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AP033

1.5A Low Dropout Positive Fixed-Mode Regulator

Features

- 3-Terminal and Fixed 3.3V
- 1.4V Maximum Dropout at Full Load Current.

Ordering Information

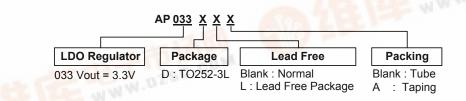
- Fast Transient Response.
- · Built-in Thermal Shutdown. WWW.DZSC.COM
- Output Current Limiting.

Applications

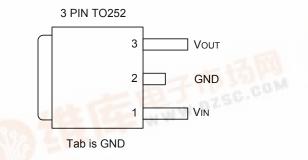
- PC peripheral
- Communication

General Description

AP033 is a low dropout positive 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. AP033 is guaranteed to have <1.4V dropout at full load current making it ideal to provide well regulated outputs of 3.3V with 4.7V to 12V input supply by different output voltage.



Pin Assignments



Pin Descriptions

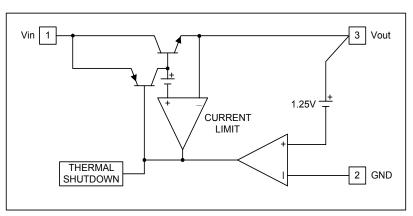


Name	Pin #	Function				
VIN	1	The input pin of regulator. Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.4V higher than VOUT in order for the device to regulate properly.				
GND	2	Ground				
Vout	3	The output of the regulator. A minimum of 10µF capacitor must be connected from this pin to ground to insure stability. Ground				

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Block Diagram



■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
Vin	DC Supply Voltage	-0.3 to 14	V
PD	Power Dissipation	Internally Li	mited
T _{ST}	Storage Temperature	-65 to +150	°C
T _{OP}	Operating Junction Temperature Range	0 to +150	°C

■ Electrical Characteristics (Under Operating Conditions)

Parameter	Conditions	Min.	Тур.	Max.	Units
	$V_{IN} = 5V, I_{OUT} = 0mA, T_{J} = 25^{\circ}C$	3.267	3.300	3.333	V
Output Voltage	4.7V <u>≤</u> V _{IN} ≤12V, 0≤I _{OUT} ≤1.5A	3.235	3.300	3.365	V
Line Regulation	4.7V <v<sub>IN<12V, I_{OUT} = 0mA, T_J=25°C</v<sub>		0.5	10	mV
	4.7 V <u>V N 12</u> V, 1001 – 011/A, 1 J-23 O		1.0	10	mV
Load Regulation	V _{IN} = 5V, 0 <u>≤</u> I _{OUT} ≤1.5A, T _J =25 ^o C (Notes1.2)		3	15	mV
			8	33	mV
Dropout Voltage	ΔV_{OUT} , $\Delta V_{REF} = 1\%$, $I_{OUT} = 1.5A$ (Note 3)		1.3	1.4	V
(V _{IN} -V _{OUT})			1.0		v
Current Limit	$(V_{IN}-V_{OUT}) \ge 1.4V, \Delta V_{OUT} = 100 \text{mV} \text{ (Note 4)}$	1.6			Α
Quiescent Current	V _{IN} <u><</u> 12V		5	10	mA
Thermal Regulation	T _A =25 °C, 30ms pulse		0.008	0.04	%/W
Ripple Rejection	F=120Hz, C _{OUT} =25uF Tantalum, I _{OUT} =1.5A				
	AP033 V _{IN} =6.3V		60	72	dB
Temperature Stability			0.5		%
Thermal Resistance					
Junction-to-Ambient	TO-252		101		°C/W
(No heat sink ;No air	10-202		101		
flow)					
Thermal Resistance	TO-252: Control Circuitry/Power Transistor		10		°C/W
Junction-to-Case			10		0/11

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.

Note 2: Line and load regulation are guaranteed up to the maximum power dissipation of 2W. Power dissipation is determined by the input/output differential and the output current.

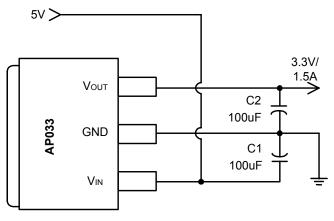
Note 3: Dropout voltage is specified over the full output current range of the device.

Note 4: AP033 is guaranteed to operate at higher peak current than 1.6 Amp. See the thermal regulation specifications for changes in output voltage due the heating effects.



1.5A Low Dropout Positive Fixed-Mode Regulator

Typical Application



Tab is GND

5V to 3.3V Fixed Mode Regulator

Function Description

Introduction

The AP033 fixed-mode Low Dropout (LDO) regulator is a 3 terminal device. The AP033 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 1.5A load step. The AP033 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 AP033 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 AP033 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 AP033 incorporates an internal thermal 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° 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 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 excessive trace inductance.



Dropout Voltage (VIN-VOUT) Load Regulation 1.4 0 -0.2 1.2 TJ=25°C ILOAD=1.5A Output Voltage Deviation(%) Dropout Voltage (V) -0.4 1 -0.6 -0.8 0.8 T_=125°C -1 0.6 -1.2 0.4 -1.4 -1.6 0.2 -1.8 0 -2 0 200 400 600 800 -25 0 25 50 75 100 Output Current (mA) Temperature(°C) **Temperature Stability** Line regulation 2 1 Output Voltage Chang (%) 1.5 Output Voltage Deviation(%) 0.8 1 0.5 0.6 0 0.4 -0.5 -1 0.2 -1.5 -2 0 -50 -25 25 50 75 100 125 150 0 5 7 9 11 Input Voltage(V) 13 15 Temperature (°C) **AP033 Line Transient Response AP033 Load Transient Response** Output Voltage Deviation (mV) 7.5 30 Input Voltage (V) CIN=1µF COUT=10µF Tantalum C_{IN}=10µF 20 C_{OUT}=10µF Tantalum 6.5 V_{IN}=4.8V 10 Preload=0.1A 0 5.5 -10 40 Output Voltage Deviation(mV) -20 20 2 0 Load Current(A) 1 -20 0 -40 -1 0 10 20 30 40 50 60 70 80 90 100

Typical Performance Characteristics

0 20 40 60 80

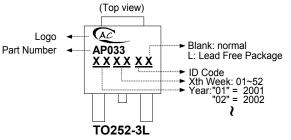
TIME(µs)

100 120 140 160 180 200

TIME(µs)

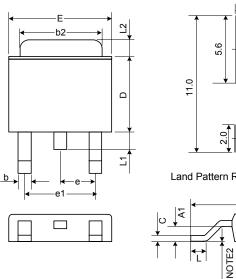


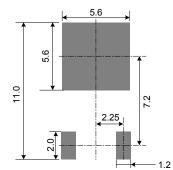
Marking Information



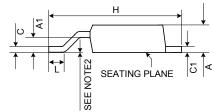
Package Dimension

TO252-3L





Land Pattern Recommendation (Unit: mm)



Notes:					
1.	JEDEC	Outline: TO-	252 AB		
-					

Mils suggested for positive contact at mounting.

Symbol	Dimensions In Millimeters			Dimensions In Inches			
	Min.	Nom.	Max.	Min.	Nom.	Max.	
Α	2.18	2.29	2.39	0.086	0.090	0.094	
A1	1.02	1.15	1.27	0.040	0.045	0.050	
b		0.61 TYP.			0.024 TYP.		
b2	5.20	5.35	5.50	0.205	0.211	0.217	
С	0.46	0.52	0.58	0.018	0.020	0.023	
C1	0.46	0.52	0.58	0.018	0.020	0.023	
D	5.33	5.57	5.80	0.210	0.219	0.228	
E	6.35	6.58	6.80	0.250	0.259	0.268	
е	2.25 BSC.			0.089 BSC.			
e1	4.50 BSC.			0.177 BSC.			
Н	9.00	9.70	10.40	0.354	0.382	0.409	
L	0.51	-	-	0.020	-	-	
L1	0.64	0.83	1.02	0.025	0.033	0.040	
L2	1.52	1.78	2.03	0.060	0.070	0.080	