

## GE1086

### 1.5A Low Dropout Positive Adjustable or Fixed-Mode Regulator

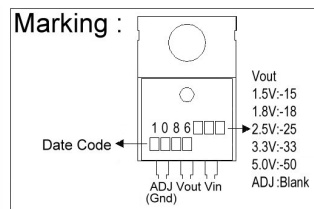
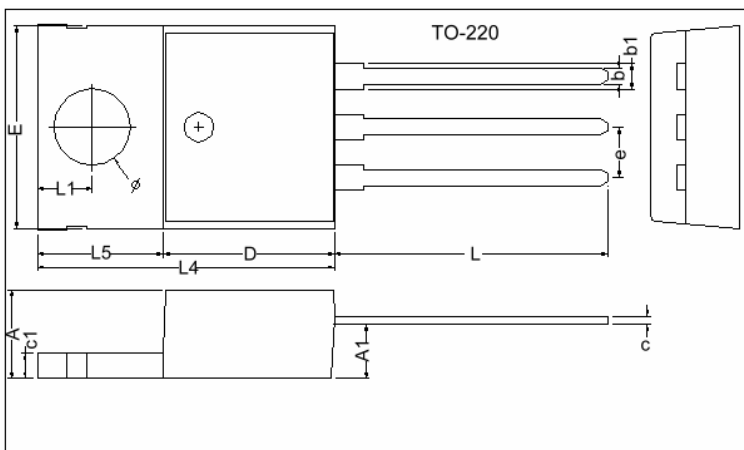
#### Description

The GE1086 is a low dropout positive adjustable or fixed-mode regulator with minimum of 1.5A 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. GE1086 is also well suited for other applications such as VGA cards. GE1086 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

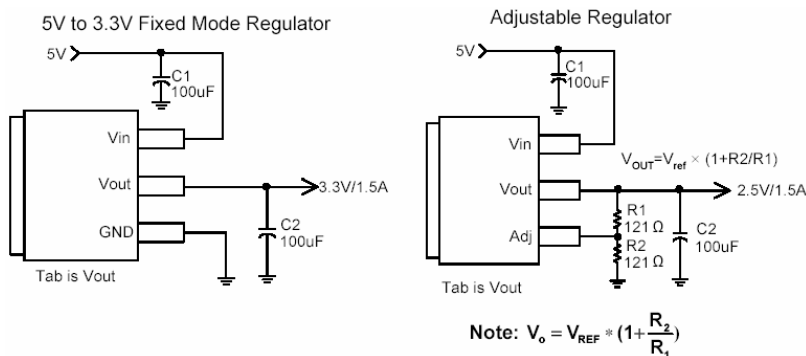
- 3-Terminal Adjustable or fixed 1.5V,1.8V,2.5V,3.3V,5.0V
- 1.4V Maximum Dropout at Full Load current
- Fast Transient response
- Built-in Thermal Shutdown
- Output current limiting

#### Package Dimensions

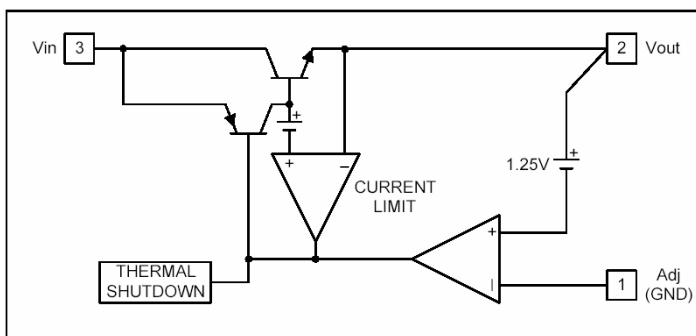


REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.40	4.80	c1	1.25	1.45
b	0.76	1.00	b1	1.17	1.47
c	0.36	0.50	L	13.25	14.25
D	8.60	9.00	e	2.54 REF.	
E	9.80	10.4	L1	2.60	2.89
L4	14.7	15.3	∅	3.71	3.96
L5	6.20	6.60	A1	2.60	2.80

#### Typical Circuit



#### Block Diagram



## Pin Descriptions

Name	I/O	Pin#	Function
Adj (GND)		1	Adjustable (Ground only for fixed mode)
Vout	O	2	The output of the regulator. A minimum of 10uF capacitor must be connected from this pin to ground to insure stability.
Vin	I	3	The input pin of regulator. Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.4V higher than Vout in order for the device to regulate properly.

## Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
Vin	DC Supply Voltage	-0.3 to 12	V
PD	Power Dissipation	Internally Limited	
TsT	Storage Temperature	-65 ~ + 150	°C
TOP	Operating Junction Temperature Range	0 ~ + 150	°C

## Electrical Characteristics

Parameter	Conditions	MIN	TYP	MAX	UNIT
Reference Voltage	GE1086-Adj Io=10mA, Tj =25°C, (Vin-Vout)=1.5V	1.225	1.250	1.275	V
Output Voltage	GE1086-1.5 Io=10mA, Tj =25°C, 3.0V≤Vin≤12V	1.470	1.500	1.530	V
	GE1086-1.8 Io=10mA, Tj =25°C, 3.3V≤Vin≤12V	1.764	1.800	1.836	V
	GE1086-2.5 Io=10mA, Tj =25°C, 4.0V≤Vin≤12V	2.450	2.500	2.550	V
	GE1086-3.3 Io=10mA, Tj =25°C, 4.8V≤Vin≤12V	3.235	3.300	3.365	V
	GE1086-5.0 Io=10mA, Tj =25°C, 6.5V≤Vin≤12V	4.900	5.000	5.100	V
Line Regulator	GE1086-XXX Io=10mA, Vout+1.5<Vin<12	-	-	0.2	%
Load Regulation	GE1086ADJ Vin=3.3V, 0mA<Io<1.5A, Tj=25°C (Note 1,2)	-	-	1	%
	GE1086-1.5 Vin=3.0V, 0mA<Io<1.5A, Tj=25°C (Note 1,2)	-	12	15	mV
	GE1086-1.8 Vin=3.3V, 0mA<Io<1.5A, Tj =25°C (Note 1,2)	-	15	18	mV
	GE1086-2.5 Vin=4.0V, 0mA<Io<1.5A, Tj=25°C (Note 1,2)	-	20	25	mV
	GE1086-3.3 Vin=5.0V, 0mA<Io<1.5A, Tj=25°C (Note 1,2)	-	26	33	mV
	GE1086-5.0 Vin=8.0V, 0mA<Io<1.5A, Tj=25°C (Note 1,2)	-	40	50	mV
Dropout Voltage (Vin-Vout)	GE1086-XXX Io=1.5A(ΔVout=1% Vout)	-	1.3	1.4	V
Current Limit	GE1086-XXX Vin-Vout=5V	1.6	-	-	A
Minimum Load Current	Adjustable model Vin=5V	-	5	10	mA
Adjust Pin Current	Adjustable model Vin=12V, Io=10mA	-	55	100	uA
Quiescent Current	fixed model Vin=12V, Io=0mA	-	-	12	mA
Thermal Regulation	TA=25°C, 30ms pulse	-	0.008	0.04	%/W
	F=120Hz, Cout=25uF, Tantalum, Io=1.5A				
	GE1086-XXX Vin=Vout+3V	-	60	70	dB
Temperature Stability	Io=10mA	-	0.5	-	%
Thermal Resistance Junction-to-Ambient (No heat sink ;No air flow)		-	86	-	°C/W
Thermal Resistance Junction-to-Case	Control Circuitry/Power Transistor	-	0.65/2.7	-	°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 GE1086 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 GE1086 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 1.5A load step. The GE1086 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 GE1086 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 GE1086 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.

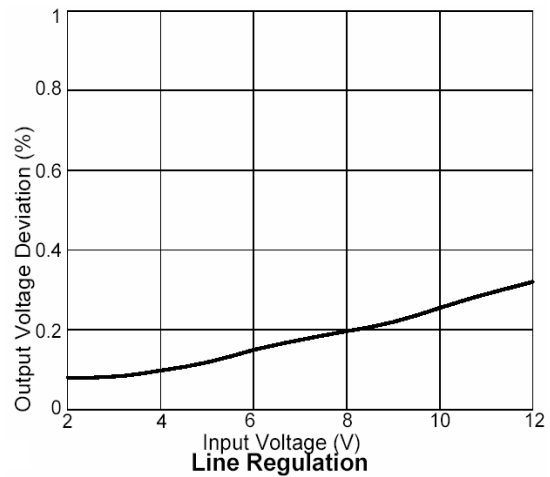
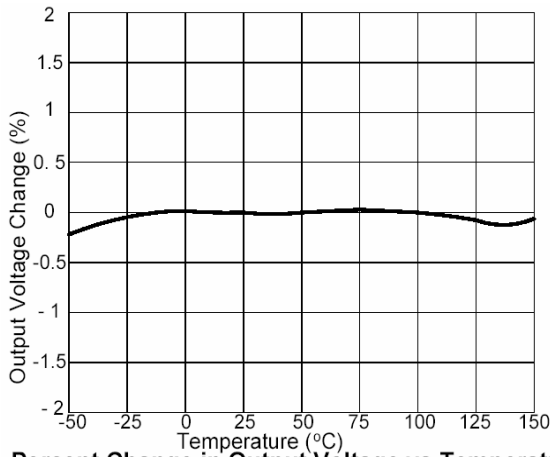
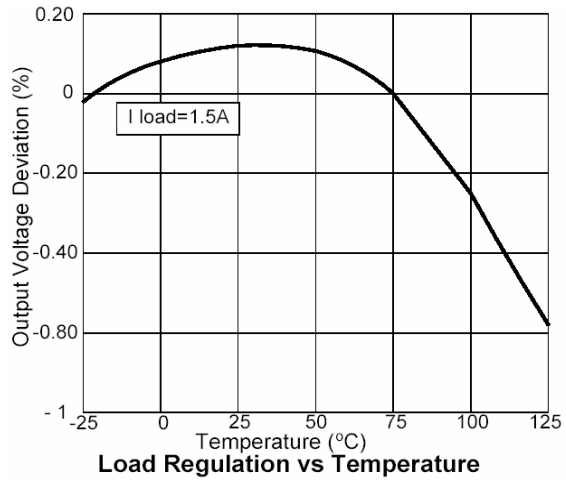
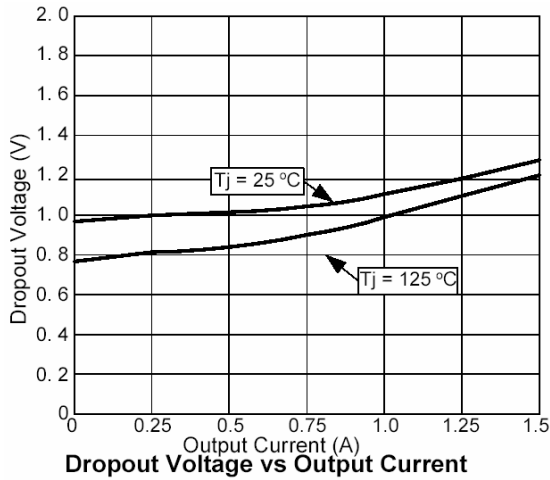
### Thermal Design

The GE1086 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°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

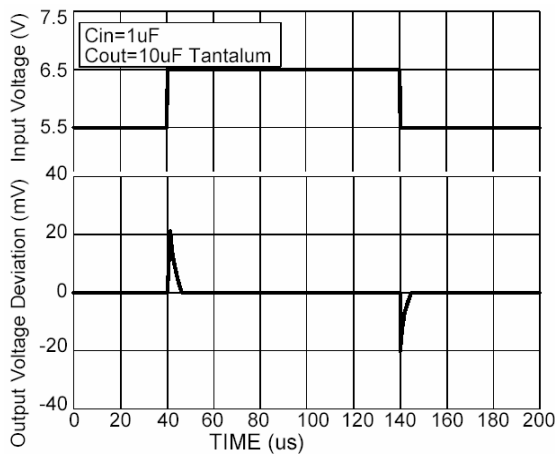
The output capacitors must be located as close to the  $V_{out}$  terminal of the device as possible. It is recommended to use a section of a layer of the PC board as a plane to connect the  $V_{out}$  pin to the output capacitors to prevent any high frequency oscillation that may result due to excessive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

## Typical Performance Characteristics

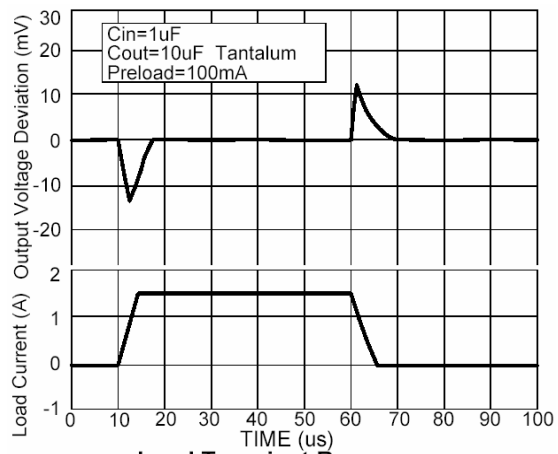


Percent Change in Output Voltage vs Temperature

Line Regulation



Line Transient Response



Load Transient Response

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