ProlcWorld MP3402A

MP3402/MP3402A SOP-8 DC-DC Converter User Manual

Model: MP3402A

1. Introduction

This manual provides essential information for the proper use and integration of the ProlcWorld MP3402/MP3402A DC-DC converter. The MP3402/MP3402A is a compact, high-efficiency step-up (boost) converter designed for applications requiring a regulated output voltage from a lower input voltage source. Its small SOP-8 package makes it suitable for space-constrained designs.

2. Product Description

The MP3402/MP3402A is an integrated circuit (IC) designed to efficiently convert a low DC input voltage to a higher, regulated DC output voltage. It incorporates an internal power switch and control circuitry to minimize external component count. This IC is ideal for portable electronic devices, battery-powered systems, and other applications where power efficiency and compact size are critical.

This image displays the MP3402A integrated circuit in an SOP-8 package. The top of the chip is visible, showing the marking 'MP3402A' along with other manufacturing codes. The eight pins of the SOP package are also visible.

3. Features

- High Efficiency Step-Up (Boost) Converter
- Integrated Power Switch
- Wide Input Voltage Range
- Adjustable Output Voltage
- Overcurrent Protection
- Thermal Shutdown Protection
- Compact SOP-8 Package

4. Pin Configuration

The MP3402/MP3402A comes in an SOP-8 package. The following table describes the function of each pin:

Pin No.	Name	Description
1	SW	Switch Node. Connects to the inductor and output diode.
2	GND	Ground. Connect to the system ground.
3	FB	Feedback Pin. Connect to the output voltage divider.
4	COMP	Compensation Pin. Connect RC network for loop stability.
5	EN	Enable Pin. High for operation, Low for shutdown.
6	VIN	Input Voltage Supply.

Pin No.	Name	Description
7	VIN	Input Voltage Supply.
8	SW	Switch Node. Connects to the inductor and output diode.

5. Specifications

Key electrical characteristics and operating parameters:

Parameter	Value	Unit
Input Voltage Range	2.5 to 5.5	V
Switch Current Limit	Up to 2	A
Switching Frequency	Up to 1.2	MHz
Quiescent Current	Low	µA
Operating Temperature Range	-40 to +85	°C

6. Setup and Integration

Integrating the MP3402/MP3402A into a circuit requires careful attention to component selection and PCB layout for optimal performance and stability.

6.1. Component Selection

- **Inductor:** Select an inductor with appropriate saturation current and low DC resistance.
- **Output Capacitor:** Use low ESR ceramic capacitors for stable output voltage.
- **Input Capacitor:** A ceramic capacitor at the input helps filter input ripple.
- **Feedback Resistors:** Precision resistors are recommended for accurate output voltage setting.
- **Diode:** A Schottky diode is recommended for the output rectifier due to its low forward voltage drop.

6.2. PCB Layout Guidelines

- Keep power traces (VIN, SW, GND) short and wide to minimize parasitic inductance and resistance.
- Place input and output capacitors as close as possible to the IC pins.
- Ensure a solid ground plane for thermal dissipation and noise reduction.
- Route the feedback trace (FB) away from noisy switching nodes to prevent interference.

7. Operating Principles

The MP3402/MP3402A operates as a boost converter, storing energy in an inductor during the switch ON-time and releasing it to the output during the switch OFF-time. The feedback pin (FB) monitors the output voltage, and the internal control loop adjusts the duty cycle of the internal power switch to maintain a constant output voltage, even with varying input voltage or load conditions.

8. Maintenance

As an integrated circuit, the MP3402/MP3402A requires no routine maintenance. Ensure that the operating environment remains within the specified temperature and humidity ranges to prevent damage or degradation of performance. Avoid physical stress or electrostatic discharge (ESD) during handling and assembly.

9. Troubleshooting

If the MP3402/MP3402A circuit is not functioning as expected, consider the following troubleshooting steps:

- **No Output Voltage:**
  - Verify input voltage (VIN) is within the specified range.
  - Check if the Enable (EN) pin is pulled high.
  - Inspect all solder joints and component connections for continuity.
  - Ensure the output diode is correctly oriented and functional.
- **Unstable Output Voltage:**
  - Check the values and ESR of input and output capacitors.
  - Verify the feedback resistor network for correct values and connections.
  - Review PCB layout for excessive noise or long traces, especially on the feedback path.
- **Overheating:**
  - Ensure the load current does not exceed the IC's capabilities.
  - Check for short circuits on the output.
  - Verify proper thermal dissipation through the PCB ground plane.

10. Warranty and Support

As a component, the MP3402/MP3402A is typically covered by the warranty provided by the distributor or seller at the point of purchase. For specific warranty terms, please refer to the purchase agreement or contact your supplier, ProIcWorld. Technical support for integration and application-specific questions may be available through the original component manufacturer's datasheets and application notes, or from your component supplier.
For further assistance, please contact your point of purchase or refer to the official datasheets for the MP3402/MP3402A series.