



AP3402 EV Board User Guide

AE Department

1. Revision Information

| Date | Revision | Description | Comment |
|---------|----------|-----------------|---------|
| 2014/07 | V1.0 | Initial release | |
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This application note contains new product information. Diodes, Inc. reserves the right to modify the product specification without notice.
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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

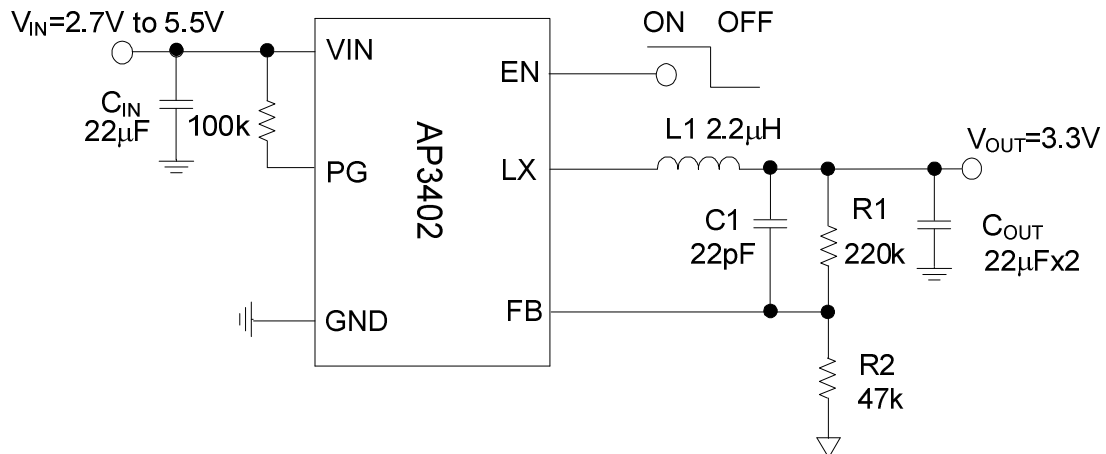
3. Key Features

- 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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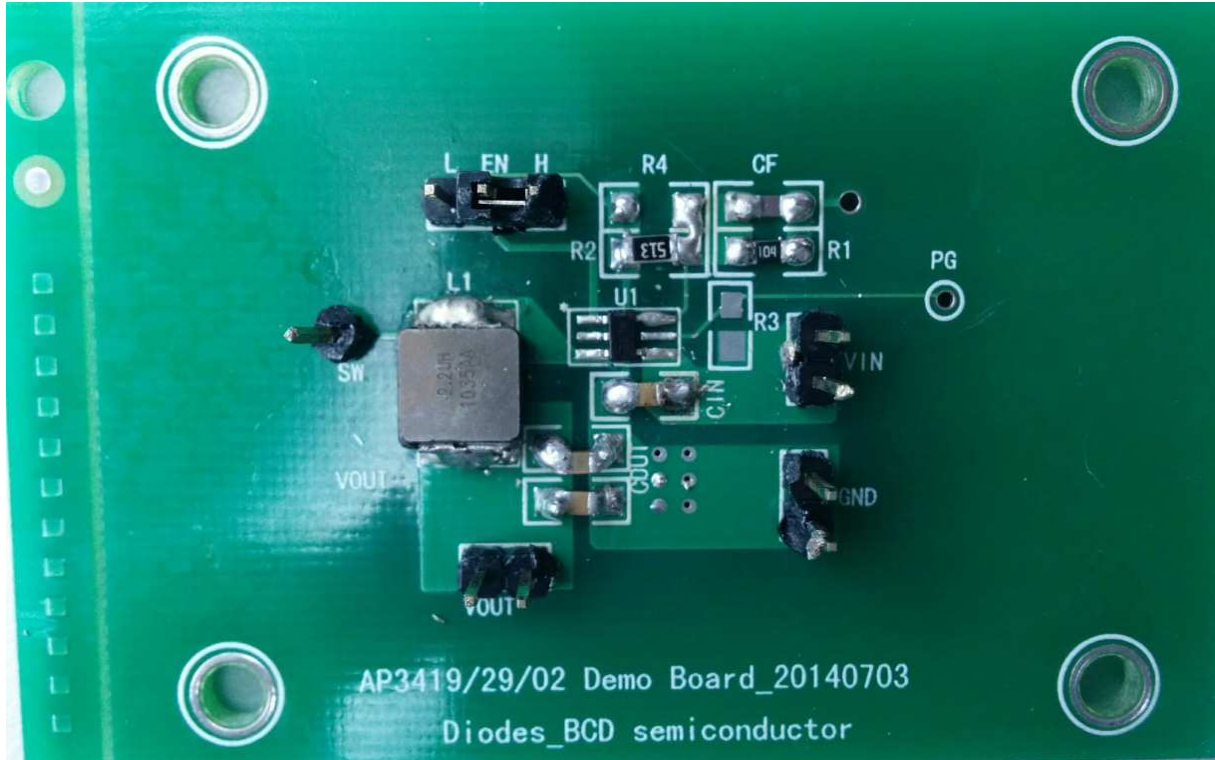
4. EV Board Schematic



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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