High Accuracy Ultralow I_Q, 500 mA, anyCAP™ Low Dropout Regulator

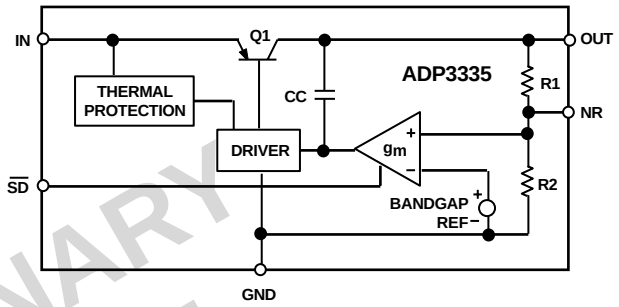
Preliminary Technical Information

ADP3335

FEATURES

High Accuracy Over Line and Load: ±0.9% @ +25ºC, ±1.5% Over Temperature
Ultralow Dropout Voltage: 220 mV (Typ) @ 500 mA
Requires Only C_o = 1.0 µF for Stability
anyCAP = Stable with Any Type of Capacitor (Including MLCC)
Current and Thermal Limiting
Low Noise
Low Shutdown Current: < 2 µA
+2.6 V to +12 V Supply Range
–40°C to +85°C Ambient Temperature Range
Ultrasmall Thermally Enhanced 8-Lead MSOP Package

FUNCTIONAL BLOCK DIAGRAM



APPLICATIONS

Notebook, Palmtop Computers
Battery Powered Systems
PCMCIA Regulator
Bar Code Scanners
Camcorders, Cameras

GENERAL DESCRIPTION

The ADP3335 is a member of the ADP330x family of precision low dropout anyCAP voltage regulators. The ADP3335 operates with an input voltage range of +2.6 V to +12 V and delivers a continuous load current up to 500 mA. The ADP3335 stands out from the conventional LDOs with the lowest thermal resistance of any MSOP-8 package and an enhanced process that enables it to offer performance advantages beyond its competition. Its patented design requires only a 1.0 µF output capacitor for stability. This device is insensitive to output capacitor Equivalent Series Resistance (ESR), and is stable with any good quality capacitor, including ceramic (MLCC) types for space-restricted applications. The ADP3335 achieves exceptional accuracy of ±0.9% at room temperature and ±1.5% over temperature, line and load variations. The dropout voltage of the ADP3335 is only 220 mV (typical) at 500 mA. This device also includes a safety current limit, thermal overload protection and a shutdown feature. In shutdown mode, the ground current is reduced to less than 2 µA. The ADP3335 has ultralow quiescent current 60 µA (typ) in light load situations.

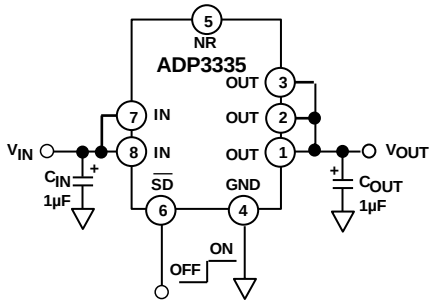


Figure 1. Typical Application Circuit

REV. PrE

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Fax: 781/326-8703 Analog Devices, Inc., 2000

ADP3335–SPECIFICATIONS[1,2] (V_{IN} = 6.0 V, C_{IN} = C_{OUT} = 1.0µF, T_A = -40°C to +85°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OUTPUT						
Voltage Accuracy[3]	V_{OUT}	V_{IN} = V_{OUTNOM} +0.75 V to +12 V I_L = 0.1 mA to 500 mA T_A = +25°C	–0.9		+0.9	%
		V_{IN} = V_{OUTNOM} +0.75 V to +12 V I_L = 0.1 mA to 500 mA	–1.5		+1.5	%
Line Regulation[3]		V_{IN} = V_{OUTNOM} +0.75 V to +12 V T_A = +25°C		0.04		mV/V
Load Regulation		I_L = 0.1 mA to 500 mA T_A = +25°C		0.04		mV/mA
Dropout Voltage	V_{DROP}	V_{OUT} = 98% of V_{OUTNOM}				
		I_L = 500 mA		220	600	mV
		I_L = 250 mA		150	300	mV
		I_L = 50 mA		60	150	mV
		I_L = 0.1 mA		5	130	mV
Peak Load Current	I_{LDPK}	V_{IN} = V_{OUTNOM} + 1 V		800		mA
Output Noise	V_{NOISE}	f = 10 Hz–100 kHz, C_L = 10 µF I_L = 500 mA, C_{NR} = 10 nF		47		µV rms
		f = 10 Hz–100 kHz, C_L = 10 µF I_L = 500 mA, C_{NR} = 0 nF		95		µV rms
GROUND CURRENT						
In Regulation	I_{GND}	I_L = 500 mA		5	25	mA
		I_L = 250 mA		2.5	13	mA
		I_L = 50 mA		0.5	2.5	mA
		I_L = 0.1 mA		50	100	µA
In Dropout	I_{GND}	V_{IN} = V_{OUTNOM} – 100 mV I_L = 0.1 mA		60	120	µA
In Shutdown	I_{GNDSD}	$\overline{SD}$ = 0 V, V_{IN} = 12 V		0.01	2	µA
SHUTDOWN						
Threshold Voltage	$V_{\overline{THSD}}$	ON	2.0			V
		OFF			0.4	V
$\overline{SD}$ Input Current	$I_{\overline{SD}}$	0 ≤ $\overline{SD}$ ≤ 5 V		1.4	6	µA
Output Current In Shutdown	$I_{\overline{OSD}}$	T_A = +25°C V_{IN} = 12 V			1	µA
		T_A = +85°C V_{IN} = 12 V			2	µA

NOTES
1 Ambient temperature of +85°C corresponds to a junction temperature of +125°C under typical full load test conditions.
2 Application stable with no load.
3 V_{IN} = 2.6V for models with V_{OUTNOM} ≤ 1.85V.

Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS*

Input Supply Voltage ..... –0.3 V to +16 V
Shutdown Input Voltage ..... –0.3 V to +16 V
Power Dissipation ..... Internally Limited
Operating Ambient Temperature Range . –40°C to +85°C
Operating Junction Temperature Range –40°C to +150°C
θ_{JA} (2-layer) ..... +153°C/W
θ_{JA} (4-layer) ..... +110°C/W
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

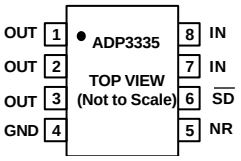
Model	Output Voltage*	Package Option	Marking Code
ADP3335ARM-1.8	1.8 V	RM-8 (MSOP-8)	LFA
ADP3335ARM-2.5	2.5 V	RM-8 (MSOP-8)	LFC
ADP3335ARM-2.85	2.85 V	RM-8 (MSOP-8)	LFD
ADP3335ARM-3.3	3.3 V	RM-8 (MSOP-8)	LFE
ADP3335ARM-5	5 V	RM-8 (MSOP-8)	LFF

*Contact the factory for other output voltage options.

PIN DESCRIPTION

Pin	Name	Function
1,2, 3	OUT	Output of the Regulator. Bypass to ground with a 1.0 µF or larger capacitor. All pins must be connected together for proper operation.
4	GND	Ground Pin.
5	NR	Noise Redcution Pin. Used for further reduction of output noise (see text for detail). Capacitor required if C_{OUT} > 3.3 µF.
6	$\overline{SD}$	Active Low Shutdown Pin. Connect to ground to disable the regulator output. When shutdown is not used, this pin shoud be connected to the input pin.
7,8	IN	Regulator Input. All pins must be connected together for proper operation.

PIN CONFIGURATION



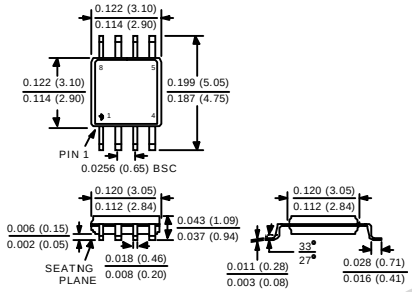
CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this device features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).

RM-8



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