

2. AP3402 General Description

The AP3402 is a 2A step-down DC-DC converter. At heavy load, the constant frequency PWM control performs excellent stability and transient response. No external compensation components are required.

The AP3402 supports a range of input voltages from 2.7V to 5.5V, allowing the use of a single Li+/Li- polymer cell, multiple Alkaline/NiMH cell, and other standard power sources. The output voltage is adjustable from 0.6V to the input voltage. The AP3402 employs internal power switch and synchronous rectifier to minimize external part count and realize high efficiency. During shutdown, the input is disconnected from the output and the shutdown current is less than 1 μ A. Other key features include over-temperature and short circuit protection, and under-voltage lockout to prevent deep battery discharge.

The AP3402 delivers 2A maximum output current while consuming only 80 μ A of no-load quiescent current. Ultra-low RDS(ON) integrated MOSFETs and 100% duty cycle operation make the AP3402 an ideal choice for high output voltage, high current applications which require a low dropout threshold.

The AP3402 is available in TSOT26 package

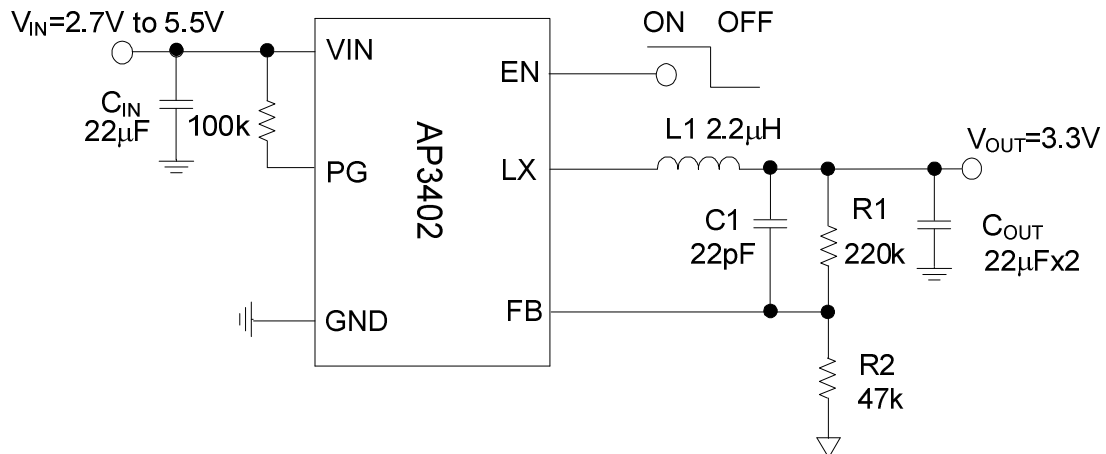
3. Key Features

- Output Current: Up to 2A
- Output Voltage: 0.6V to VIN
- Input Voltage: 2.7V to 5.5V
- Peak Efficiency Up to 95%
- 80 μ A (Typ) No Load Quiescent Current
- Shutdown Current: <1 μ A
- 100% Duty Cycle Operation
- 1MHz Switching Frequency
- Power Good Indicator Function
- Internal Soft Start
- No External Compensation Required
- Current Limit Protection
- Thermal Shutdown
- TSOT26 Package

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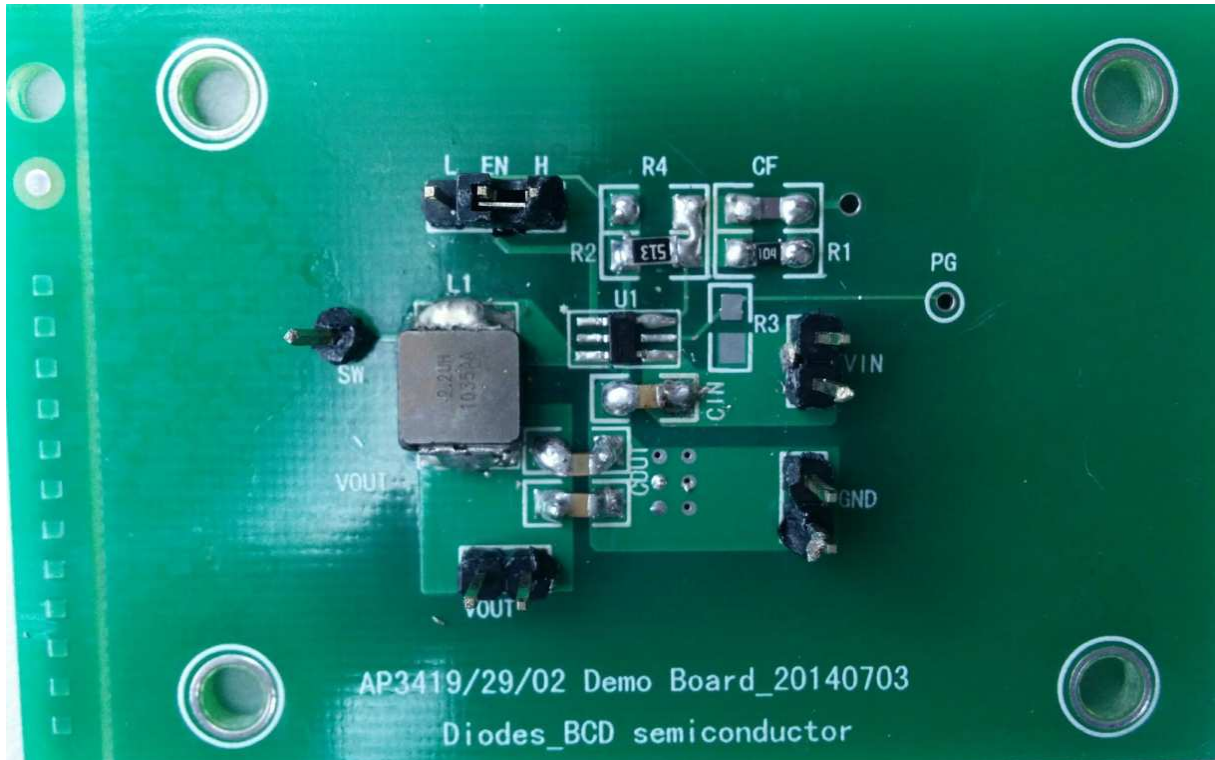
4. EV Board Schematic



5. EVB AP3402 Description

AP3402 EVB is suitable evaluation board for the AP3402, a DC/DC converter. The board is targeted to be used in providing a simple and convenient evaluation environment for the AP3402. Requires parts, power supply connectors etc. on the board, which makes it easy to be evaluated.

6. EV Board View



7. Resistor select for output voltage setting

$$V_{out} = (1 + R1/R2) \times V_{ref} \quad (V_{ref}=0.6V)$$

V _o	R1	R2	L1
3.3V	220k	47k	2.2uH
1.8V	300k	150k	2.2uH
1V	100k	150k	2.2uH

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8. External Components Selection

Input & output Capacitors (C_{in})

- (1) For lower output ripple, low ESR is required.
- (2) Low leakage current needed, X5R/X7R ceramic recommend, multiple capacitor parallel connection.

Output Voltage programmer resistors ($R_1, R_{2/4}$)

- (1) For programmer output voltage
- (2) For accurate output voltage, 1% tolerance is required.

Inductor ($L1$)

- (1) Low DCR for good efficiency
- (2) Inductance saturate current must higher than the output current

9. Evaluation board BOM list for AP3402:

Item	Value	Type	Rating	Description	Description
CIN	22uF	X5R/X7R, Ceramic/0805	10V	Input coupling CAP	TAIYO YUDEN EMK212ABJ106KD-T
COUT	22uF × 2	X5R/X7R, Ceramic/0805	10V	Output coupling CAP	TAIYO YUDEN EMK212ABJ106KD-T
L1	2.2uH		>3A	Inductor	CDMC6D28NP-2R2M
R1	220K	0805	1%	Voltage set RES*	
R2	50K	0805	1%		
R4	Floating			Parallel Res of R2	
CF	22pF	0805		Feedforward CAP	
IC		AP3402		SOT23-5	

*Note: The present value of R1/R2 are based on $V_{out}=3.3V$

10. Test result:

Converter Operation Waveform:



Operation waveform at $I_{out}=2A$
(Blue-VoutAC; Yellow-Vsw; Green-IL)

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