

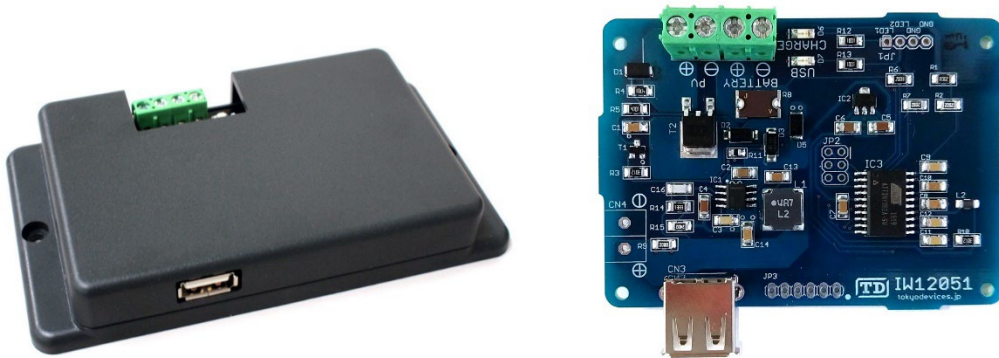


TOKYO DEVICES

IW12051-CS/BP

General purpose Solar Charger, Lead-acid Battery, Uninterruptible USB 5V output

Revision 1.0



The IW12051 series is a power control module designed to utilize solar panel energy as a USB power source. By combining solar panels with lead-acid batteries, it provides power to USB devices 24 hours a day, 365 days a year. It supports output currents up to 2.5A, allowing it to drive large loads such as single-board computers. This module is suitable for various applications including uninterrupted power supply for sensors and communication devices, as well as emergency power sources. Two models are available: the IW12051-CS with a flanged case, and the IW12051-BP, a board module for embedded use.

IMPORTANT NOTICE

Tokyo Devices, Inc. and/or its licensors do not warrant the accuracy or completeness of this specification or any information contained therein. Tokyo Devices, Inc. and/or its licensors do not warrant that this design will meet the specifications, will be suitable for your application or fit for any particular purpose, or will operate in an implementation. Tokyo Devices, Inc. and/or its licensors do not warrant that the design is production worthy. You should completely validate and test your design implementation to confirm the system functionality for your application. Any contents of this document are subject to change without notice. Tokyo Devices and the TD logo are registered trademarks of Tokyo Devices, Inc. in Japan.

注意事項

東京デバイス株式会社(以下、当社)は本製品が本文章で示す設計上の精度・性能を完全に満たすことを保証しません。また当社は、本製品がお客様のアプリケーションに実装された場合に正しく動作することを保証しません。組込み・実装する場合には、お客様の責任において十分な試験・検証を行ってください。本製品は人命や財産に重大な損害が予想される用途には使用できません。本製品を使用することで生じた損害（お客様または第三者いずれに生じた損害も含まれます。）に関して当社は一切その責任を負いません。本文章の内容は予告なく変更される場合があります。東京デバイスならびに TD ロゴマークは東京デバイス株式会社の登録商標です。

目次

IW12051-CS/BP	1
1. Specifications	4
1. Battery and Solar Panel Selection	4
2. Connection	5
3. Basic Operation	5
4. Over-discharge Protection.....	5
5. LED Indicator Patterns.....	5
5.1. Red LED	5
5.2. Green LED.....	6
6. Precautions.....	6
7. Product Customization Services.....	6

1. Specifications

Name	Value	Description
Compatible Battery	12V Lead-Acid Battery	
Compatible Solar Panel	45W max.	Open circuit voltage \leq 28V, Short-circuit current \leq 1.6A
Charging Control Method	PWM	
Charging Voltage	14.4V	
Maximum Charging Current	1.6A	
USB Output Voltage	5V	\pm 4%
USB Output Current	2.5A	Peak 2.7A, Overcurrent protection 3A
Protection		- Short-circuit protection - Surge protection - Reverse connection protection - Over-discharge protection
Cut-off Voltage	10.5V typ.	
Recovery Voltage	13.2V typ.	
Self-consumption Current	8.8mA typ. < 200 μ A	(during over-discharge protection operation)
Operating Temp. Range	-10~45°C	No Condensation
Dimensions (IW12051-BP)	58 × 80 × 18	mm (Screw holes for board fixing 2.5 ϕ × 4)
Weight (IW12051-BP)	25g typ.	
Dimensions (IW12051-CS)	70.6 × 127 × 20.5	mm (Mounting flange holes 3.5 ϕ × 2)
Weight (IW12051-CS)	100 g typ.	

1. Battery and Solar Panel Selection

As shown in Figure 1, the IW12051 is connected to a solar panel, battery, and a USB load. The battery is compatible with a 12V lead-acid battery. A general-purpose solar panel can be used. Please ensure the open-circuit voltage is between 14V and 28V, the output is 45W or less, and the short-circuit current is 1.6A.

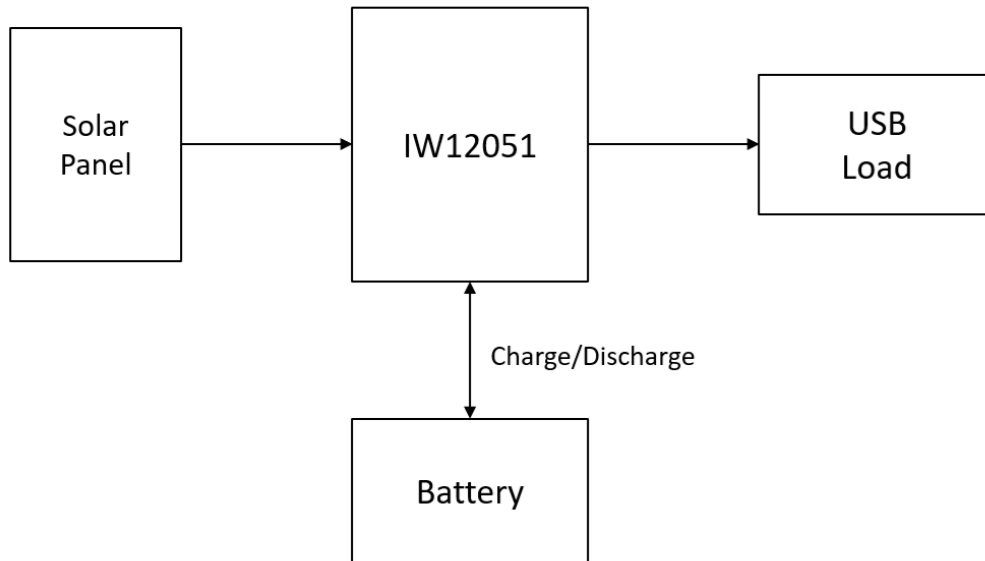


Figure 1 Connection Diagram

2. Connection

Connect the solar panel to the terminal marked "PV" on the board. Ensure correct polarity by following the + and - symbols. Connect the lead-acid battery to the terminal marked "BATTERY" on the board. Be careful with polarity. Once connected, the power will turn on automatically, and the red and green LEDs will flash alternately.

3. Basic Operation

The IW12051 has two operating modes: Day Mode and Night Mode.

In Day Mode, when the solar panel voltage is higher than the battery voltage, the battery will charge.

In Night Mode, when the solar panel voltage is lower than the battery voltage, the battery will discharge.

4. Over-discharge Protection

Lead-acid batteries are vulnerable to over-discharge, which can significantly reduce battery life. To prevent battery degradation due to insufficient sunlight, the IW12051 automatically stops USB power supply when the battery voltage falls below the cutoff voltage. USB power supply will resume once the battery is recharged above the recovery voltage.

5. LED Indicator Patterns

The LED next to the terminal connectors indicates the operational status of the IW12051.

5.1. Red LED

Blinking: Day Mode (charging state).

Off: Night Mode (discharging state).

5.2. Green LED

Blinking in Day Mode: USB power supply is active.

Off in Day Mode: USB power supply is disabled (over-discharge protection).

Blinks every 30 seconds in Night Mode: USB power supply is active.

Off for more than 30 seconds in Night Mode: USB power supply is disabled (over-discharge protection).

6. Precautions

- Do not connect batteries with voltages of 6V or 24V, as they are not compatible and may cause damage.
- Do not connect solar panels with open-circuit voltages over 30V or short-circuit currents exceeding 1.6A, as they can cause overheating or ignition.
- Although the module includes an internal fuse, for safety, also install a fuse of about 5A capacity on the battery side.
- Noises such as "popping" or "buzzing" during charging are normal and not indicative of a fault.
- When connecting loads with high current consumption, use high-quality USB cables with low internal resistance. Using poor-quality cables can cause voltage drops, leading to unstable operation of the load.

7. Product Customization Services

Tokyo Devices offers customization of circuit board exteriors, functionalities, and performance based on customer needs.

For more details, please check the "Customization" on the Tokyo Devices website.

Tokyo Devices, Inc.
Copyright © 2024 Tokyo Devices, Inc. All rights reserved.
<https://en.tokyodevices.com/>