



ZHEJIANG UNIÜ-NE Technology CO., LTD

浙江宇力微新能源科技有限公司



## U3406 Data Sheet

V0.4

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## ■ General Description

The U3406 400V synchronous buck controller regulates from a high input voltage source or from an input rail subject to high voltage transients, minimizing the need for external surge suppression components. A high-side switch minimum on-time of 60 ns gives large step-down ratios, enabling the direct step-down conversion from a 100V nominal input to low-voltage rails for reduced system complexity and solution cost. The U3406 continues to operate during input voltage dips as low as 8.5V, at nearly 100% duty cycle if needed, making it an excellent choice for high-performance 100V battery automotive applications, ADAS (surround view ECU) and HEV/EV systems.

Forced-PWM (FPWM) operation eliminates switching frequency variation to minimize EMI, while user-selectable diode emulation lowers current consumption at light-load conditions. Measuring the voltage drop across the low-side MOSFET or with an optional current sense resistor gives cycle-by-cycle overcurrent protection. The adjustable switching frequency as high as 0.5MHz can be synchronized to an external clock source to eliminate beat frequencies in noise-sensitive applications.

## ■ Applications

- High-Power Automotive DC/DC Regulator
- Automotive Motor Drives, ADAS
- HEV/EV Power Compliant to LV-148

## ■ Key Features

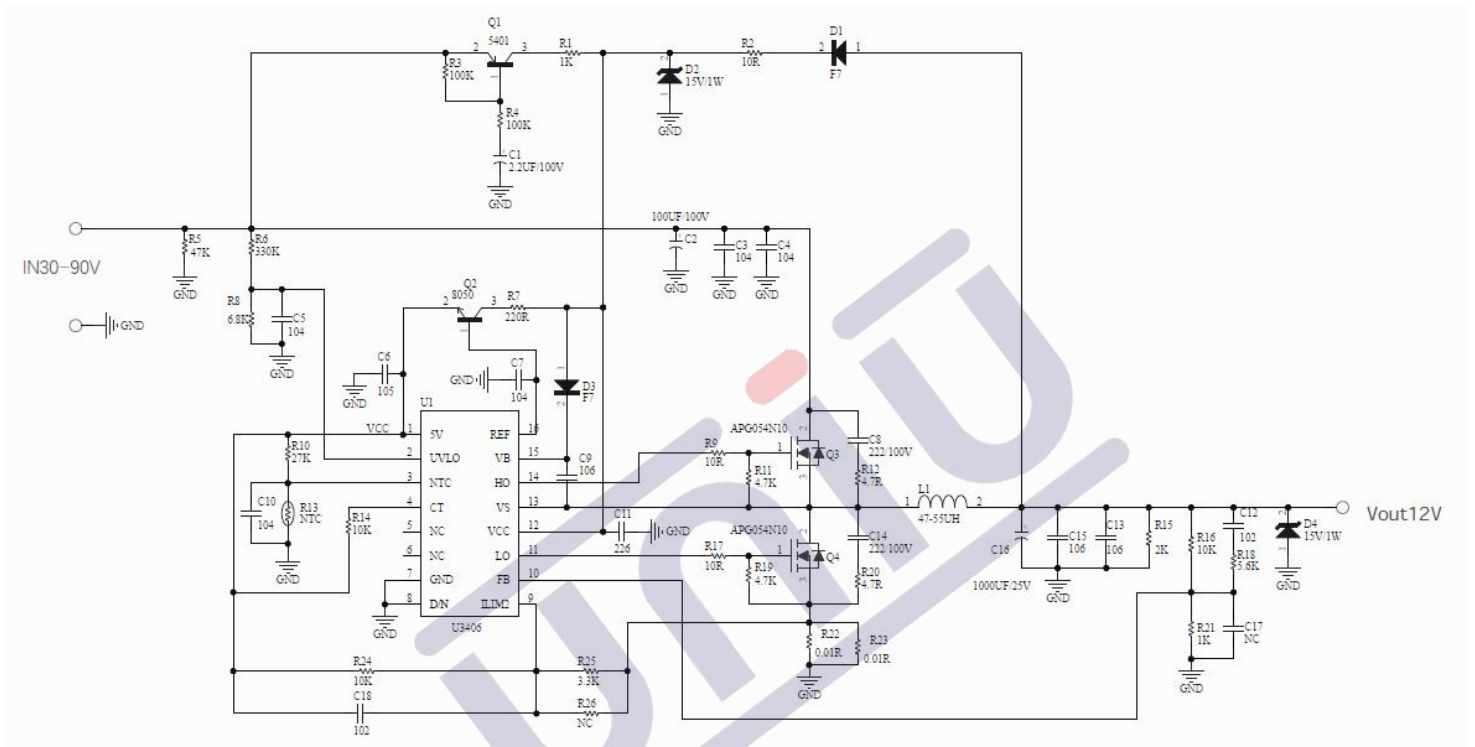
- Device Temperature Grade 1: -40°C to +80°C Ambient Temperature Range
- Versatile Synchronous Buck DC/DC Controller
  - Wide Input Voltage Range of 9.5V to 400V
  - Adjustable Output Voltage From 1.25V to 280V
  - Voltage-mode Control With Line Feedforward
- Three-stage frequency conversion
- 60ns Minimum On-Time for High  $V_{IN} / V_{OUT}$  Ratio
- 180ns Minimum Off-Time for Low Dropout
- 1.1V Reference With  $\pm 1\%$  Feedback Accuracy
- 8.5V Gate Drivers for Standard  $V_{TH}$  MOSFETs
  - 220ns Adaptive Dead-Time Control
  - 2A Source and 2.5A Sink Capability
- Inherent Protection Features for Robust Design
  - Hiccup-Mode Overcurrent Protection
  - Input UVLO With Hysteresis
  - VCC and Gate-Drive UVLO Protection
  - Thermal Shutdown Protection With Hysteresis
- 16-Pin SOP Package With Wettable Flanks
- Create a Custom Design Using the U3406 With UNI-SEMI<sup>®</sup> Power Designer

■ Device Information<sup>(1)</sup>

Part Number	Package	Body Size (Nom)
U3406	SOP(16)	10mm × 6.3mm

(1) For all available packages, see the orderable addendum at the end of the data sheet

■ Simple application diagram



■ Output Power Table

Part Number	Package	VIN	IO+/IO-	OUT
U3406	SOP-16	9.5~400V	2A/2.5A	ADJ

Note:

- 1.Default for Buck Converter Application
- 2.The practical output power is determined by the output voltage and thermal condition

■ Description (continued)

The U3406 voltage-mode controller with line feedforward drives external high-side and low-side N-channel power switches with robust 8.5V gate drivers suitable for standard-threshold MOSFETs. Adaptively-timed gate drivers with 2A source and 2.5A sink capability minimize body diode conduction during switching transitions, reducing switching losses and improving thermal performance when driving

MOSFETs at high input voltage and high frequency. The U3406 can be powered from the output of the switching regulator or another available source, further improving efficiency.

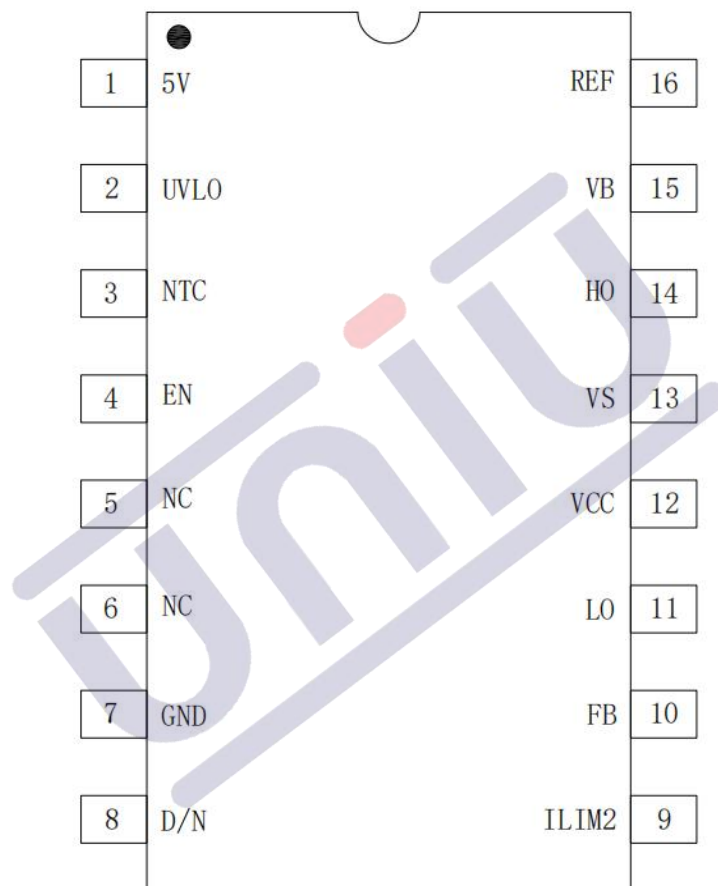
Additional features of the U3406 include a configurable soft start, an open-drain power-good monitor for fault reporting and output- monitoring, monotonic start-up into prebiased loads, integrated VCC bias supply regulator and bootstrap diode, external power supply tracking, precision enable input with hysteresis for adjustable line undervoltage lockout (UVLO), hiccup-mode overload protection, and thermal shutdown protection with automatic recovery.

The U3406 controller is offered in a 10mm × 6.3mm thermally enhanced, 16-pin SOP package with additional spacing for high-voltage pins and wettable flanks for optical inspection of solder joint fillets.

## ■ Pin Configuration and Functions

RGY Package 16-Pin SOP With Wettable Flanks

Top View



## 1、版本记录

DATE	REV.	DESCRIPTION
2022/09/28	0.1	首次发布
2023/10/08	0.2	更新应用原理图
2023/11/12	0.3	优化参数及应用原理图

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