



### FEATURES

- 1% Accuracy 1.235V Voltage Reference.
- Fast Transient Response.
- Low Ground Current at 55µA.
- Wide Output Current Range, 10µA~80mA.
- Output Programmable from 1.235V~11V.
- Low Temperature Coefficiency.
- Error Flag Warns of Output Dropout.

### APPLICATIONS

- Voltage Regulator for Pentium® CPUs.
- Wireless Communication System.
- 5V to 3.3V Regulator for VGA Cards.
- Battery Powered Systems.

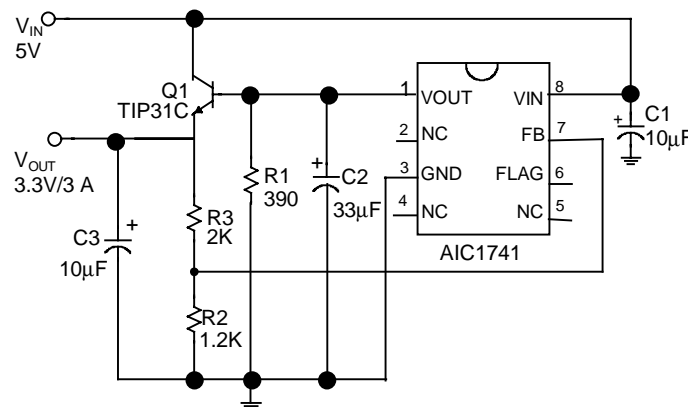
### DESCRIPTION

The AIC1741 is a low power precision adjustable regulator with 80mA output capability. The device can be used as a secondary regular to provide feedback in a switching power supply.

The AIC1741 circuitry includes an internal wide band amplifier, a precision bandgap reference, and a PMOS output transistor. The feedback input can be connected to an external resistor divider to program the sensed output voltage. The VOUT pin provides loop frequency compensation when used as a part of a larger servo system.

Although the device works as a stand-alone regulator, it can also drive an NPN power transistor to construct a high current low dropout regulator, with only very minor current loss to ground.

### TYPICAL APPLICATION CIRCUIT



5V to 3.3V Regulator for VGA Cards.

### ORDERING INFORMATION

AIC1741 XX

- PACKAGE TYPE  
N: PLASTIC DIP  
S: SMALL OUTLINE
- TEMPERATURE RANGE  
C: 0°C~+70°C

ORDER NUMBER	PIN CONFIGURATION
AIC1741CN (PLASTIC DIP)	TOP VIEW 
AIC1741CS (PLASTIC SO)	

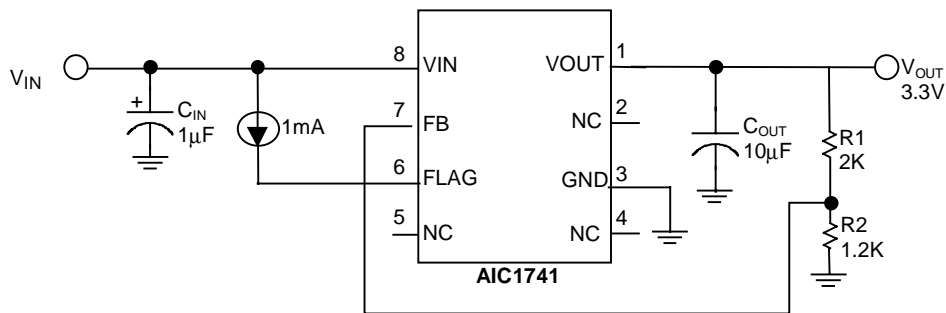
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### ABSOLUTE MAXIMUM RATINGS

Input Supply Voltage	.....	-0.3~12V
Feedback Input Voltage	.....	-0.3~12V
Shutdown Input Voltage	.....	-0.3~12V
Error Comparator Output	.....	-0.3~12V
Operating Junction Temperature Range	.....	-40°C~125°C
Storage Temperature Range	.....	-65°C~150°C

### TEST CIRCUIT



### ELECTRICAL CHARACTERISTICS (Ta=25°C, CIN=1µF, COUT=10µF, unless otherwise specified. Test conditions are referred to TEST CIRCUIT.)

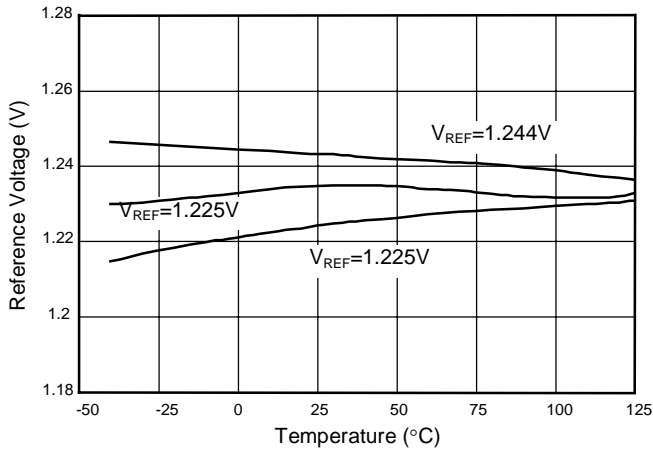
PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V <sub>IN</sub> =3.6~12V, No Load, V <sub>OUT</sub> =3.3V	3.267	3.3	3.333	V
Output Voltage Temperature Coefficiency	(Note 1)		50	150	PPM/°C
Line Regulation	V <sub>IN</sub> =3.6~12V, I <sub>L</sub> =1mA, V <sub>OUT</sub> =3.3V		3	10	mV
Load Regulation (Note 2)	V <sub>IN</sub> =7V, I <sub>L</sub> =0.1~80mA, V <sub>OUT</sub> =3.3V		4	10	mV
Dropout Voltage (Note 3)	I <sub>L</sub> =0.1mA I <sub>L</sub> =80mA, V <sub>OUT</sub> =3.3V		0.2 200	10 300	mV
Ground Current	V <sub>IN</sub> =4~12V, I <sub>O</sub> =0.1mA~I <sub>MAX</sub>		55	80	µA
Flag Pin Off Leakage Current	V <sub>IN</sub> =7V			1	µA
Flag Pin Pull Low Voltage	I <sub>OL</sub> =1mA, V <sub>IN</sub> =2.9V		100	300	mV
Flag Pin Upper Threshold Voltage		40	60		mV
Flag Pin Lower Threshold Voltage			68	88	mV

- Note 1: Guaranteed by design.
- Note 2: Regulation is measured at constant junction temperature, using pulse testing with a low ON time.
- Note 3: Dropout voltage is defined as the input to output differential at which the output voltage drops 100mV below the value measured with a 1V differential.

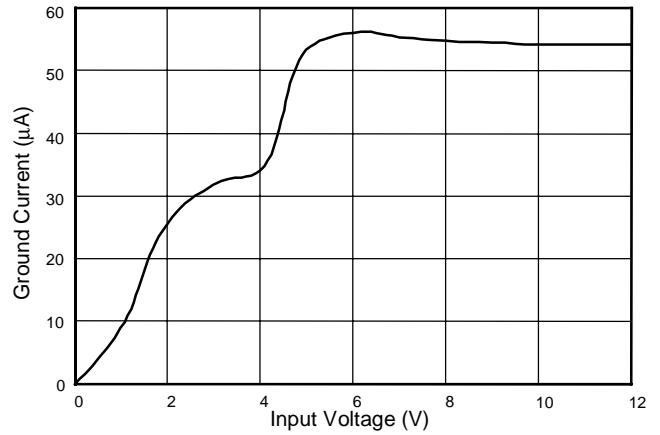


## TYPICAL PERFORMANCE CHARACTERISTICS

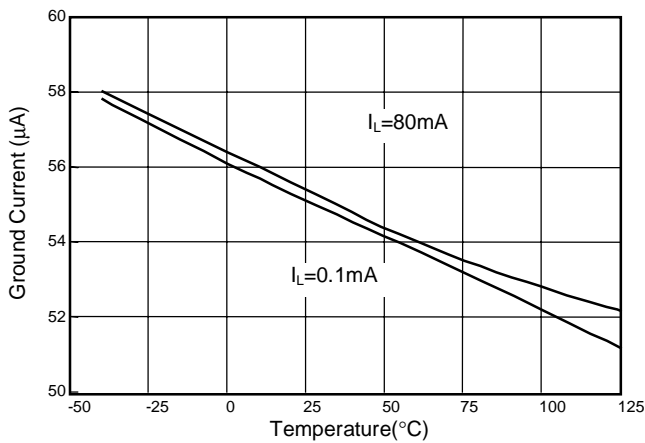
Reference Voltage vs. Temperature



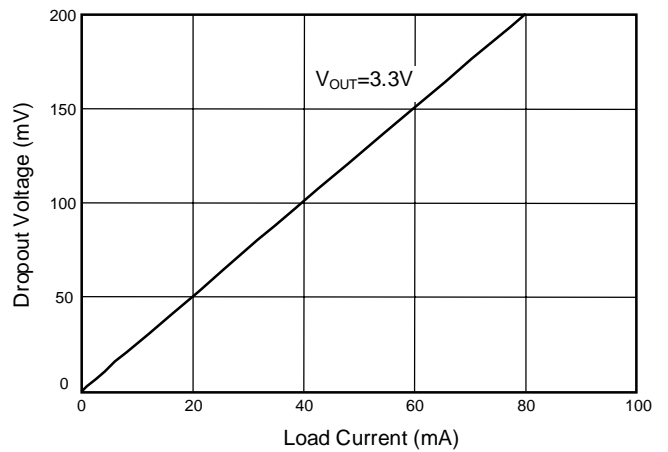
Ground Current vs. Input Voltage



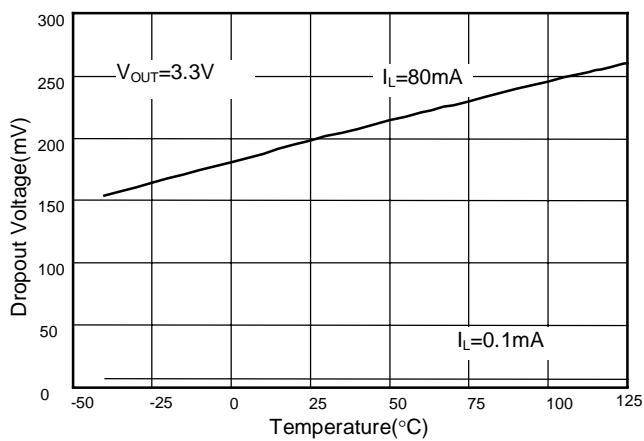
Ground Current vs. Temperature



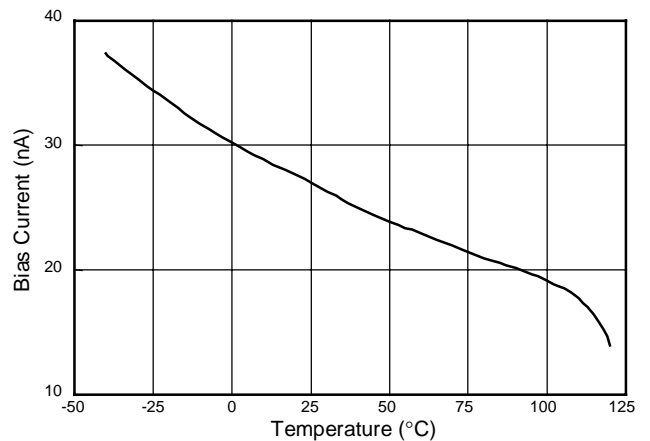
Dropout Voltage vs. Load Current



Dropout Voltage vs Temperature

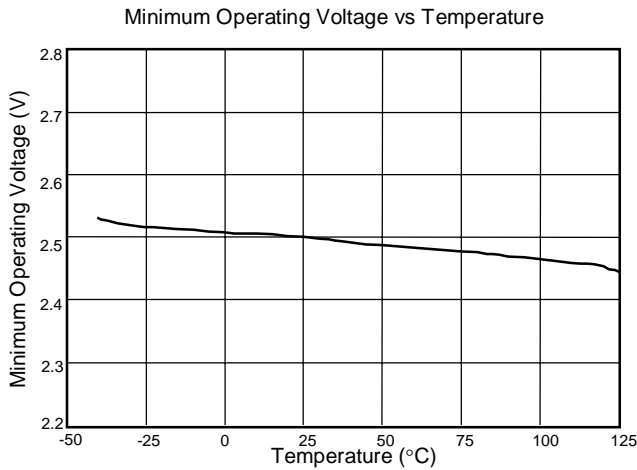


Bias Current vs. Temperature

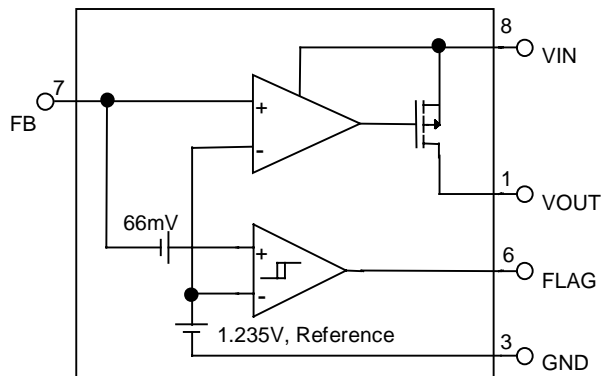




### TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)



### BLOCK DIAGRAM



### PIN DESCRIPTIONS

- |             |               |             |                                                         |
|-------------|---------------|-------------|---------------------------------------------------------|
| PIN 1: VOUT | - Output pin. | PIN 6: FLAG | - Open drain output of error flag warns.                |
| PIN 2: NC   | -             | PIN 7: FB   | - Error amplifier positive feedback (see Block Diagram) |
| PIN 3: GND  | - Power GND.  | PIN 8: VIN  | - Power supply input.                                   |
| PIN 4: NC   | -             |             |                                                         |
| PIN 5: NC   | -             |             |                                                         |



## APPLICATION INFORMATIONS

The AIC1741 has two major applications, one as a low dropout linear regulator and another an error amplifier for a switching power supply to provide precision feedback control.

### Use as a Linear Regulator

When AIC1741 is connected as a low dropout linear regulator, two external divider resistors are needed to set the output voltage (see Test Circuit). The output voltage can be calculated from the following formula:

$$V_{OUT} = V_{REF}(1 + R1/R2) + I_{FB}R1$$

where  $V_{REF}$  is the nominal 1.235V reference voltage and  $I_{FB}$  is the feedback pin bias current, nominally -20nA. For better accuracy, the recommended maximum value of R2 is 100K $\Omega$ .

A 1 $\mu$ F (or greater) capacitor is required between the AIC1741 output and ground for stability. Without this capacitor the part will oscillate. Even though most types of capacitor may work, if Aluminum electrolytic type is used, the equivalent series resistance (ESR) should be held to 5 $\Omega$ . or less. Many Aluminum electrolytics have electrolytes that freeze at about -30 $^{\circ}$ C, so solid tantalums are recommended for operation below -25 $^{\circ}$ C. The value of this capacitor may be increased without limit.

The output capacitance required for stability varies with output voltage (smaller for higher output voltage) and output current (smaller for lower output currents). At the worst-case situation of a 80mA load at 1.235V output (output shorted to FB pin) a 3.3  $\mu$ F or greater capacitor should be used.

A 0.1 $\mu$ F capacitor should be placed from the AIC1741 input to ground if the lead inductance between the input and power source exceeds 500nH (approximately 10 inches of trace). Noise injection into the feedback terminal of the AIC1741 from

nearby noise sources can also upset the output. This may especially be a problem when using high value external resistors to set the output voltage. Adding a 100pF capacitor between output and feedback and increasing the output capacitor to at least 3.3 $\mu$ F will cure this problem.

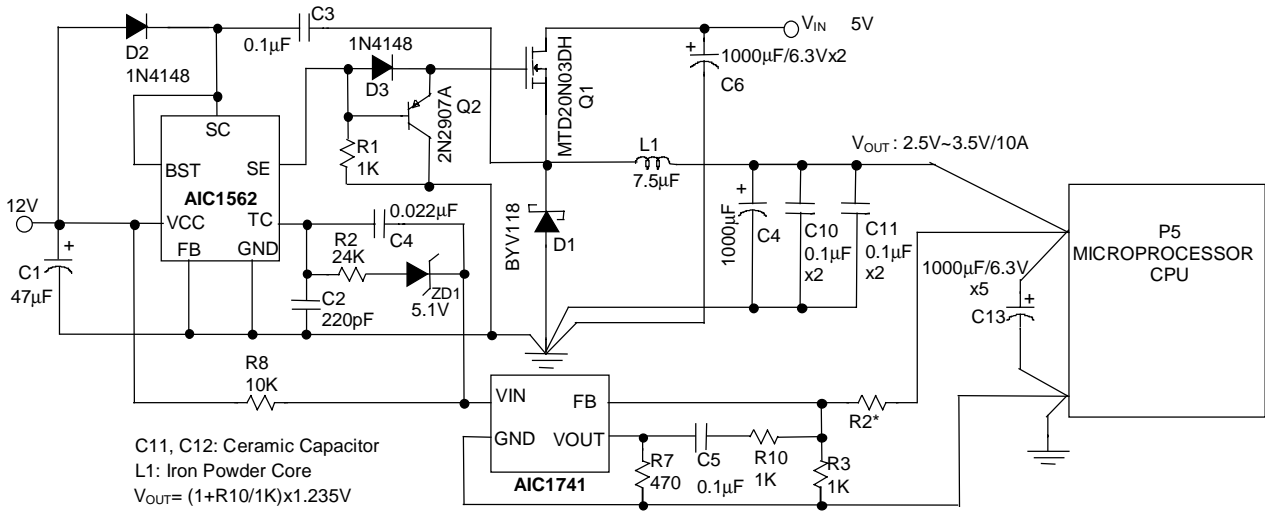
The AIC1741 can drive low cost NPN bipolar transistor to deliver more output current. Typical application circuit is an example of 5V to 3.3V linear regulator for VGA cards power supply. A 390 $\Omega$  resistor and 1 $\mu$ F capacitor are needed between VOUT pin and ground for stability. The minimum dropout voltage between input to output is  $V_{BEQ1} + V_{DS}$  of AIC1741 output PMOSFET, typical 1V @ 3A output current.

### Use as an Error Amplifier

Fig. 1 shows a popular application for the AIC1741 in switching power supply. The output voltage is sensed between FB pin and GND pin of the AIC1741 through the divider resistor. The VIN pin serves to control the duty cycle of the pulse width modulator to stabilize the output voltage at the set voltage. The FB pin and VIN pin are in same phase while the FB pin and VOUT pin are in opposite phases. Connecting a capacitor from VOUT pin to FB pin provides frequency compensation for the control loop. The AIC1741 provides output voltage remote sensing to improve precision and regulation specifications of the output of the switching power supply.



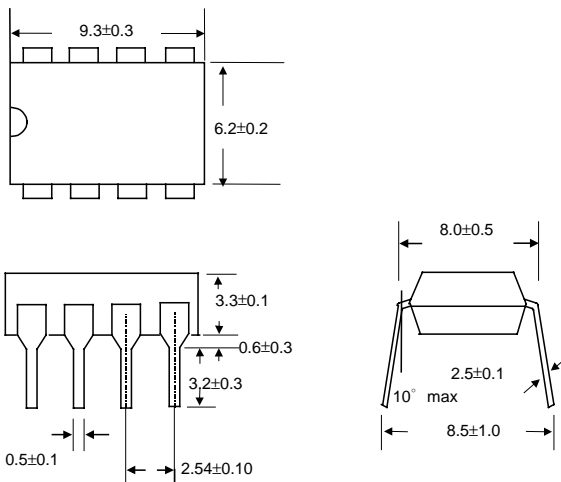
**APPLICATION EXAMPLES**



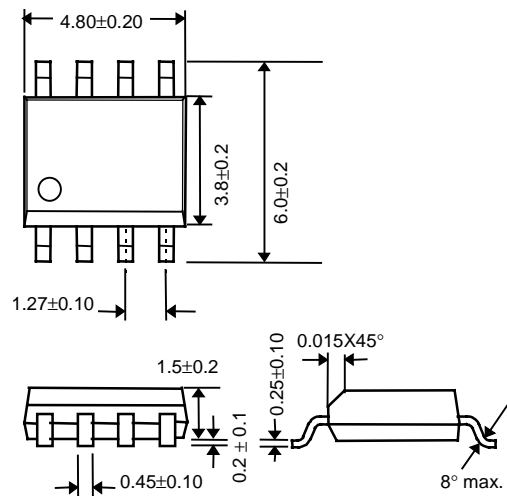
**Fig. 1 CPU Power Supply for P5 Mother Board**

**PHYSICAL DIMENSIONS**

● 8 LEAD PLASTIC DIP



● 8 LEAD PLASTIC SO



UNIT: mm