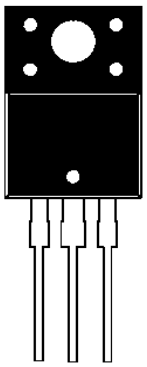
3A Low Dropout Positive Voltage Regulator

PL1085-XXXFP

TO-220FP



G O I

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.

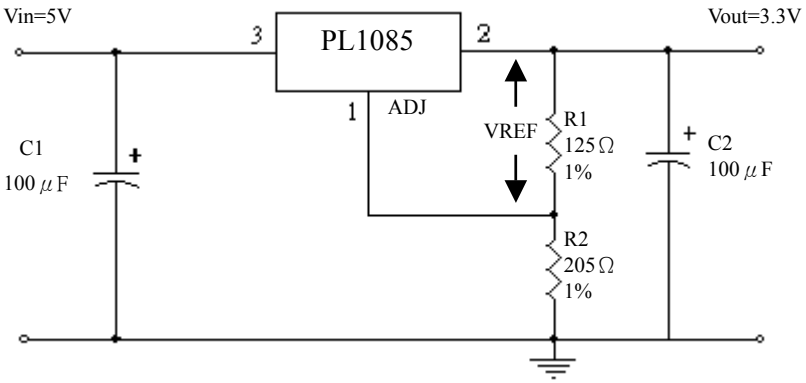
Description

The PL1085-XXXFP 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

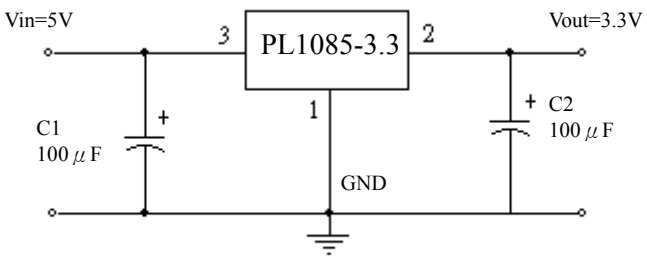
$V_{REF}=V_{OUT}-V_{ADJ}=1.25V(typ)$

$V_{OUT}=V_{REF}(1+R_1/R_2)+I_{ADJ}\times R_2$

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

(1)C1 needed if device is far away from filter capacitors.

(2)C2 required for stability.



Fixed Voltage Regulator

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}	Operation Junction Temperature	0 ~ +150	℃

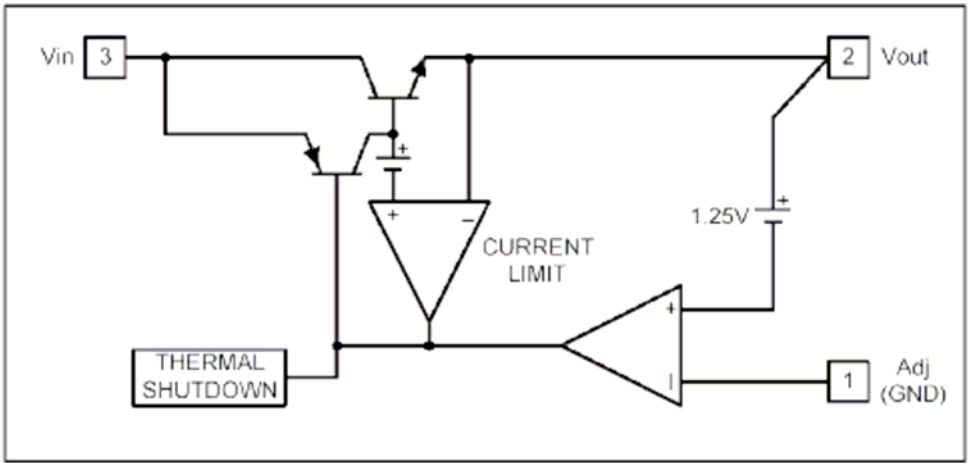
Electrical Characteristics (Io=10mA,Tj=25℃,unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{REF}	Reference Voltage	PL1085-Adj, Vin-Vout=1.5V	1.225	1.250	1.275	V
Vo	Output Voltage	PL1085-1.5, 3.0V≤Vin≤12V PL1085-1.8, 3.3V≤Vin≤12V PL1085-2.5, 4.0V≤Vin≤12V PL1085-3.3, 4.8V≤Vin≤12V PL1085-5.0, 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	Adj : 2.65V≤Vin≤12V	-	-	0.2	%
		Fixed : 1.5+Vout≤Vin≤12V				
ΔVo	Load Regulation	PL1085-Adj,Vin=3.3V, 0≤Io≤3A (Note 1, 2)	-	-	1	%
		PL1085-1.5, Vin=3.0V, 0≤Io≤3A(Note 1, 2)	-	12	15	mV
		PL1085-1.8, Vin=3.3V, 0≤Io≤3A(Note 1, 2)	-	15	18	mV
		PL1085-2.5, Vin=4.0V, 0≤Io≤3A(Note 1, 2)	-	20	25	mV
		PL1085-3.3, Vin=5.0V, 0≤Io≤3A(Note 1, 2)	-	26	33	mV
		PL1085-5.0, Vin=8.0V, 0≤Io≤3A(Note 1, 2)	-	40	50	mV
Is	Current Limit	Vin-Vout=5V	3.1	-	-	A
I_{Adj}	Adjust Pin Current	Adjustable model, Vin=12V, Iout=10mA	-	55	100	μA
I_Q	Quiescent Current	Fixed model, Vin=12V, Io=0mA	-	-	12	mA
Ts	Temperature Stability	Io=10mA, 0°C≤Tj≤125°C	-	0.5	-	%
I_L	Minimum Load Current	Adjustable model, Vin=5V	-	5	10	mA
	Thermal Regulation	T_A=25℃, 30ms pulse	-	0.008	0.04	%/W
RR	Ripple Rejection Ratio	V_{IN}-V_{OUT}=3V, Io=3A, f=120Hz, C_{OUT}=25μF, tantalum	60	70	-	dB
V_D	Dropout Voltage	Io=3A(ΔV_{OUT}=1%V_{OUT})	-	1.3	1.4	V
$R_{th, j-a}$	Thermal Resistance, Junction to Ambient	No heat sink, no air flow	-	98	-	℃/W
$R_{th, j-c}$	Thermal Resistance, Junction to Case	Control Circuitry/Power Transistor	-	15	-	℃/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 Vin-1.4V. The PL1085 only needs 1.4V 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 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 10μF aluminum electrolytic capacitor insures both stability and good transient response.

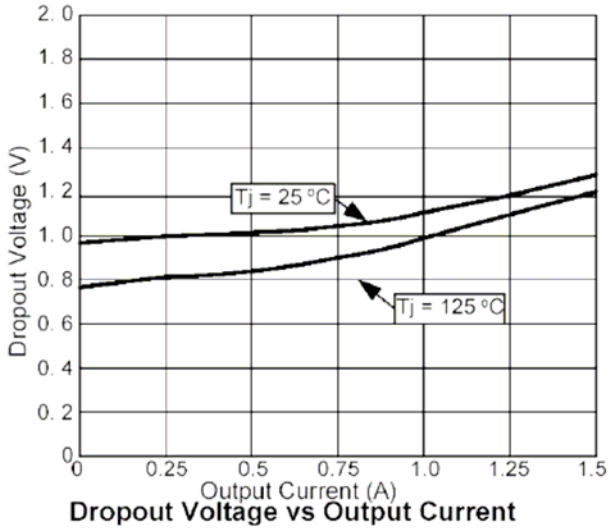
Thermal Design

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℃, 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.

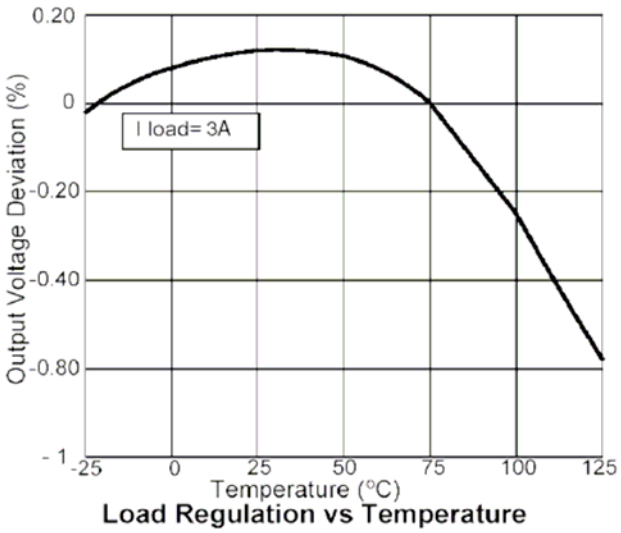
Layout Consideration

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.

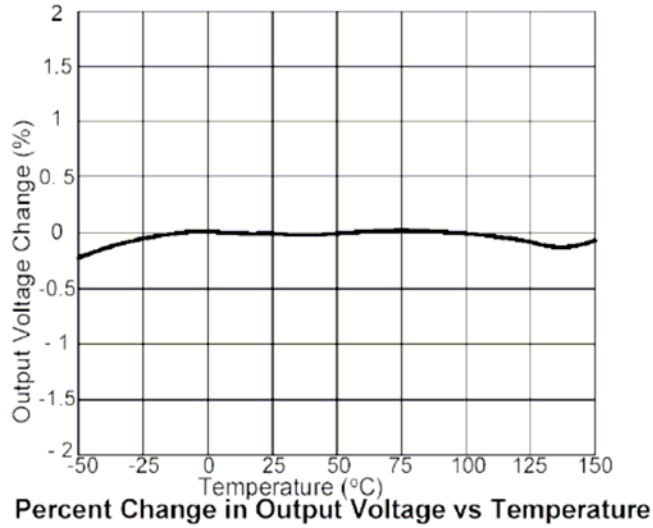
Characteristic Curves



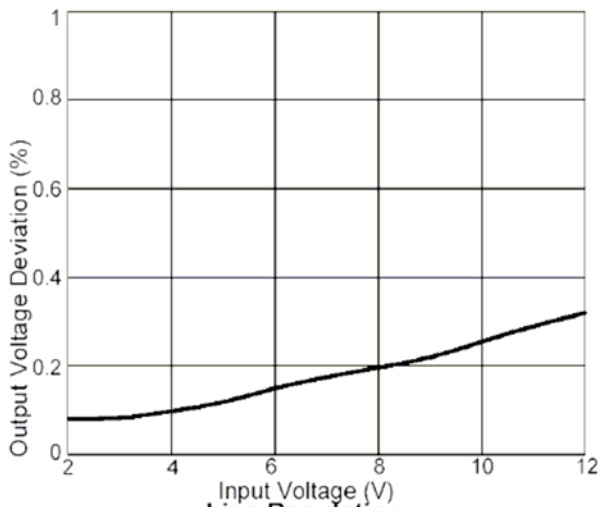
Dropout Voltage vs Output Current



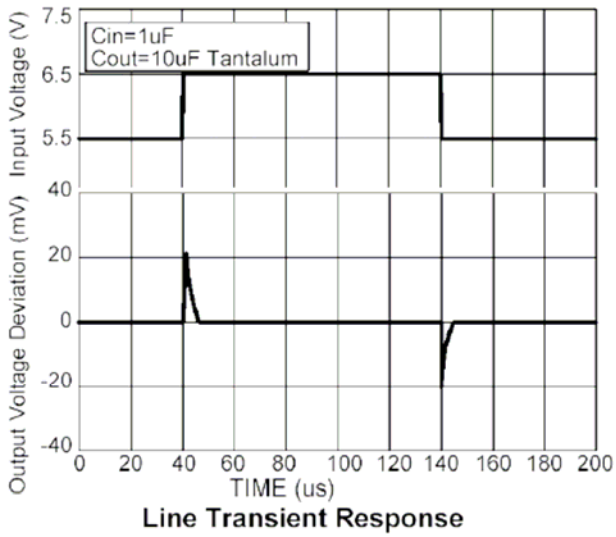
Load Regulation vs Temperature



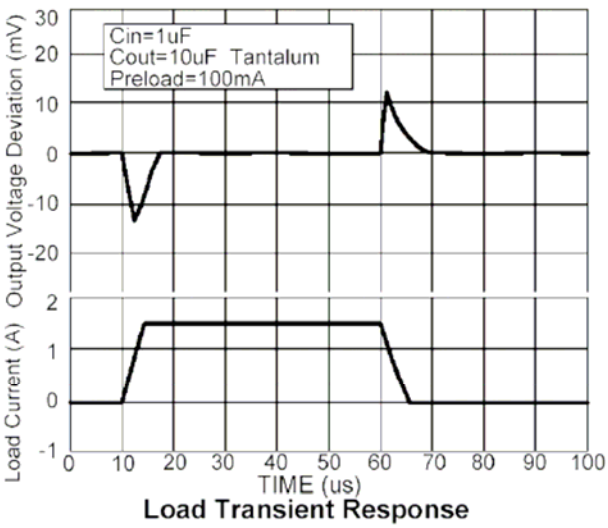
Percent Change in Output Voltage vs Temperature



Line Regulation

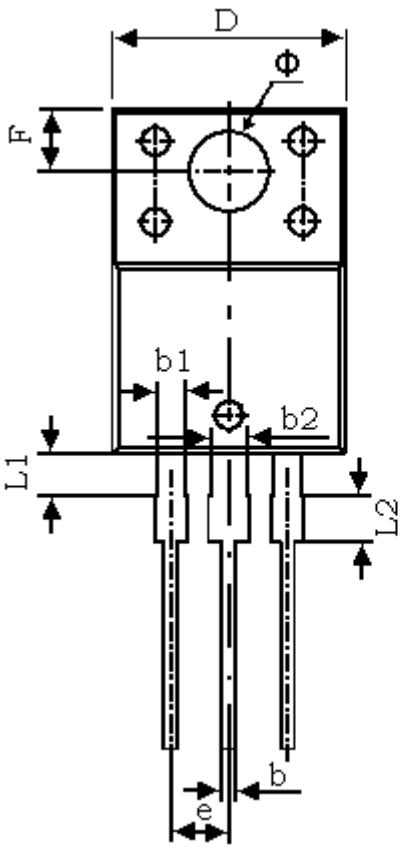


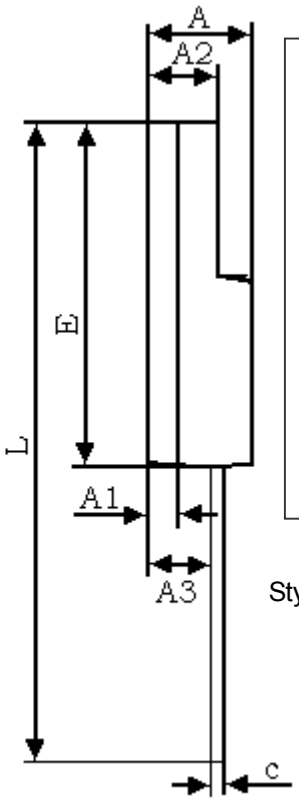
Line Transient Response

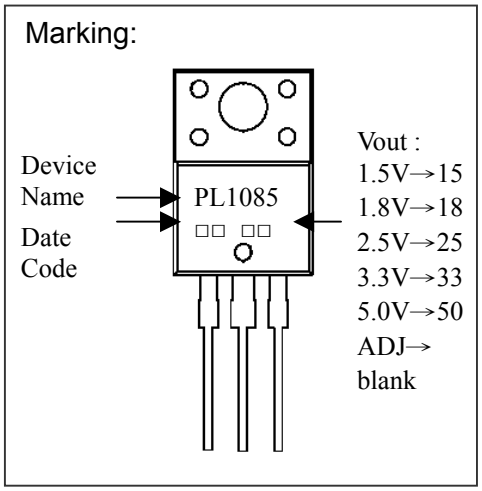


Load Transient Response

TO-220FP Dimension







Style: Pin 1.GND/ADJ 2.Output 3.Input 4.Output

3-Lead TO-220FP Plastic Package
CYStek Package Code: FP

*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.169	0.185	4.300	4.700	D	0.392	0.408	9.960	10.360
A1	0.051 REF		1.300 REF		E	0.583	0.598	14.800	15.200
A2	0.110	0.126	2.800	3.200	e	0.100 TYP		2.540 TYP	
A3	0.098	0.114	2.500	2.900	F	0.106 REF		2.700 REF	
b	0.020	0.030	0.500	0.750	Φ	0.138 REF		3.500 REF	
b1	0.043	0.053	1.100	1.350	L	1.102	1.118	28.000	28.400
b2	0.059	0.069	1.500	1.750	L1	0.067	0.075	1.700	1.900
c	0.020	0.030	0.500	0.750	L2	0.075	0.083	1.900	2.100

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