

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

**FEATURES**

- Low Quiescent Current ..... 4000µA @ 80mA Output
- Ultra Low Dropout..... 80mV @ 80mA Output
- 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
- Pin Compatible with LP2981/82 and MIC5205
- Low Cost Solution

**APPLICATIONS**

- Cellular Phones
- Palmtop/ Laptop Computer
- Personal Digital Assistance (PDA)
- Radio Control Systems
- Radio Control System
- Portable Instrumentation
- Radio Control Systems
- Cordless Telephones
- CD-ROM/ USB

**PRODUCT DESCRIPTION**

The AS2805 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 AS2805 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 AS2805 is offered in a small package 5-pin SOT-23 as fix, adjustable with ON/OFF Switch.

The AS2805 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 (M) 5-PIN	SOT-23 (MZ) 5-PIN	SOT-89(M1) 3-PIN	TO-92 (N)	Oper. Temp. Range
AS2805YM-X	AS2805YMZ-X	AS2805YM1-X	AS2805YN-X	-40°C to 85°C

Package marking information.

For SOT-23 & SOT-89

5YX

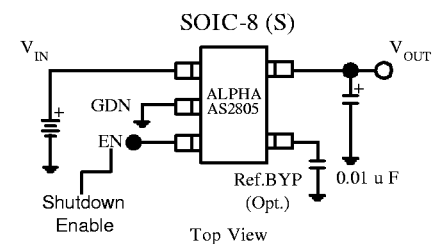
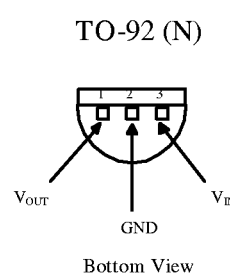
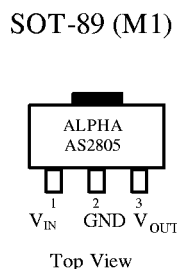
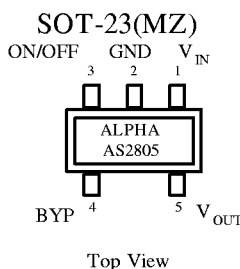
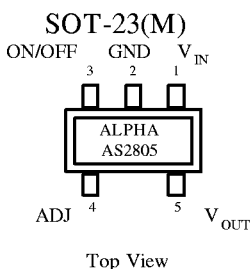
Example 5A50 = AS2805m1-5.0

Or AS2805M-5.0

X = Output Voltage ( 2.5V, 2.8V, 3.0V, 3.3V, 3.6V, 4.0V, 4.5V, 4.8V, 5.0V or Blank for Adjustable. Y= Output Tolerance (A or C)

Consult factory for other fixed voltages.

**PIN CONNECTIONS**



## ABSOLUTE MAXIMUM RATINGS

Power Dissipation..... Internally Limited	Supply Voltage..... 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	AS2805A			AS2805C			Units
		Min	Typ	Max	Min	Typ	Max	
3.0 Volt Version		AS2805A-3			AS2805C-3			
Output Voltage	$V_{IN} = 6V$ $I_{OUT} = 100mA$	2.94	3.00	3.06	2.91	3.00	3.09	V
3.3 Volt Version		AS2805A-3.3			AS2805C-3.3			
Output Voltage	$V_{IN} = 6V$ $I_{OUT} = 100mA$	3.23	3.30	3.37	3.21	3.30	3.39	V
5 Volt Version		AS2805A-5			AS2805C-5			
Output Voltage	$V_{IN} = 6V$ $I_{OUT} = 100mA$	4.90	5.00	5.10	4.85	5.00	5.15	V
All Voltage Options								
Long Term Stability			20			20		mV/1000
Line Regulation	$5V < V_{in} < 16V$		2.0	10		4.0	30	mV
Load Regulation	$5mA < I_o < 120mA$		14	50		14	50	mV
Dropout Voltage	$I_o=10mA$		0.001	0.05		0.001	0.05	V
	$I_o=50mA$		0.05	0.05		0.05	0.05	
	$I_o=80mA$		0.08	0.1		0.08	0.1	
	$I_o=120mA$		0.3	0.4		0.3	0.4	
Quiescent Current	$I_o < 10mA$ ,		1200	1500		1200	1500	$\mu A$
	$I_o < 50mA$ ,		1500	2000		3000	3500	
	$I_o < 80mA$ ,		4000	4500		4000	4500	
	$I_o = 120mA$ ,		5000	5500		5000	5500	
Maximum Operational Input Voltage				16			16	V
Continuous Output Current				120			120	mA
Pulse Output Current				180			180	mA
Output Noise Voltage	10Hz-100kHz, $C_{out}=100\mu F$		500			500		$\mu V_{rms}$
Ripple Rejection	$f_o=120Hz$		80			80		dB
On/ Off Threshold Current				50			26	$\mu A$
Threshold Voltage	On		1.6	1.2		1.6	1.2	V
	Off	3.25	2.6		3.25	2.6		V

Adjustable

Vin=14V, Vo=3V, Io=10mA, R1=27k, C2=100μF, Tj=25°

Parameter	Conditions	AS2805A/C			Units
		Min	Typ	Max	
Reference Voltage	Io ≤ 120mA, over tem. R1 = 27K	1.14	1.20	1.26	V
		1.08		1.32	V

Adjustable Version only

Vin=14V, Vo=3V, Io=10mA, R1=27k, C2=100μF, Tj=25° (Continued)

Parameter	Conditions	AS2805C			Units
		Min	Typ	Max	
Output Voltage Range		3.0		29	V
Line Regulation	V <sub>out</sub> +0.6V<V <sub>in</sub> <16V		0.2	1.5	mV
Load Regulation	5mA<I <sub>o</sub> <100mA		0.3	1.0	% max
Output Impedance	100mADC and 10mArms, 100Hz-10kHz		40		mΩ/V
Quiescent Current	Io=10mA Io=120mA		0.4	1.0	mA
			15	20	mA
Output Noise Voltage	10Hz - 100kHz		100		μVrms/V
Long Term Stability			0.4		%/1000h
Ripple Rejection	f <sub>o</sub> =120Hz		0.02		%/V
Dropout Voltage	Io<10mA Io=120mA		0.05	0.2	V
			0.3	0.4	V
Maximum Operational Input Voltage				16	V
Continuous Current				120	mA
Pulse Output Current				180	mA
On/Off Threshold Current			20	50	μA
Threshold Voltage	Vo=3V		2.0	1.2	V
		3.25	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 KΩ.

## Application Hints

The AS2805 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 100µF aluminum electrolytic covers all general application circuits, this stability can be obtained with a tantalum electrolytic value of 47µF.

Another critical point of electrolytic characteristics is its performance over temperature. The AS2805 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 AS2805 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 AS2805 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 AS2805 provides access to the internal reference. A 0.01µF 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 AS2805 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<sub>BYP</sub>. If the rapid turn-ON is necessary, use 470pF or less.

Figure 1 shows AS2805 standard application circuit. The EN (enable bar) pin is pulled low (<1.2V) to enable the regulator. To disable the regulator, EN > 3.25V.

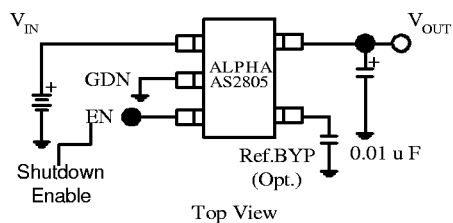


Fig. 1

The AS2805 in figure 2 shows adjustable output voltage configuration. Two resistors set the output voltage. The formula for output voltage is:

$$V_{OUT} = 1.20V \times \left( \frac{R2}{R1} + 1 \right)$$

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

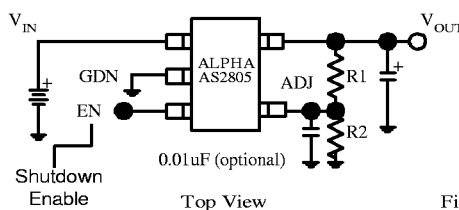


Fig. 2