

# Discharging Module for Supercapacitor Evaluation

## Instruction Manual

Doc No. U23J010050  
NIPPON CHEMI-CON CORPORATION

Part Number: N3JXJ

### Precautions

This product is an experimental charging module exclusively for the supercapacitor module " [MDKA150S8R3PE6111A](#) ".

Please refrain from using this product for the following applications:

Use of the module for applications other than our "MDKA150S8R3PE6111A", massproduction, or installation in equipment that may cause injury or death.

Use of the product in a manner not described in the instruction manual may result in damage or ignition.

To avoid personal injury, fire, or other accidents due to malfunction of this product, design safety by the person using the product.

We assume no responsibility for any malfunction or damage that may occur while using this product.

Specifications of this product and the contents of this instruction manual are subject to change without notice.

### Outline

This is an experimental charging module exclusively for MDKA150S8R3PE6111A.

The circuit configuration is a non-isolated DCDC converter.

Standard specification output voltage is 12.125V and output current is 15A.

Although the output voltage is fixed, it is selectable from 3V to 25V with mounting options.

### 1. Dimention and Terminal Descriptions

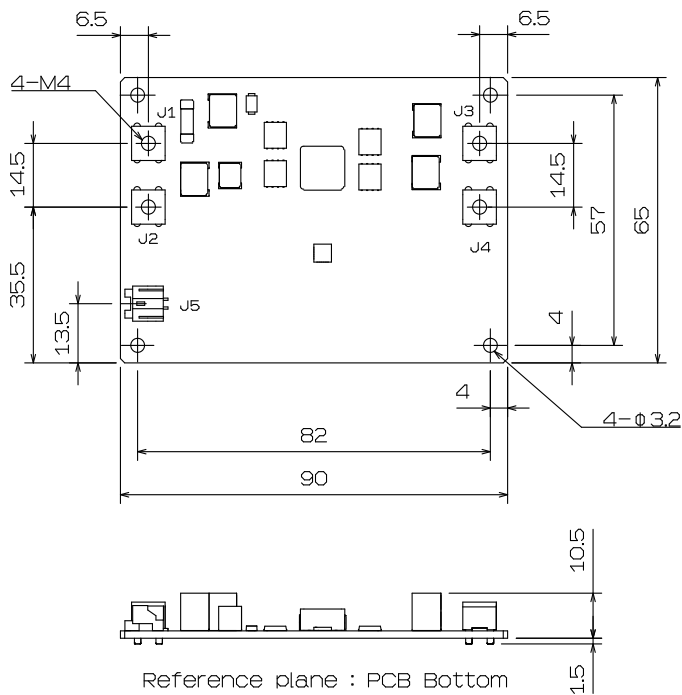


Figure 1. Dimention

Table 1. Electrical Mounting Points

Terminal Ref	Name	Specifications
J1	Vin (+)	M4 female screw (Brass - Tin plating)
J2	Vin (-)	
J3	Vout (+)	
J4	Vout (-)	
J5	On/Off	2Pin Connector

Table 2. Mechanical Mounting Points

Item	Description
Part	Holes at four corners $\phi$ 3.2mm PCB FR-4 (t=1.6mm) Side A: Within silk area Side B: Pattern removal area
Recommended Mounting Method	Screw fastening
Tightening Torque	Max. 0.5 Nm

\* Note that the PCB surface may be distorted by the mounting of the board.

## 2. Specifications

Table 3. Specifications

Item		Standard	Mounting OP
Input	Voltage Range	6 to 30V	
	Start-up Voltage	6.5V	
	Current	25A max	
	Efficiency	96% max	
Output	Voltage Output	12.125V	3 to 25V
	Voltage Accuracy	$\pm 0.1V + 2\%$	
	Current	15A max (time limited)* 1	
	Ripple Voltage	p-p 150mV max *2	
Environment	Storage Temperature Range	-40 to 85°C	
	Operating Temperature Range	-40 to 70°C	
	Cooling Method	Natural air cooling	
Shape	Size	65 x 90 x 13mm	
	Weight	50g	

### Combinable supercapacitor Number of Series

Min: 3 series (3s), rated voltage 7.5V

Max: 12 series (12s), rated voltage 30V

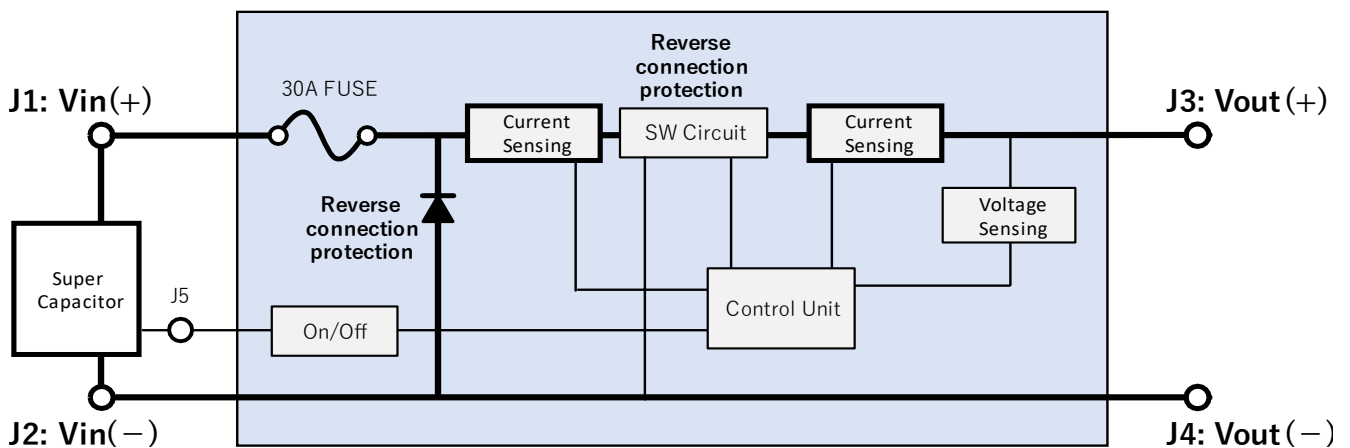
\* Rated voltage of a single cell is assumed to be 2.5V.

Multiple parallel connections possible

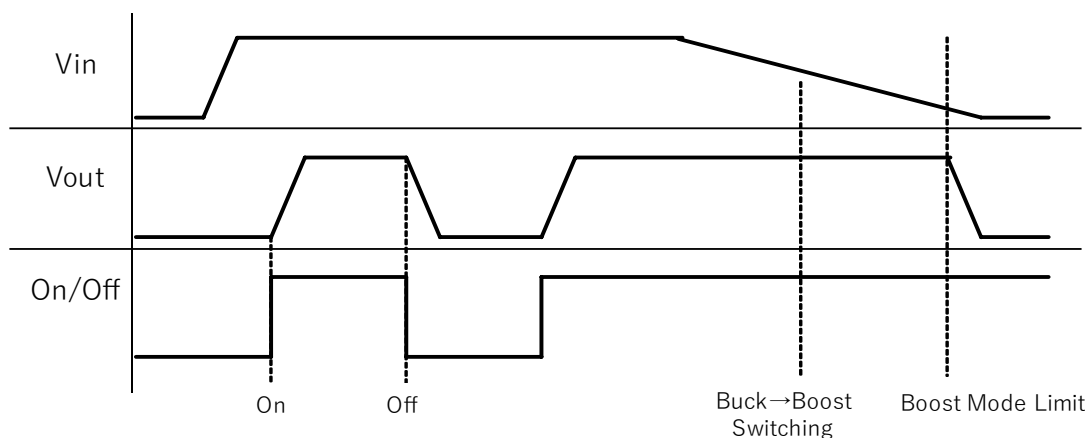
\*1. Allowable operation time at maximum output current is 1 minute.

\*2. When the power supply is in boost operation (input voltage > output voltage), it may exceed specifications.

## 3. Control Block Diagram



## 4. Sequence Chart



## 5. Electrical Connection Methods



Figure 2. Connection

### Input Vin

Terminal Ref: Connect an supercapacitor to J1 & J2.

When installing, make sure that the supercapacitor side is at 0 V before connecting.

Inputting other than the supercapacitor is the responsibility of the customer.

### Output Vout

Terminal Ref: Connect DC power supply to J3&J4.

Cautions: If the energy in the supercapacitor is exhausted, no output will be produced.

When there is a possibility of reverse current (regeneration), such as in motor loads, etc., make sure that the reverse voltage does not exceed the output rating of 25V.

### On/Off Connector

Terminal Ref: Connect the supplied harness to J5 and connect it to the fault detection terminal of the supercapacitor module.

\* This product will not start if the harness is not connected.

\* Refer to "7. Functional Description" for the startup method without the dedicated harness.

## 6. How to Change Output Voltage (Mounting Option)

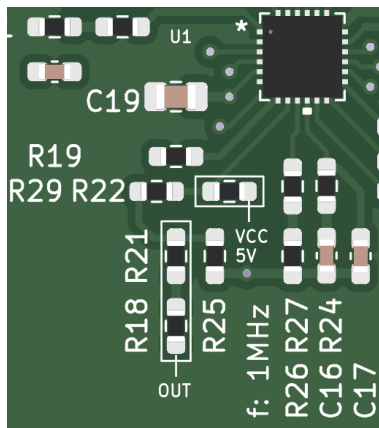


Figure 3. Output Voltage Setting Mounting Location

By replacing R18 and R21 at the following mounting points, the output voltage can be set. The table below shows the values obtained by adding the two resistors. Any changes from the default settings should be made by the customer.

Table 4. Output Settings

Ref	Output Settings
R18+R21	
14k	3.0V
16k	3.3V
30k	5.0V
86k	12.0V
110k	15.0V
182k	24.0V

Mounted Parts: SMD resistors, 1608 (IEC 0603)

## 7. Functional Description

### Reverse voltage protection to input section

If a reverse voltage is applied to  $V_{in}$ , the fuse inside the circuit will blow to protect the device. In this case,  $V_{in}(+)$  of the input section becomes electrically open.

### Reverse voltage protection to Output section

$V_{out}(+)$  is prevented from reverse current flow by the SW element of the power supply circuit. This function prevents current from returning from the load side to the supercapacitor side.

### Overcurrent Protection

This product has built-in overcurrent protection, but does not have an automatic shut-off function. Even in the case of a pseudo short circuit, the limiting current continues to flow continuously.

### Overvoltage Protection

The overvoltage function of this product is only the FB function of the power supply. It does not provide double protection.

### Overheat Protection

This product does not have an overheat protection function. In the development and evaluation of the product, operation was verified under the following conditions:

- 1) Continuous operation at room temperature of 25° C, natural air cooling, and no airflow
- 2) Continuous (1 minute) operation at 70° C, inside a thermostatic chamber, forced convection, maximum load

### On/Off Function

With a voltage input of 6.5 V or more to  $V_{in}$ , the output is enabled when there is a short between connectors Pin 1 and 2 of J5.

When the supplied harness is connected, the signal state with the supercapacitor module is normal-short.

If an abnormality is detected on the charging module side, it becomes Abnormal-Open and the output is stopped (SW stop of power supply).

To switch On/Off by another method, follow the procedure below:

- 1) Connect a jumper resistor to R15, which is unmounted at shipping.
- 2) Turn on/off the pin-to-pin connection of J5 with a switch, etc. In this case, add a chattering remover.

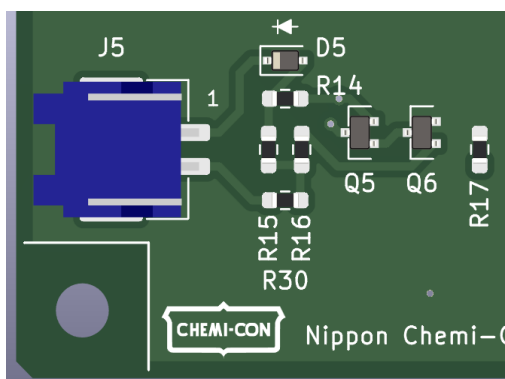
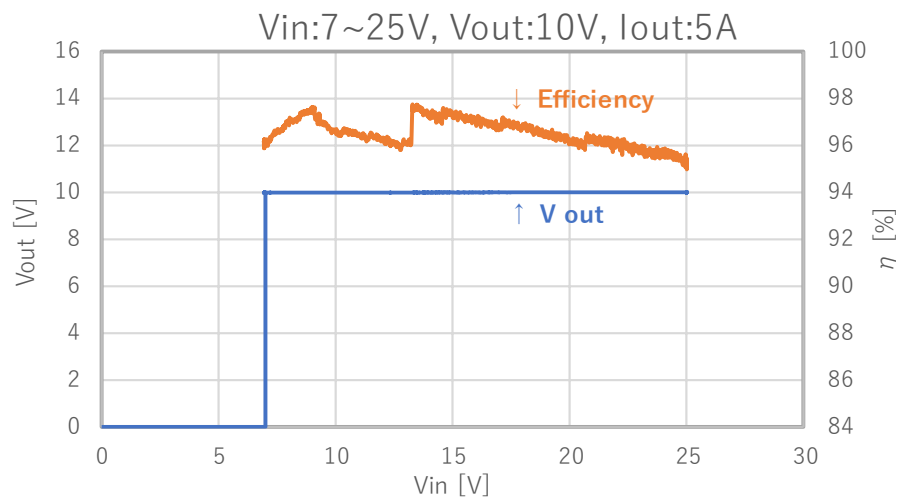


Figure 4. On/Off Circuit

## 8. Operating Waveform



Operating conditions  
Input: DC7~25V  
Output: Electronic load CC5A  
Environmental temperature: 25° C

Graph 1. Representative Waveforms