



# ACE1085G

## 3A Low Dropout Linear Regulator

### Description

The ACE1085G is a low dropout positive adjustable or fixed-mode regulator with minimum of 3A output current capability. The product is specifically designed to provide well-regulated supply for low voltage IC applications such as high-speed bus termination and low current 3.3V logic supply. ACE1085G is also well suited for other applications such as VGA cards. ACE1085G is guaranteed to have <1.4V dropout at full load current making it ideal to provide well-regulated outputs of 1.25 to 5.0V with 4.7 to 12V input supply by different output voltage.

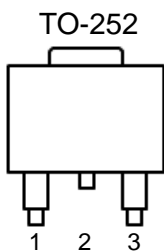
### Features

- 3-Terminal Adjustable or fixed 1.5V,1.8V,2.5V,3.3V,5.0V
- 1.4V Maximum Dropout at Full Load current
- Fast Transient response
- Built-in Thermal Shutdown
- Output current limiting

### Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
DC Supply Voltage	$V_{IN}$	-0.3 to 12	V
Power Dissipation	$P_D$	Internally Limited	
Storage Temperature	$T_{ST}$	-65 ~ 150	°C
Operating Junction Temperature Range	$T_{OP}$	0 ~ 150	°C

### Packaging Type



### Adjustable Version

TO-252	Description	Function
1	ADJ	Adjustable
2	Vout	Output
3	Vin	Input

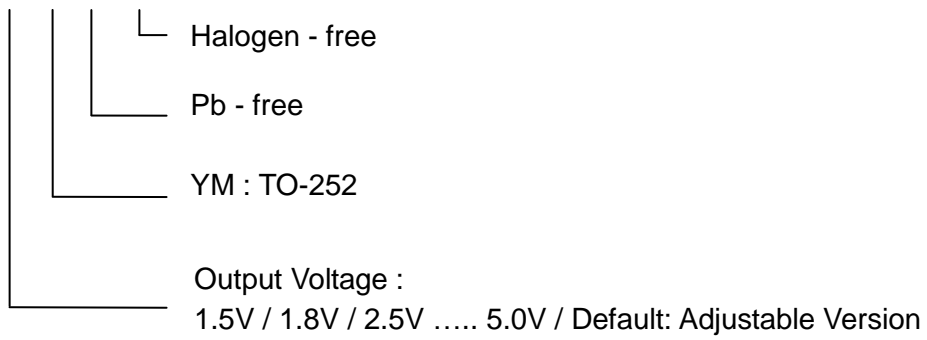


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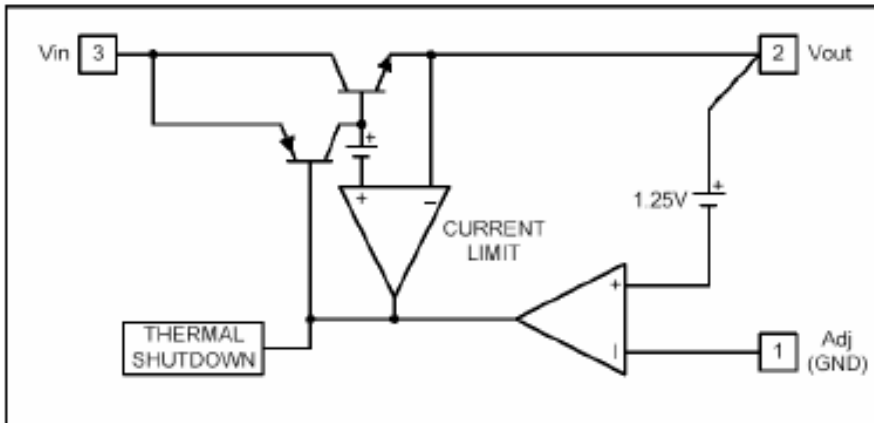
## 3A Low Dropout Linear Regulator

### Ordering information

ACE1085G XX XX + H



### Block Diagram





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### Electrical Characteristics

Parameter	Conditions		Min	Typ	Max	Unit
Reference Voltage	ACE1085G	$I_o=10\text{mA}$ , $T_J=25$ , $(V_{in}-V_{out})=1.5\text{V}$	1.225	1.250	1.275	V
Output Voltage	ACE1085G-15	$I_o=10\text{mA}$ , $T_J=25$ , $3\text{V} \leq V_{in} \leq 12\text{V}$	1.470	1.500	1.530	V
	ACE1085G-18	$I_o=10\text{mA}$ , $T_J=25$ , $3.3\text{V} \leq V_{in} \leq 12\text{V}$	1.764	1.800	1.836	V
	ACE1085G-25	$I_o=10\text{mA}$ , $T_J=25$ , $4\text{V} \leq V_{in} \leq 12\text{V}$	2.450	2.500	2.550	V
	ACE1085G-33	$I_o=10\text{mA}$ , $T_J=25$ , $4.8\text{V} \leq V_{in} \leq 12\text{V}$	3.235	3.300	3.365	V
	ACE1085G-50	$I_o=10\text{mA}$ , $T_J=25$ , $6.5\text{V} \leq V_{in} \leq 12\text{V}$	4.900	5.000	5.100	V
Line Regulator	ACE1085GXXX	$I_o=10\text{mA}$ , $V_{out}+1.5 < V_{in} < 12$			0.2	%
Load Regulation	ACE1085G	$V_{in}=3.3\text{V}$ , $0\text{mA} < I_o < 3\text{A}$ , $T_J=25$ (Note 1,2)			1	%
	ACE1085G-15	$V_{in}=3.0\text{V}$ , $0\text{mA} < I_o < 3\text{A}$ , $T_J=25$ (Note 1,2)		12	15	mV
	ACE1085G-18	$V_{in}=3.3\text{V}$ , $0\text{mA} < I_o < 3\text{A}$ , $T_J=25$ (Note 1,2)		15	18	mV
	ACE1085G-25	$V_{in}=4.0\text{V}$ , $0\text{mA} < I_o < 3\text{A}$ , $T_J=25$ (Note 1,2)		20	25	mV
	ACE1085G-33	$V_{in}=5.0\text{V}$ , $0\text{mA} < I_o < 3\text{A}$ , $T_J=25$ (Note 1,2)		26	33	mV
	ACE1085G-50	$V_{in}=8.0\text{V}$ , $0\text{mA} < I_o < 3\text{A}$ , $T_J=25$ (Note 1,2)		40	50	mV
Dropout Voltage ( $V_{in}-V_{out}$ )	ACE1085GXXX	$I_o=3\text{A}$ ( $V_{out}=1\% V_{out}$ )		1.3	1.4	V
Current Limit	ACE1085GXXX	$V_{in}-V_{out}=5\text{V}$	3.1			A
Minimum Load Current	Adjustable model	$V_{in}=5\text{V}$		5	10	mA
Adjust Pin Current	Adjustable model	$V_{in}=12\text{V}$ , $I_o=10\text{mA}$		55	100	$\mu\text{A}$
Quiescent Current	Fixed model	$V_{in}=12\text{V}$ , $I_o=0\text{mA}$			12	mA
Thermal Regulation	$T_A=25^\circ\text{C}$ , 30ms pulse			0.008	0.04	%W
Ripple Rejection	$F=120\text{Hz}$ , $C_{OUT}=25\mu\text{F}$ , Tantalum, $I_o=3\text{A}$					
	ACE1085GXXX	$V_{in}=V_{out}+3\text{V}$		60	70	dB
Temperature Stability	$I_o=10\text{mA}$			0.5		%



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Thermal Resistance Junction-to-Ambient (No heat sink ;No air flow)			98		°C/W
Thermal Resistance Junction-to-Case	Control Circuitry / Power Transistor		15		°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.

Note 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.

## Functional Description

### Introduction

The ACE1085G 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 1.25 to  $V_{in}-1.4V$ . The ACE1085G 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 ACE1085G 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 ACE1085G is only a 3 terminal device, it is not possible to provide true remote sensing of the 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 ACE1085G 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 10uF aluminum electrolytic capacitor insures both stability and good transient response.

### Thermal Design

The ACE1085G incorporates an internal shutdown that protects the device when the junction temperature exceeds the maximum allowable junction temperatures. 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 excessive trace inductance.

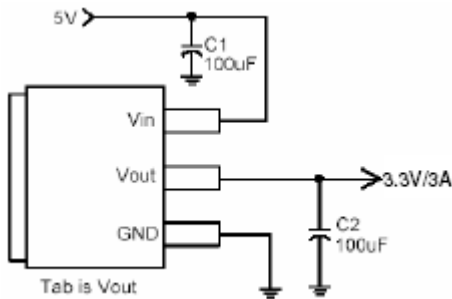


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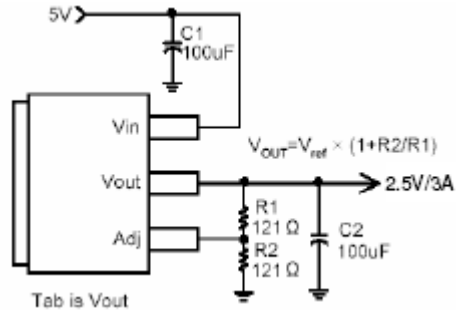
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### Typical Circuit

5V to 3.3V Fixed Mode Regulator



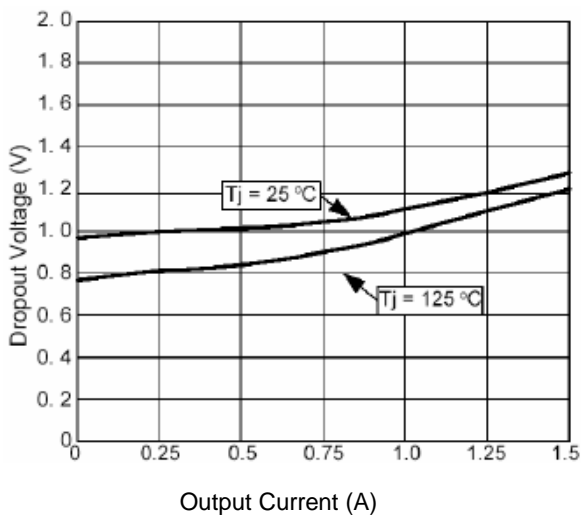
Adjustable Regulator



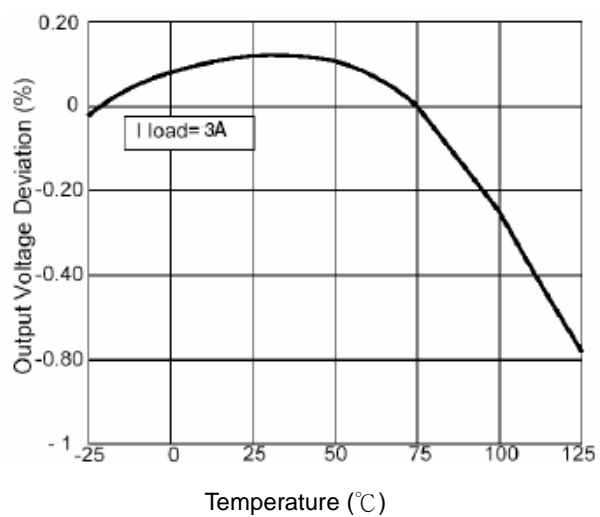
Note:  $V_O = V_{REF} * (1 + R2/R1)$

### Typical Performance Characteristic

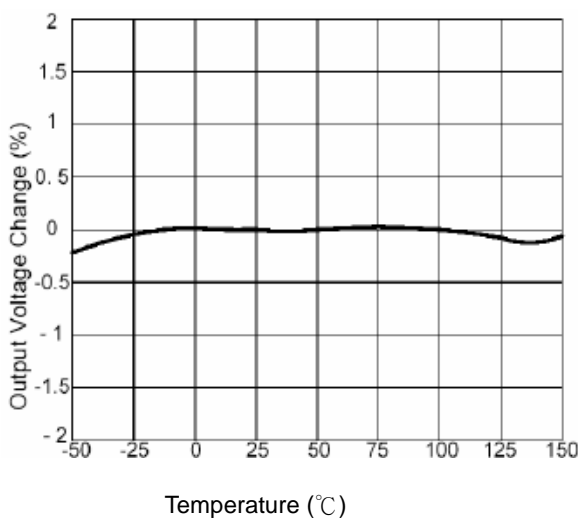
Dropout Voltage VS. Output Current



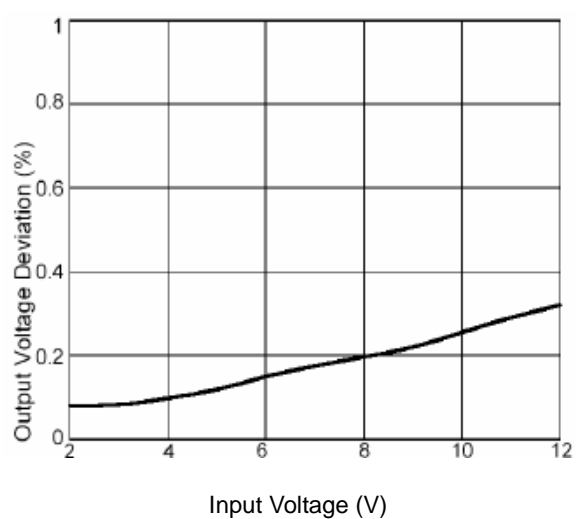
Load Regulation vs Temperature



Percent Change in Output Voltage vs Temperature



Line Regulation

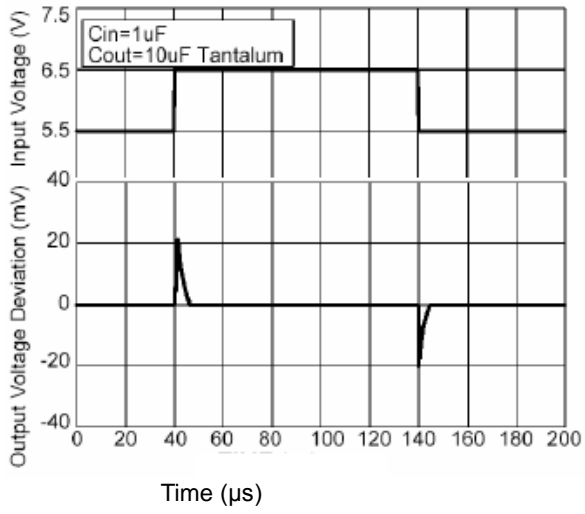




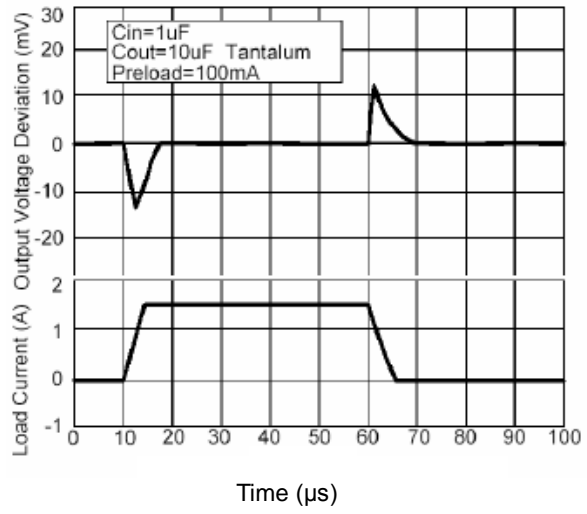
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## 3A Low Dropout Linear Regulator

Load Transient Response



Load Transient Response



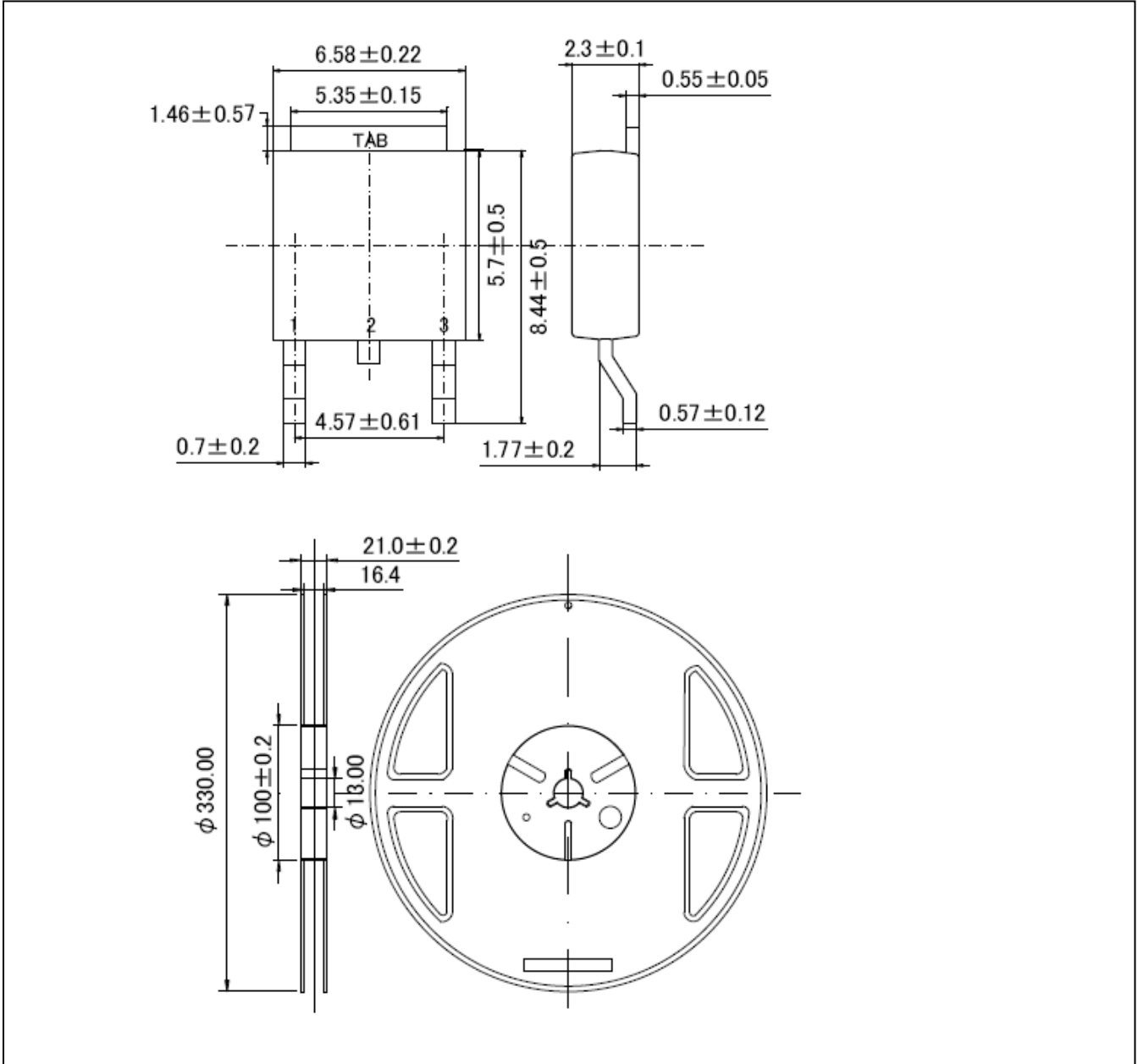


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### Packing Information

TO-252





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### Notes

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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