High Accuracy anyCAP™*
300 mA Low Dropout Linear Regulator

ADP3306

FEATURES
**High Accuracy Over Line and Load Regulations
at 25°C: ±1%**
Ultralow Dropout Voltage: 300 mV Typical @ 300 mA
Requires Only C_O = 1 μF for Stability
**anyCAP™ = Stable with All Types of Capacitors
(Including MLCC)**
Current and Thermal Limiting
Low Noise
Dropout Detector
Low Shutdown Current: 1 μA
Several Fixed Voltage Options
3.2 V to 12 V Supply Range
–20°C to +85°C Ambient Temperature Range
Thermally Enhanced SO-8 and TSSOP-14 Packages
Excellent Line and Load Regulations

APPLICATIONS
Cellular Telephones
Notebook, Palmtop Computers
Battery Powered Systems
Portable Instruments
Post Regulator for Switching Supplies
Bar Code Scanners

GENERAL DESCRIPTION
The ADP3306 is a member of the ADP330x family of precision low dropout anyCAP™ voltage regulators. The ADP3306 stands out from the conventional LDOs with a novel architecture, an enhanced process and a new package. Its patented design requires only a 0.1 μF output capacitor for stability. This device is stable with any capacitor, regardless of its ESR (Equivalent Series Resistance) value, including ceramic types (MLCC) for space restricted applications. The ADP3306 achieves exceptional accuracy of ±1.0% at room temperature and ±1.5% overall accuracy over temperature, line and load regulations. The dropout voltage of the ADP3306 is only 300 mV (typical) at 300 mA.

In addition to the new architecture and process, ADI's new proprietary thermally enhanced package (Thermal Coastline) can handle 1 W of power dissipation without external heat sink or large copper surface on the PC board. This keeps PC board real estate to a minimum and makes the ADP3306 very attractive for use in portable equipment.
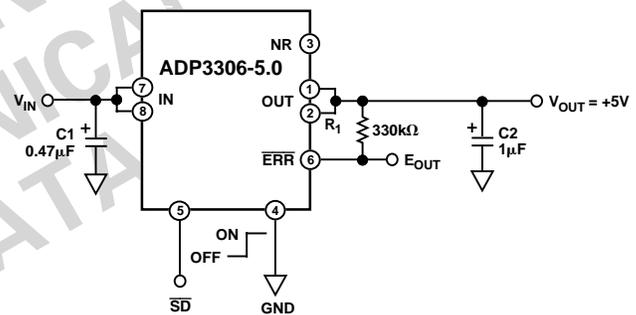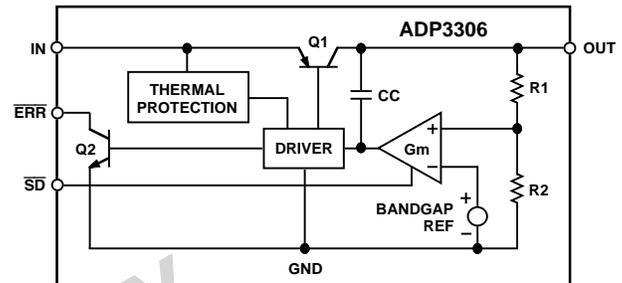
FUNCTIONAL BLOCK DIAGRAM

Figure 1. Typical Application Circuit

The ADP3306 operates with a wide input voltage range from 3.2 V to 12 V and delivers a load current in excess of 300 mA. It features an error flag that signals when the device is about to lose regulation or when the short circuit or thermal overload protection is activated. Other features include shutdown and optional noise reduction capabilities. The ADP330x anyCAP™ LDO family offers a wide range of output voltages and output current levels from 50 mA to 300 mA:

ADP3300 (50 mA, SOT-23)
ADP3307 (100 mA, SOT-23)
ADP3301 (100 mA)
ADP3302 (100 mA, Dual Output)
ADP3304 (100 mA, Dual Output with Separate Grounds)
ADP3303 (200 mA)

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ADP3306-xx—SPECIFICATIONS

(@ T_A = –20°C to +85°C, V_{IN} = 7 V, C_{IN} = 0.47 μF, C_{OUT} = 0.47 μF, unless otherwise noted)[1]

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OUTPUT VOLTAGE ACCURACY	V_{OUT}	V_{IN} = Nom V_{OUT} +0.5 V to 12 V I_L = 0.1 mA to 300 mA T_A = +25°C	–1		+1	%
		V_{IN} = Nom V_{OUT} +0.5 V to 12 V I_L = 0.1 mA to 300 mA	–1.5		+1.5	%
LINE REGULATION	$\dfrac{\Delta V_O}{\Delta V_{IN}}$	V_{IN} = Nom V_{OUT} +0.5 V to 12 V T_A = +25°C		0.03		mV/V
LOAD REGULATION	$\dfrac{\Delta V_O}{\Delta I_L}$	I_L = 0.1 mA to 300 mA T_A = +25°C		0.04		mV/mA
GROUND CURRENT	I_{GND}	I_L = 300 mA I_L = 0.1 mA		3 0.5	5 1	mA mA
GROUND CURRENT IN DROPOUT	I_{GND}	V_{IN} = 2.5 V I_L = 0.1 mA		2.0	3	mA
DROPOUT VOLTAGE	V_{DROP}	V_{OUT} = 98% of V_O Nominal I_L = 300 mA I_L = 10 mA I_L = 1 mA		0.3 0.05 0.02	0.6 0.1 0.05	V V V
SHUTDOWN THRESHOLD	V_{THSD}	ON OFF	2.0	0.9 0.9	0.3	V V
SHUTDOWN PIN INPUT CURRENT	I_{SDIN}	0 < V_{SD} < 5 V 5 ≤ V_{SD} ≤ 12 V @ V_{IN} = 12 V			1 22	μA μA
GROUND CURRENT IN SHUTDOWN MODE	I_Q	$V_{\overline{SD}}$ = 0, V_{IN} = 12 V T_A = +25°C $V_{\overline{SD}}$ = 0, V_{IN} = 12 V T_A = +85°C			1 5	μA μA
OUTPUT CURRENT IN SHUTDOWN MODE	I_{OSD}	T_A = +25°C @ V_{IN} = 12 V T_A = +85°C @ V_{IN} = 12 V			2 4	μA μA
ERROR PIN OUTPUT LEAKAGE	I_{EL}	V_{EO} = 5 V			13	μA
ERROR PIN OUTPUT "LOW" VOLTAGE	V_{EOL}	I_{SINK} = 400 μA		0.15	0.3	V
PEAK LOAD CURRENT	I_{LDPK}	V_{IN} = Nom V_{OUT} + 1 V		350		mA
OUTPUT NOISE @ 5 V OUTPUT	V_{NOISE}	f = 10 Hz–100 kHz C_{NR} = 0 C_{NR} = 10 nF, C_L = 10 μF		100 30		μV rms μV rms

NOTES
[1]Ambient temperature of +85°C corresponds to a typical junction temperature of +125°C under typical full load test conditions.

Specifications subject to change without notice.

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ABSOLUTE MAXIMUM RATINGS*

Input Supply Voltage . . . . –0.3 V to +16 V
Shutdown Input Voltage . . . . –0.3 V to +16 V
Error Flag Output Voltage . . . . –0.3 V to +16 V
Noise Bypass Pin Voltage . . . . –0.3 V to +5 V
Power Dissipation . . . . Internally Limited
Operating Ambient Temperature Range . . . –55°C to +125°C
Operation Junction Temperature Range . . . . –55°C to +125°C
Storage Temperature Range . . . . –65°C to +150°C
Lead Temperature Range (Soldering 10 sec) . . . . +300°C
  Vapor Phase (60 sec) . . . . +215°C
  Infrared (15 sec) . . . . +220°C

*This is a stress rating only; operation beyond these limits can cause the device to
 be permanently damaged.

ORDERING GUIDE

Model	Voltage Output	Package Options*
ADP3306AR-2.7	2.7 V	SO-8
ADP3306AR-3	3.0 V	SO-8
ADP3306AR-3.2	3.2 V	SO-8
ADP3306AR-3.3	3.3 V	SO-8
ADP3306AR-5	5.0 V	SO-8
ADP3306ARU-3.0	3.0 V	TSSOP-14
ADP3306ARU-3.3	3.3 V	TSSOP-14

Contact the factory for the availability of other output voltage options.
*SO = Small Outline; TSSOP = Thin Shrink Small Outline.

Other Members of anyCAP™ Family[1]

Model	Output Current	Package Options[2]	Comments
ADP3300	50 mA	SOT-23	High Accuracy
ADP3301	100 mA	SO-8	High Accuracy
ADP3302	100 mA	SO-8	Dual Output
ADP3304	100 mA	SO-8	Dual Output with Separate Grounds
ADP3307	100 mA	SOT-23	High Accuracy
ADP3303	200 mA	SO-8	High Accuracy

NOTES
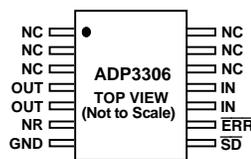[1]See individual data sheets for detailed ordering information.
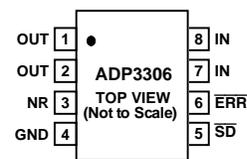[2]SO = Small Outline, SOT = Surface Mount.

PIN FUNCTION DESCRIPTIONS

TSSOP	SOIC	Mnemonic	Function
4, 5	1, 2	OUT	Output of the Regulator. Fixed 2.7, 3.0, 3.2, 3.3 or 5 volts output voltage. Bypass to ground with a 0.1 μF or larger capacitor. **Output Pins must be connected together for proper operation.**
6	3	NR	Noise Reduction Pin. Used for reduction of the output noise. (See text for details). No connection if not used.
7	4	GND	Ground Pin.
8	5	$\overline{SD}$	Active Low Shutdown Pin. Connect to ground to disable the regulator output. When shutdown is not used, this pin should be connected to the input pin.
9	6	$\overline{ERR}$	Open Collector Output, which goes low to indicate that the output is about to go out of regulation.
10, 11	7, 8	IN	Regulator Input. **Input pins must be connected together for proper operation.**
1, 2, 3, 12, 13, 14		NC	No Connect.

PIN CONFIGURATIONS

14-Lead TSSOP

```
NC  ──      ── NC
NC  ──      ── NC
NC  ──  ADP3306  ── NC
OUT ──  TOP VIEW ── IN
OUT ── (Not to Scale) ── IN
NR  ──      ── ERR
GND ──      ── SD
```

8-Lead SOIC

```
OUT 1 ──          ── 8 IN
OUT 2 ──  ADP3306  ── 7 IN
NR  3 ──  TOP VIEW ── 6 ERR
GND 4 ── (Not to Scale) ── 5 SD
```