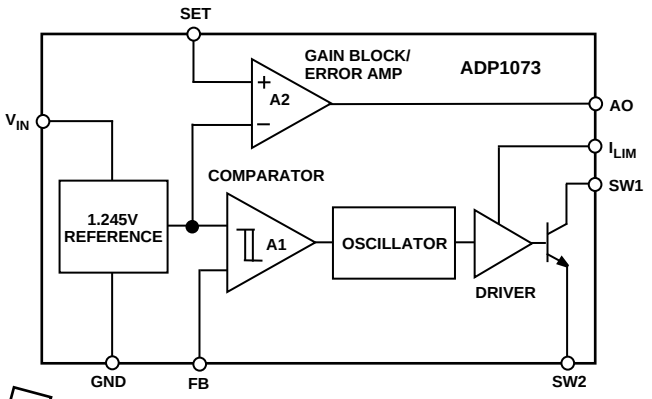
Micropower DC-DC Converter Adjustable and Fixed 5 V, 12 V

ADP1073

FEATURES
Operates at Supply Voltages from 1.0 V to 30 V
Ground Current: 95 μA
Works in Step-Up or Step-Down Mode
Very Few External Components Required
Low-Battery Detector On Chip
User-Adjustable Current Limit
Internal 1 A Power Switch
Fixed and Adjustable Output Voltage Versions
8-Pin DIP or SO-8 Package

APPLICATIONS
Single-Cell to 5 V Converters
Laptop and Palmtop Computers
Pagers
Cameras
Battery Backup Supplies
Cellular Telephones
Portable Instruments
4 mA–20 mA Loop Powered Instruments
Hand-Held Inventory Computers
Battery-Powered α, β, γ Particle Detectors

FUNCTIONAL BLOCK DIAGRAM



ORDERING GUIDE

Model	Output Voltage	Package Description	Package Option*
ADP1073AN	ADJ	PDIP	N-8
ADP1073AR	ADJ	SOIC	SO-8
ADP1073AN-5	5 V	PDIP	N-8
ADP1073AR-5	5 V	SOIC	SO-8
ADP1073AN-12	12 V	PDIP	N-8
ADP1073AR-12	12 V	SOIC	SO-8

*For outline information see Package Information section.

GENERAL DESCRIPTION

The ADP1073 is part of a family of step-up/step-down switching regulators which operates from an input supply voltage of as little as 1.0 V. This extremely low input voltage allows the ADP1073 to be used in applications that require using a single cell battery as the primary power source.

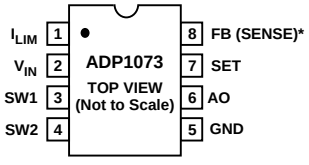
The ADP1073 can be configured to operate in either step-up or step-down mode; but for input voltages greater than 3 V, the ADP1173 is recommended.

An auxiliary gain amplifier can serve as a low-battery detector or linear regulator. Quiescent current on the ADP1073-5 is only 135 μA unloaded, making it ideal for systems where long battery life is required.

The ADP1073 can deliver 40 mA at 5 V from an input voltage range as low as 1.25 V, or 10 mA at 5 V from a 1.0 V input. Current limiting is available by adding an external resistor. Battery protection circuitry keeps reverse currents to safe levels at reverse supply voltages of up to 1.6 V.

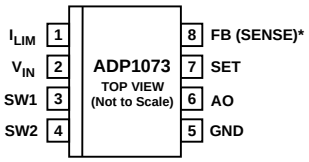
PIN CONFIGURATIONS

Plastic DIP Package (N-8)



*FIXED VERSIONS

Small Outline Package (SO-8)



*FIXED VERSIONS

ADP1073–SPECIFICATIONS (@ T_A = +25°C, V_{IN} = 1.5 V, unless otherwise noted)

Model	Conditions[1]	V_S	ADP1073 Min	ADP1073 Typ	ADP1073 Max	Units
QUIESCENT CURRENT*	Switch Off	I_Q		95	130	µA
QUIESCENT CURRENT, STEP-UP MODE CONFIGURATION	No Load, ADP1073-5 ADP1073-12	I_Q		135 250		µA
INPUT VOLTAGE*	Step-Up Mode Step-Down Mode	V_{IN}	1.15 1.0		12.6 12.6 30	V V V
COMPARATOR TRIP POINT VOLTAGE*	ADP1073[1]		202	212	222	mV
OUTPUT SENSE VOLTAGE*	ADP1073-5[2] ADP1073-12[2]	V_{OUT}	4.75 11.4	5.00 12.00	5.25 12.6	V V
COMPARATOR HYSTERESIS*	ADP1073			5	10	mV
OUTPUT HYSTERESIS*	ADP1073-5 ADP1073-12			125 300	250 600	mV mV
OSCILLATOR FREQUENCY*		f_{OSC}	15	19	23	kHz
DUTY CYCLE*	Full Load ($V_{FB} < V_{REF}$)	DC	65	72	80	%
SWITCH ON TIME*		t_{ON}	30	38	50	µs
FEEDBACK PIN BIAS CURRENT*	ADP1073 V_{FB} = 0 V	I_{FB}		10	50	nA
SET PIN BIAS CURRENT*	$V_{SET} = V_{REF}$	I_{SET}		60	120	nA
AO OUTPUT LOW*	I_{AO} = 100 µA	V_{AO}		0.15	0.4	V
REFERENCE LINE REGULATION*	1.0 V ≤ V_{IN} ≤ 1.5 V 1.5 V ≤ V_{IN} ≤ 12 V			0.35 0.05	1.0 0.1	%/V %/V
SWITCH SATURATION VOLTAGE* STEP-UP MODE	V_{IN} = 1.5 V, I_{SW} = 400 mA V_{IN} = 1.5 V, I_{SW} = 500 mA V_{IN} = 5 V, I_{SW} = 1 A	V_{CESAT}		300 400 700	400 600 550 750 1000 1500	mV mV mV mV mV mV
A2 ERROR AMP GAIN*	R_L = 100 kΩ[3]	A_V	400	1000		V/V
REVERSE BATTERY CURRENT	(Note 4)	I_{REV}		750		mA
CURRENT LIMIT CURRENT LIMIT TEMPERATURE COEFFICIENT	220 Ω Between I_{LIM} and V_{IN}			400 –0.3		mA %/°C
SWITCH OFF LEAKAGE CURRENT	Measured at SW1 Pin	I_{LEAK}		1	10	µA
MAXIMUM EXCURSION BELOW GND	I_{SW1} ≤ 10 µA, Switch Off	V_{SW2}		–400	–350	mV

NOTES
*Denotes the specifications that apply over the full operating temperature range.
[1]This specification guarantees that both the high and low trip point of the comparator fall within the 210 mV to 230 mV range.
[2]This specification guarantees that the output voltage of the fixed versions will always fall within the specified range. The waveform at the sense pin will exhibit a sawtooth shape due to the comparator hysteresis.
[3]100 kΩ resistor connected between a 5 V source and the AO pin.
[4]The ADP1110 is guaranteed to withstand continuous application of +1.6 V applied to the GND and SW2 pins while V_{IN}, I_{LIM}, and SW1 pins are grounded.

Specifications subject to change without notice.