

CA-IS3105W System Application Guide

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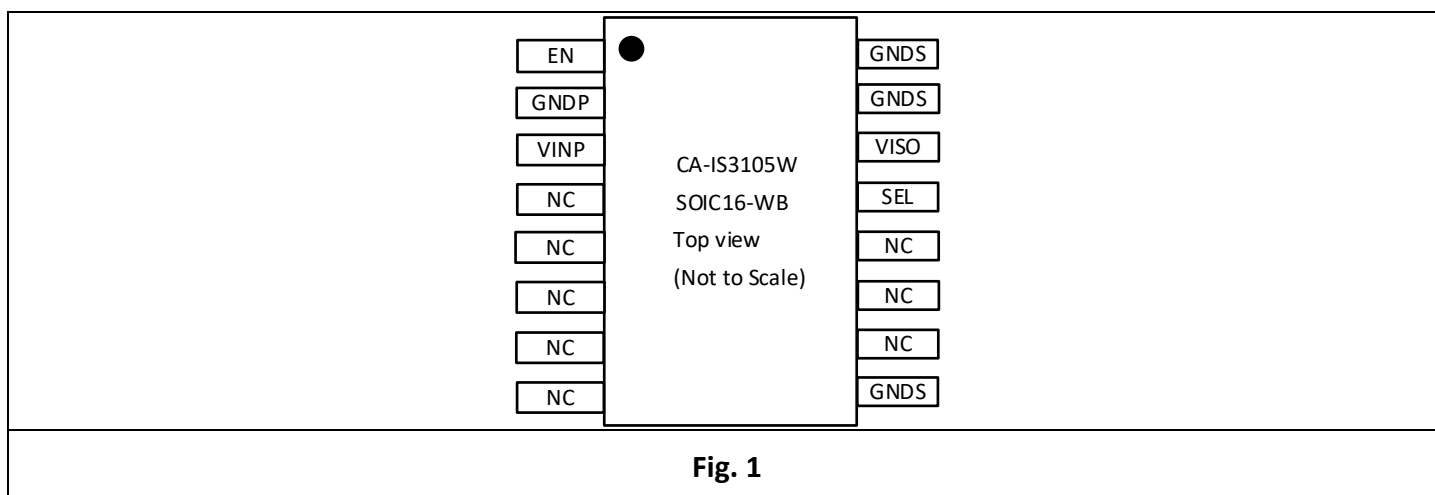
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Chip Introduction

The CA-IS3105W device is a 5kV_{RMS} isolated voltage withstand DC-DC converter chip, integrated with on-chip transformer, capable of efficient transmission of more than 650mW power to secondary output. This chip adopts a unique control architecture, which can quickly respond to load changes and accurately adjust the output voltage. The emergence of the CA-IS3105W device can replace the isolated power supply scheme of traditional discrete devices. This scheme has a smaller physical size and can achieve complete isolation.

The CA-IS3105W device integrates soft start, short circuit protection, over-temperature protection and other protection functions to enhance system reliability. The CA-IS3105W device has EN enable pin, when EN is low, the output voltage is zero, and the power supply has only microampere standby input current.

Four output voltages can be selected through pin SEL, which are 5V, 3.3V, 5.4V and 3.7V respectively. Output terminal is supported to connect to LDO, to facilitate different voltage requirements of users. The CA-IS3105W device comes in a 16-pin widebody SOIC package and is insulated to withstand voltage up to 5kV_{RMS}.



Basic Principles

Fig. 2 is the main block diagram of the internal circuit of the CA-IS3105W device, which mainly includes primary and secondary side power modules, drive circuit, transformer and control circuit, etc. The feedback system (green line in the block diagram) feeds back the output voltage to the control system on the secondary side and generates PWM signal. PWM transmits the digital control signal to the primary side through OOK modulation, and then the primary side sends PWM signal to the driver to control the on/off of the primary side power device. The energy flows from the primary side to the secondary side, thus making the output signal enable at the preset value. The on/off of the primary and secondary side power device sends the energy of the primary side to the secondary side continuously through the transformer, so that the power supply system works stably.

The CA-IS3105W device is a highly integrated product with micro-transformers integrated on the on-chip base. The output voltage is optional in four levels, which can produce different output according to different configurations. It is suitable for 3.3V or 5V applications, with a maximum output current of 130mA and a maximum output power of 0.65W.

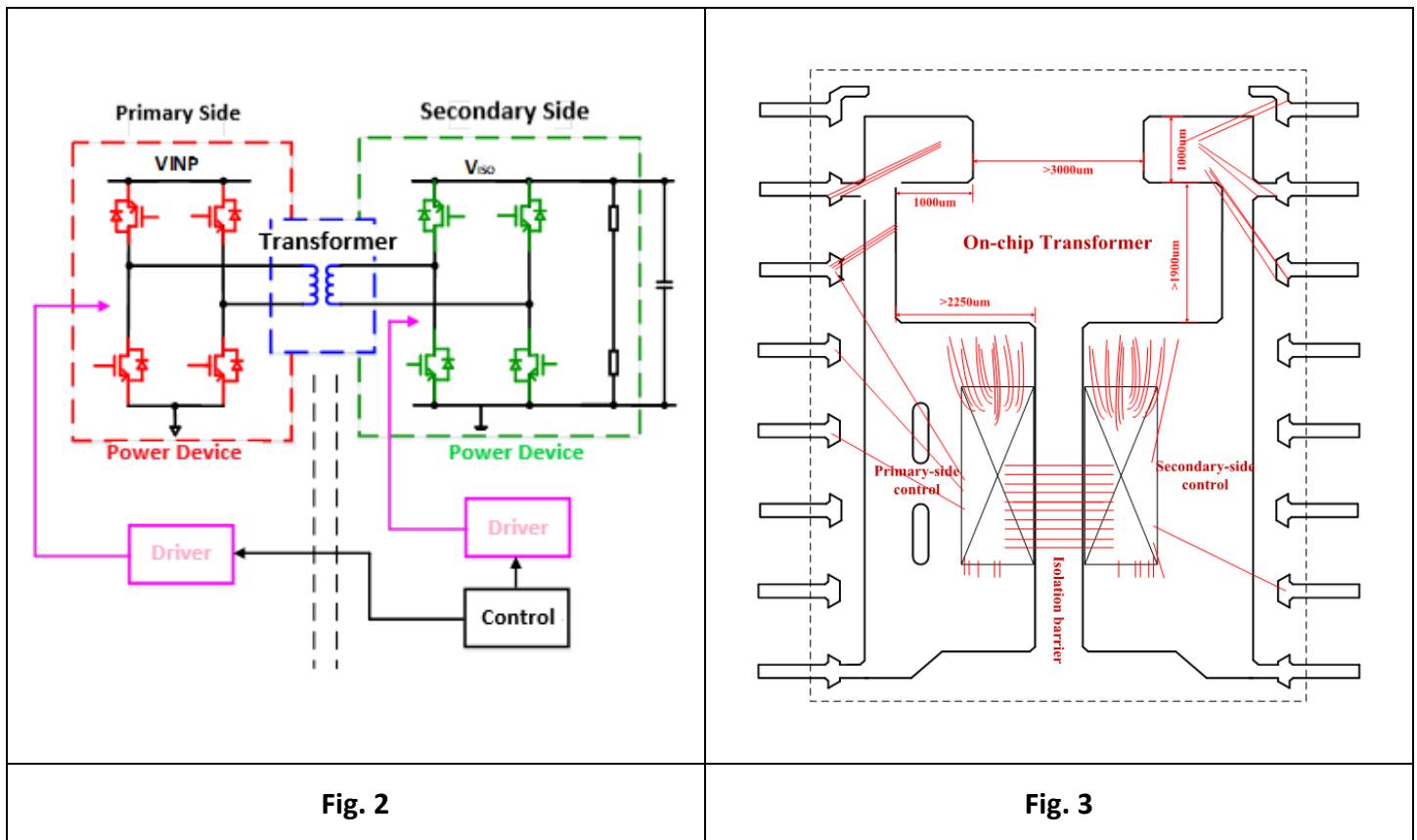


Fig. 2

Fig. 3

Design Guide

1. EN Enable

The EN pin can control whether the output terminal has voltage. When EN is low, there is no output voltage, and the standby power consumption of the chip is less than 10uA. In the application, when EN pin is connected to low level, the system standby power consumption can be greatly reduced.

2. SEL Enable

When EN is at high level, the output voltage can be 5V, 3.3V, 5.4V and 3.7V through SEL pin connection mode. For details, please refer to CA-IS3105W datasheet. In the application, when the output is 5.4V, it is not recommended to change the resistance value of the indirect 100k resistor (5% accuracy is enough) between SEL and VISO.

3. Output Connected to LDO

Although the output voltage ripple of the CA-IS3105 device is small, if in practical application, in addition to the above four output voltages, the output VISO can be connected to LDO when users need other voltages. For example, VISO is set to 3.7V, and a voltage with a lower ripple voltage is obtained through LDO, such as 3.3V, as shown in Fig. 4.

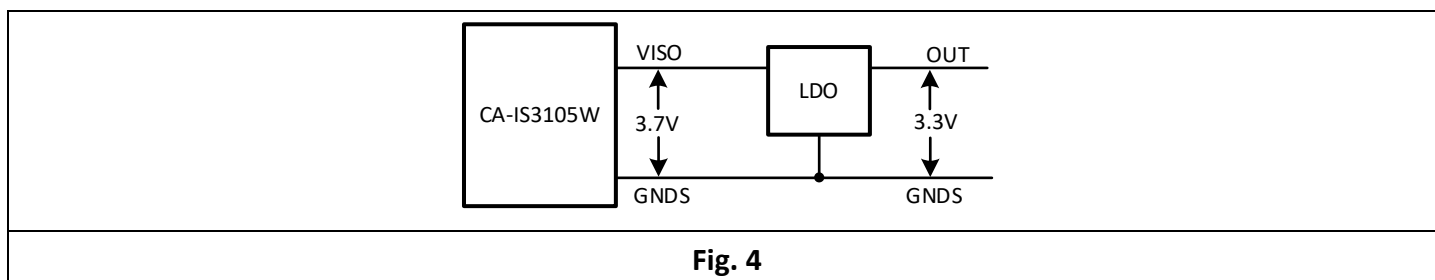


Fig. 4

4. Output Current Derating Application

When the ambient temperature of the chip does not exceed 85°C, the maximum load current can be 130mA; when the ambient temperature of the chip exceed 85°C, reduce the load current of the chip to prevent the over-temperature protection or damage to the chip due to the high temperature inside. For the load current derating curve of the chip, please refer to CA-IS3105W datasheet.

5. PCB Wiring and Radiation Suppression Design

Different from other chips, the CA-IS3105W requires a capacitance of about 10μF on the input and output sides to work normally because the VCC and ground of the chip have a large peak current when the isolated power supply is working. Capacitors should be placed as close to the chip as possible.

For EMI conduction interference CE suppression, a differential mode inductor of about 22uH is effective.

For optimization methods of PCB wiring and EMI characteristics of isolated power supply, please log in to the official website of Chipanalog and check *Radiation Suppression Design Reference of Isolated Power Supply* in "Technology and Support – Documentation".

Typical Applications

The CA-IS3105 device is an isolated constant voltage power supply with configurable output voltage with enable control. The maximum load current is 130mA. When the CA-IS3105W has no output voltage, the standby current is low, which reduces the standby power consumption of the whole system. The following are some typical applications of the CA-IS3105W device.

Battery Pack Management

Fig. 5 is a programmable logic controller application where the CA-IS3105W device provides output voltage to supply power to isolated CAN transceiver CA-IS305X.

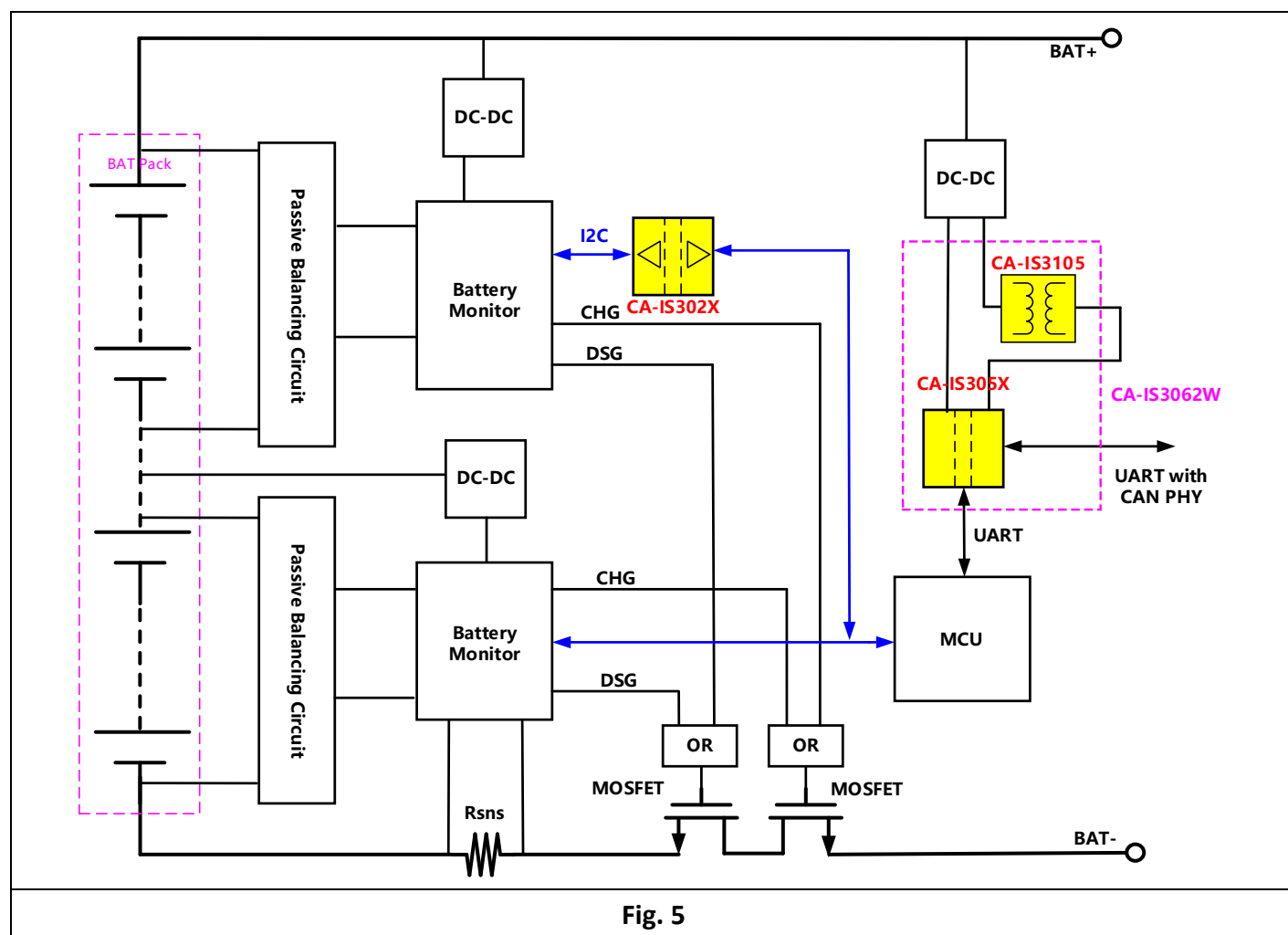


Fig. 5

Photovoltaic Inverter

Fig. 6 shows the application of photovoltaic inverter. The CA-IS3105W device provides output voltage to supply power to isolated RS485 transceiver CA-IS308X, isolated CAN transceiver CA-IS305X and digital isolator CA-IS37XX chips.

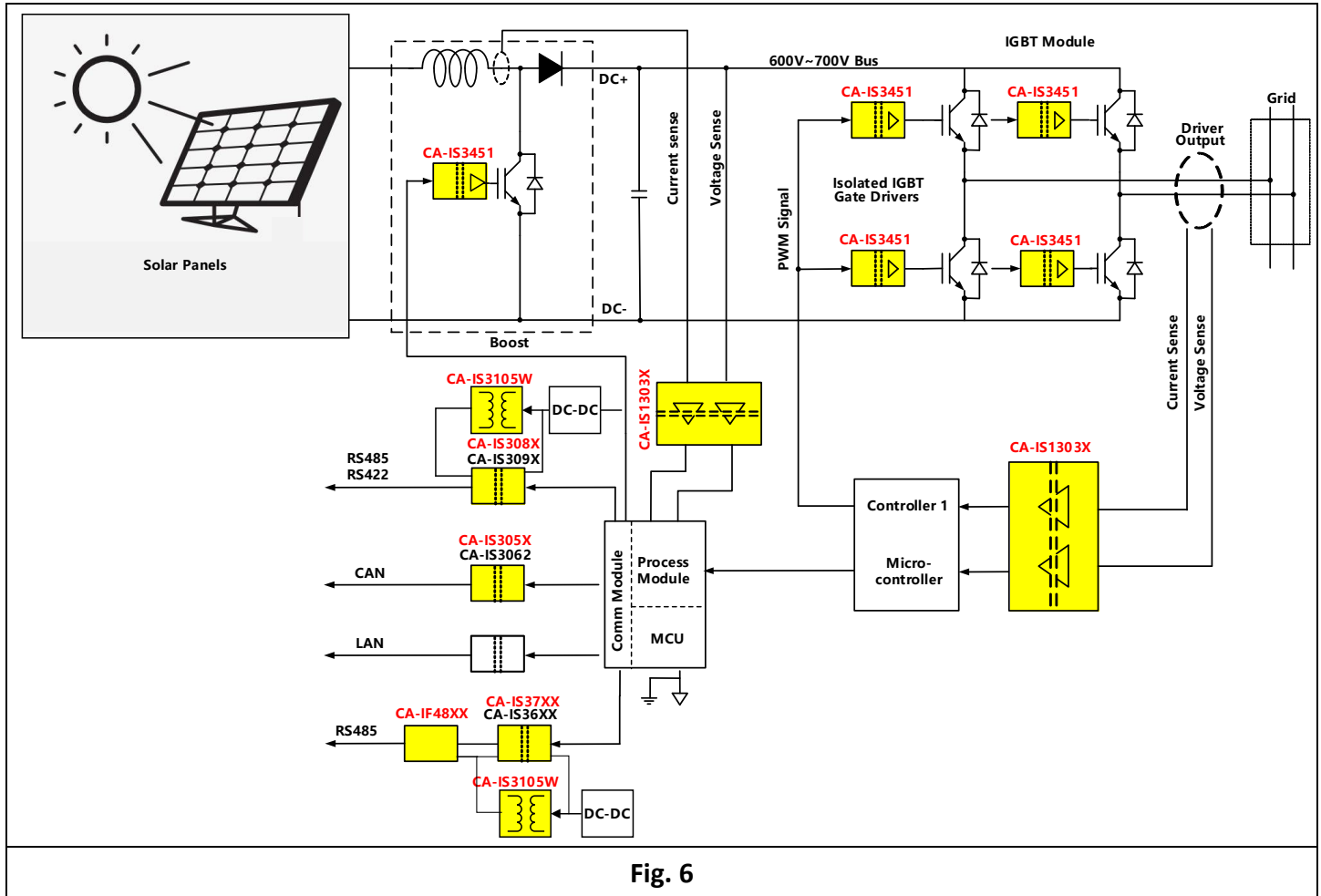


Fig. 6

Application Precautions

Before the CA-IS3105W device is powered on, one of the four output voltages of the chip should be configured by setting the SEL pin state in advance. During the normal operation of the chip, if the SEL pin is reconfigured again, the output voltage will not change. To change the output voltage, reset the output voltage after the CA-IS3105W is powered off, and then power on the chip again.

Revision History

Version	Date	State Description
Ver1.0	July.2021	Initial version

Important Statement

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