Shaoxing Yuli Semiconductor CO.,LTD

绍 兴 宇 力 半 导 体 有 限 公 司

U3406 Data Sheet

V 0.5

■ 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

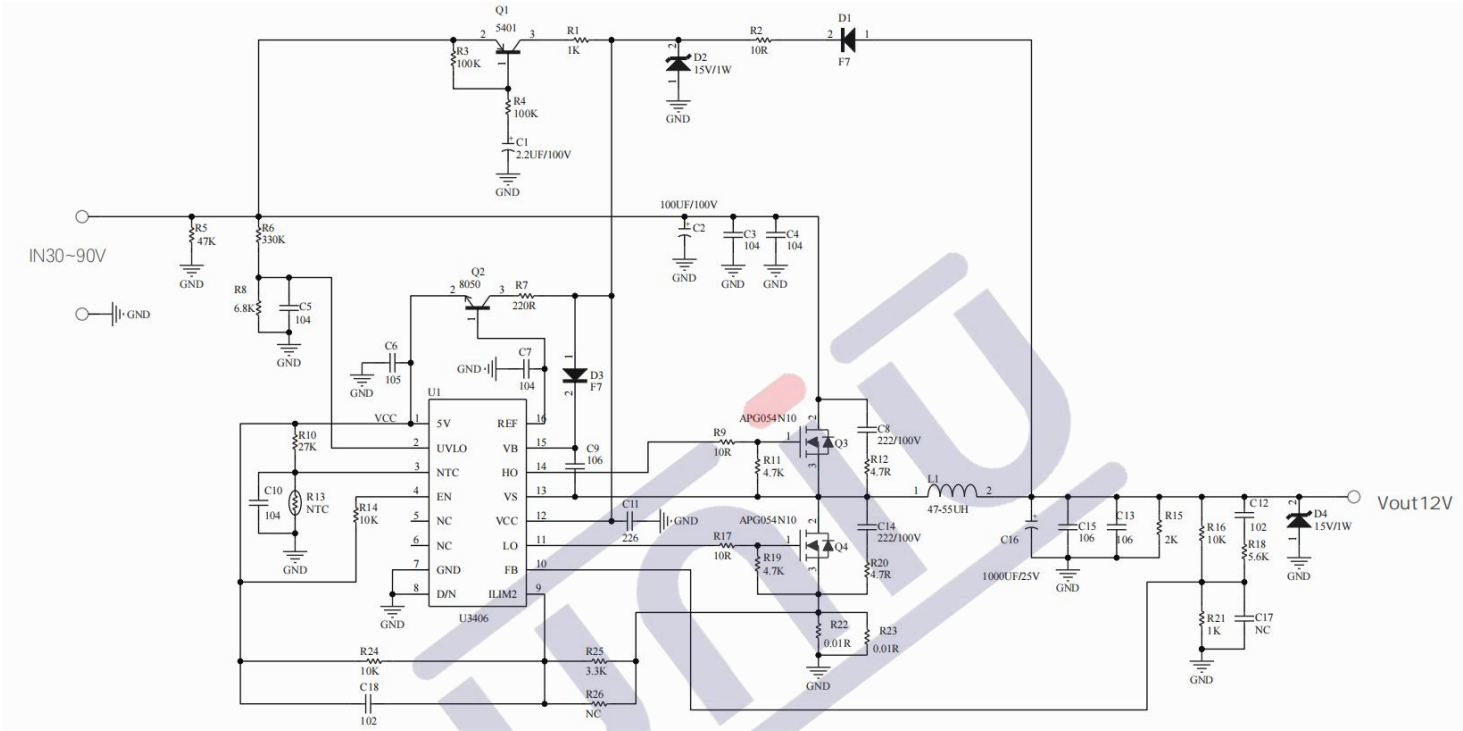
- Device Temperature Grade 1:–40°C to +125°C Ambient Temperature Range
- Versatile Synchronous Buck DC/DC Controller
  - ➢ Wide Input Voltage Range of 9.5V to 400V
  - ➢ Adjustable Output Voltage From 1.25V to 280V
  - ➢ Voltage-mode Control With Line Feedforward
- Three-stage frequency conversion
- 60ns Minimum On-Time for High V_{IN} / V_{OUT} Ratio
- 180ns Minimum Off-Time for Low Dropout
- 1.1V Reference With ± 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 ® Power Designer

■ Device Information(1)

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

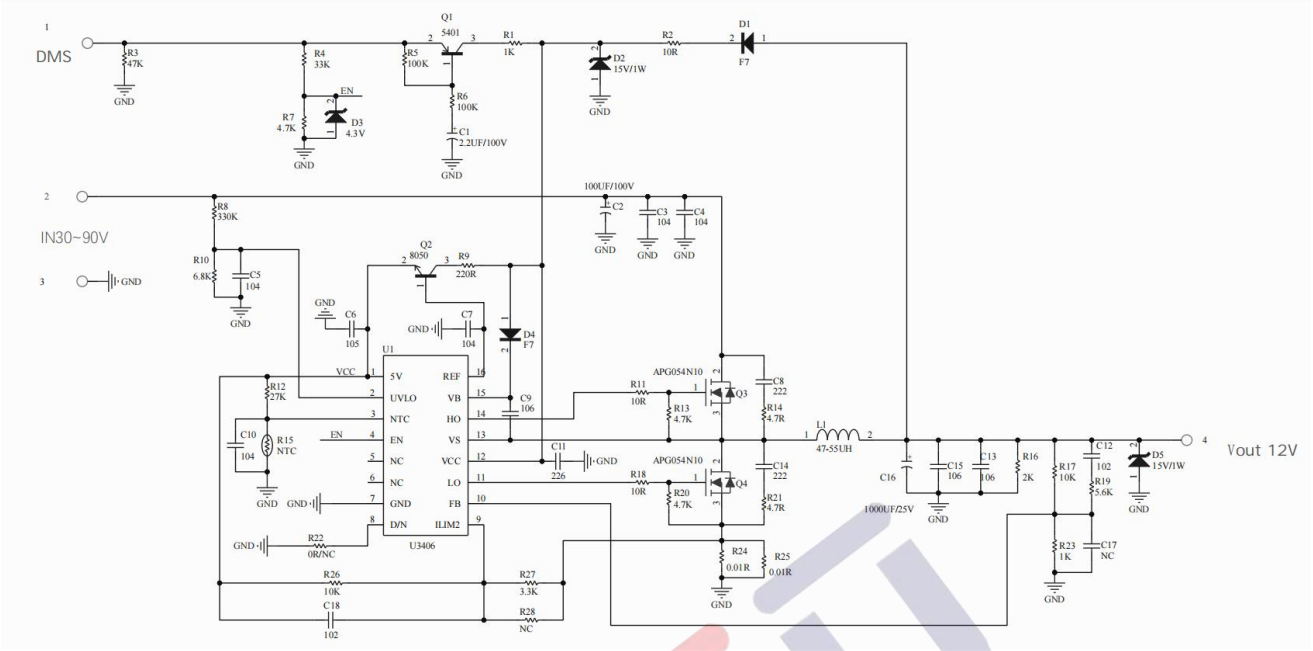
Part Number	Package	VIN	IO+/IO-	OUT
U3406	SOP-16	9.5~400V	2A/2.5A	ADJ

Note:

1.Default for Buck Converter Application

2.The practical output power is determined by the output voltage and thermal condition

APP2:Four-wire circuit diagram (electric door lock)

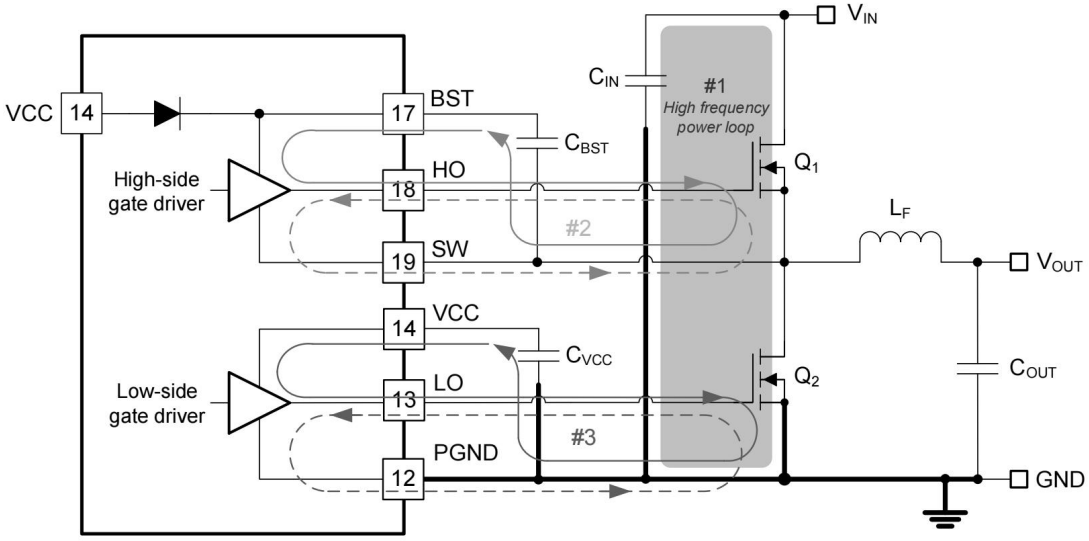


■ Layout

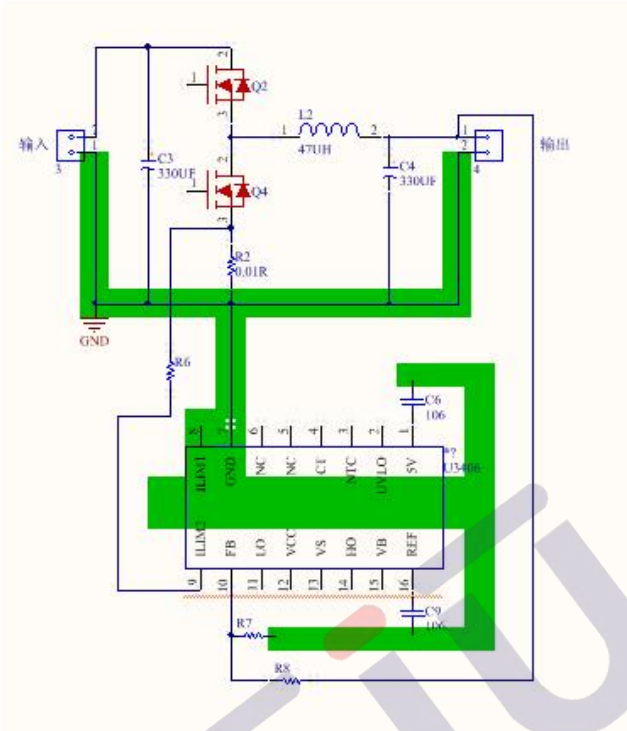
● Layout Guidelines

Proper PCB design and layout is important in a high-current, fast-switching circuits (with high current and voltage slew rates) to assure appropriate device operation and design robustness. As expected, certain issues must be considered before designing a PCB layout using the U3406.The high-frequency power loop of the buck converter power stage is denoted by #1 in the shaded area of Figure 70. The topological architecture of a buck converter means that particularly high di/dt current flows in the components of loop 1, and it becomes mandatory to reduce the parasitic inductance of this loop by minimizing its effective loop area. Also important are the gate drive loops of the low-side and high-side MOSFETs, denoted by 2 and 3.

DC/DC Regulator Ground System With Power Stage and Gate Drive Circuit Switching Loops



Three wire step-down circuit ground Layout reference.



1、Version Record

Date	Rev.	Description
2022/09/28	0.1	First Release
2023/10/08	0.2	Update the application schematic diagram
2023/11/12	0.3	Optimization parameters and application schematic diagram
2023/12/30	0.4	Optimize parameters and functions
2024/05/15	0.5	Optimize parameters and functions

2、Contact

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