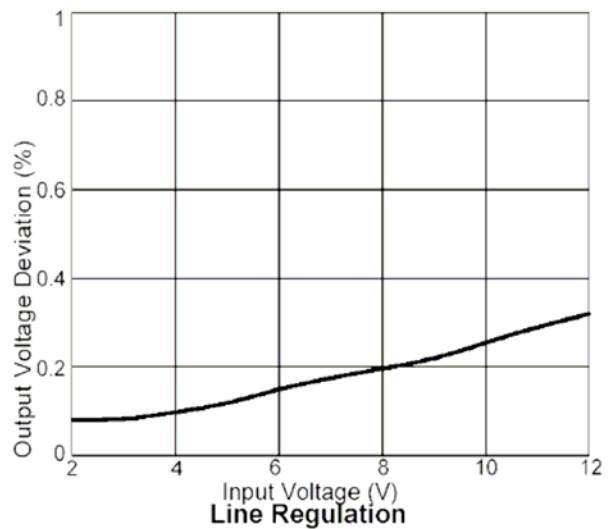
Dropout Voltage vs Output Current



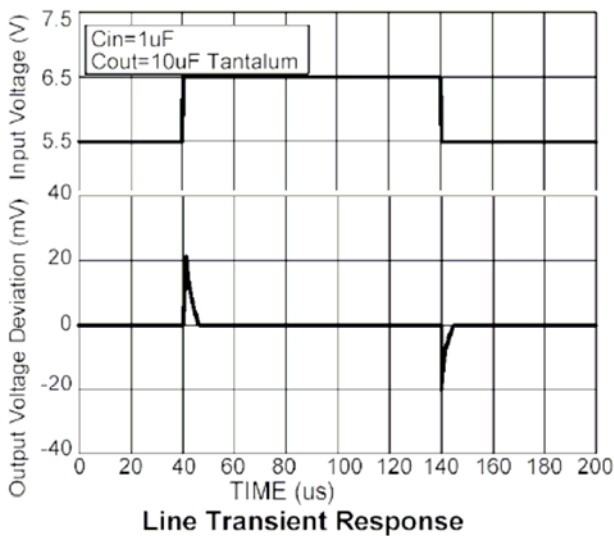
Load Regulation vs Temperature



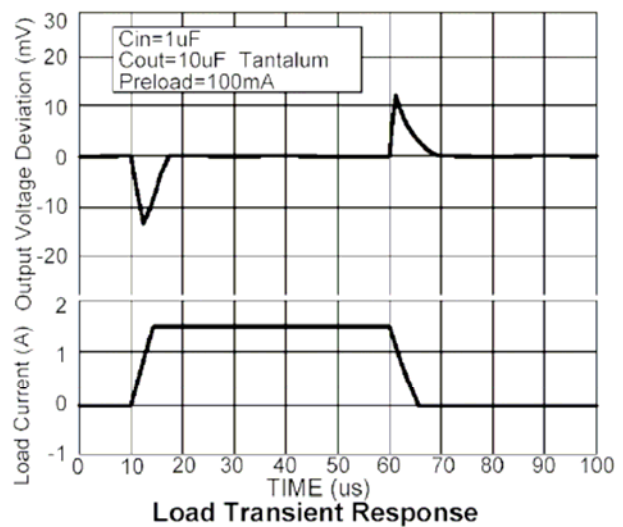
Percent Change in Output Voltage vs Temperature



Line Regulation

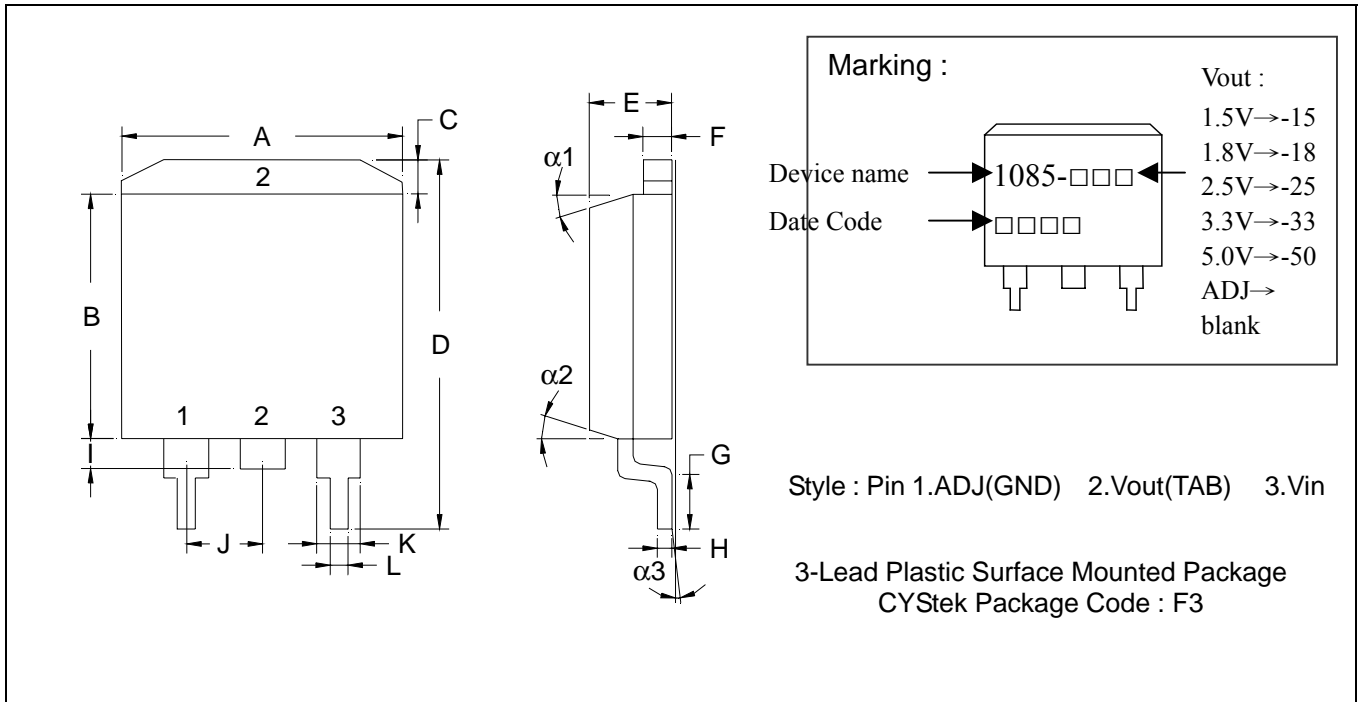


Line Transient Response



Load Transient Response

## TO-263 Dimension



\*: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	$\alpha 1$	-	-	6°	8°
F	0.0450	0.0550	1.14	1.40	$\alpha 2$	-	-	6°	8°
G	0.0900	0.1100	2.29	2.79	$\alpha 3$	-	-	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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