

**Micropower SOT-23, 120 mA Low-Dropout
Voltage Regulator, Bypass & ON/OFF Switch**
(PRELIMINARY INFORMATION)

FEATURES

- Low Quiescent Current..... 4000µA @ 80 mA
- Smallest Possible Size (SOT-23-5)
- 5V, 4.8V, 4.5V, 4V, 3.6V, 3.3V, 3.V, 2.8V & 2.5V Fix Output
- Guaranteed Output Current In Excess Of 120mA
- ByPass Pin Provides A Significant Reduction In Output Noise
- Available In Adjustable Output With ON/OFF Switch
- Internal Thermal Overload Protection/ Short Circuit Protection
- Voltage Dropout Is less than 50 mV At 50mA Output
- Pin Compatible with LP2981/82 and MIC5205
- Low Cost Solution

APPLICATIONS

- Cellular Phone
- Palmtop/ Laptop Computer
- Personal Digital Assistance (PDA)
- Radio Control Systems
- Camcorder, Camera
- Portable Instrumentation
- Radio Control Systems
- Cordless Telephones
- CD-ROM/USB

PRODUCT DESCRIPTION

The AS2807 is a low power voltage regulator. This device is meets the requirement of battery-powered applications such as cordless telephones, radio control systems, and portable computers. The AS2807 features very low quiescent current and very low dropout voltage (typ. 50mV at light load and 200 mV at 120mA). Other features like logic-compatible on/off input enables the regulator to be switched on and off. The AS2807 is offered in a small package 5-pin SOT-23 as fix, adjustable with ON/OFF Switch.

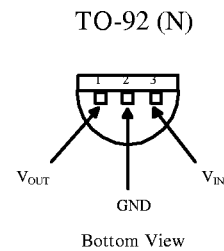
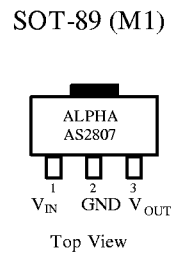
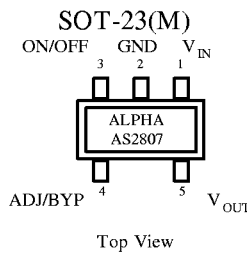
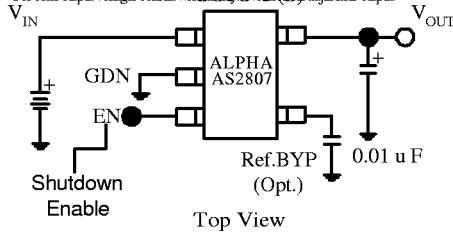
The AS2807 is the same pin out as the LP2981/82 and MIC5205. The regulator output voltage may be internally pin-strapped for a 5V, 4.8V, 4.5V, 4V, 3.6V, 3.3V, 3.V, 2.8V & 2.5V or programmed from 2.5V to 29V with an external pair of resistors. For other fix voltages consult with ALPHA Semiconductor.

ORDERING INFORMATION

SOT-23 5-PIN	TO-92	SOT-89 3-PIN	Oper. Temp. Range
AS2807YM-X	AS2807YN-X	AS2807YN-X	-40°C to 85°C

Package Marking Information for SOT-23 & SOT-89
7XX
Example 7A50=AS2807AM1-50 or AS2807AM-50
X= Output Voltage (2.5V, 3.0V, 3.3V, 3.5V, 3.6V, 4.5V, 5.0V or Blank for Adj.
Y= Output Tolerance, (A or Blank)
For other output voltages consult with ALPHA Semiconductor for adjustable output.

PIN CONNECTIONS



ABSOLUTE MAXIMUM RATINGS

Power Dissipation.....	Internally Limited	Supply Voltage.....	+3.2V to 30V
Lead Temp (soldering, 5 seconds).....	260°C		
Storage Temperature Range.....	65°C to +150°C		
Operating Junction Temperature Range.....	-40°C to + 85°C		
Input Supply Voltage.....	2.5V to 16V		
ESD Rating	2KV		

ELECTRICAL CHARACTERISTICS at $V_S=14V$, $T_a=25^\circ C$, $I_o=10mA$, $C_2=100\mu F$, unless otherwise specified. (Note 1)

Parameter	Conditions	Min	Typ	Max	Units
Output Voltage	Variations from Specific Output Over Temperature	-1		1	%
		-2		2	%
All Voltage Options					
Long Term Stability			20		mV/1000
Line Regulation	$5V < V_{in} < 16V$		2.0	10	mV
Load Regulation	$5mA < I_o < 120mA$		14	80	mV
Dropout Voltage	$I_o=10mA$		0.001	0.05	V
	$I_o=50mA$		0.05	0.05	
	$I_o=80mA$		0.08	0.1	
	$I_o=120mA$		0.30	0.4	
Quiescent Current	$I_o < 10mA$		1200	1500	μA
	$I_o < 50mA$		1500	2000	
	$I_o < 80mA$		4000	4500	
	$I_o = 120mA$		5000	5500	
Maximum Operational Input Voltage				16	V
Continuous Output Current				120	mA
Pulse Output Current				180	mA
Output Noise Voltage	10Hz-100kHz, $C_{out}=100\mu F$		500		μV_{rms}
Ripple Rejection	$f_o=120Hz$		80		dB
On/ Off Threshold Current				50	μA
Threshold Voltage			1.6	1.2	V
		3.25	2.6		V

Adjustable

 $V_{in}=14V$, $V_o=3V$, $I_o=10mA$, $R_1=27k$, $C_2=100\mu F$, $T_j=25^\circ$

Parameter	Conditions	AS2807			Units
		Min	Typ	Max	
Reference Voltage	$I_o \leq 120mA$, over tem. $R_1 = 27K$	1.19 1.18	1.20	1.212 1.23	V V

Adjustable Version only

 $V_{in}=14V$, $V_o=3V$, $I_o=10mA$, $R_1=27k$, $C_2=100\mu F$, $T_j=25^\circ$ (Continued)

Parameter	Conditions	AS2807			Units
		Min	Typ	Max	
Output Voltage Range		3.2		29	V
Line Regulation	$V_{out}+0.6V < V_{in} < 16V$		0.2	1.5	mV
Load Regulation	$5mA < I_o < 100mA$		0.3	1.0	% max
Output Impedance	100mADC and 10mA rms, 100Hz-10kHz		40		m Ω/V
Quiescent Current	$I_o=10mA$		0.4	1.0	mA
	$I_o=120mA$		15		mA
	During Shutdown $R_L=500\Omega$		0.8	1.0	mA
Output Noise Voltage	10Hz - 100kHz		100		$\mu V_{rms}/V$
Long Term Stability			0.4		%/1000h
Ripple Rejection	$f_o=120Hz$		0.02		%/V
Dropout Voltage	$I_o < 10mA$		0.001	0.05	V
	$I_o=50mA$		0.05	0.01	V
	$I_o=120mA$		0.3	0.5	V
Maximum Operational Input Voltage				16	V
Continuous Output Current				120	mA
Pulse Output Current	1% Duty Cycle, $T < 100ms$, $R_L=500\Omega$			150	mA
On/Off Threshold Current			20	50	μA
Threshold Voltage	$V_o=3V$				
		On	3.25	2.0	1.2
Off			2.2		V

Note 1: See TYPICAL APPLICATIONS notes to ensure constant junction temperature, low duty cycle pulse testing used.

Note 2: All limits are at 25°C or over the full operating temperature junction range of -40°C to +125°C.

Note 3: The maximum power dissipation is a function of maximum junction temperature, total thermal resistance, and ambient temperature.

Note 4: Human body model, 100 μF discharged through 1.5 K Ω .

Application Hints

The AS2807 requires an output capacitor for device stability. The value required varies greatly depending upon the application circuit and other factors. The high frequency characteristics of electrolytic capacitors depend greatly on the type and also on the manufacturer. Sometimes only bench testing is the only means to determine the proper capacitor type and value. The high quality 100 μ F aluminum electrolytic covers all general application circuits, this stability can be obtained with a tantalum electrolytic value of 47 μ F.

Another critical point of electrolytic characteristics is its performance over temperature. The AS2807 is designed to operate starting at -40°C which may not be true in the case of electrolytic. Higher temperatures generally no problem. The electrolytic type in aluminum will freeze around -30°C. This could cause an oscillation at output of regulator. At a lower temperature requirement by many applications the capacitor should maintain its performance. So as a result, for an application which regulator junction temperature does not exceed 25°C, the output capacitor can be reduced by the

factor of two over the value needed for the entire temperature range.

Other points with linear regulators are that the twitch higher output current stability decreases. In most applications the AS2807 is operating at few milliamps. In these applications the output capacitance can be further reduced. For example, when the regulator is running at 10mA output current the output capacitance value is half compared to the same regulator that is running at 100 mA. With the AS2807 adjustable regulator, the minimum value of output capacitance is a function of the output voltage. The value decreases with higher output voltages, since the internal loop gain is reduced.

The worst case occurs at the lower temperature and maximum operating currents, the entire circuit and the electrolytic, should be cooled down to the minimum temperature. The minimum of 0.6 volts required at the input of regulator above the output to keep the power dissipation and die heating to its minimum. After the value for the capacitor has been determined for actual use, the value should be doubled.

Typical Applications Circuits

The AS2807 provides access to the internal reference. A 0.01 μ F capacitor on the Ref BYP pin will provide a significant reduction in output noise. This pin may be left unconnected if the output noise is not a major concern. The AS2807 start-up speed is proportioned to the size of its capacitor. Applications requiring a slow ramp-up of output voltage should consider larger values of C_{BYP}. If the rapid turn-ON is necessary, use 470pF or less.

Figure 1 shows AS2807 standard application circuit. The EN (enable bar) pin is pulled low (<1.2V) to enable the regulator. To disable the regulator, EN > 3.25V.

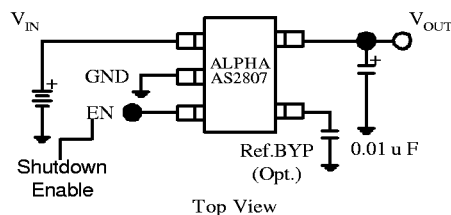


Fig. 1

The AS2807 in figure 2 shows adjustable output voltage configuration. Two resistors set the output voltage. The formula for output voltage is:

$$V_{OUT} = 1.200V \times \left(\frac{R2+1}{R1} \right)$$

Resistor values are not critical as the Adj pin has high input impedance, for best results use resistors of 470k Ω or less. A capacitor for Adj to ground will provide improved noise performance.

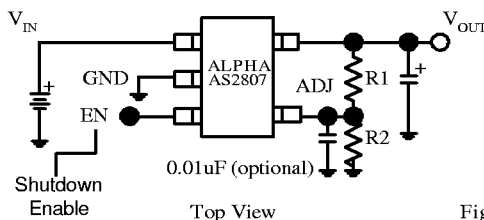


Fig. 2