

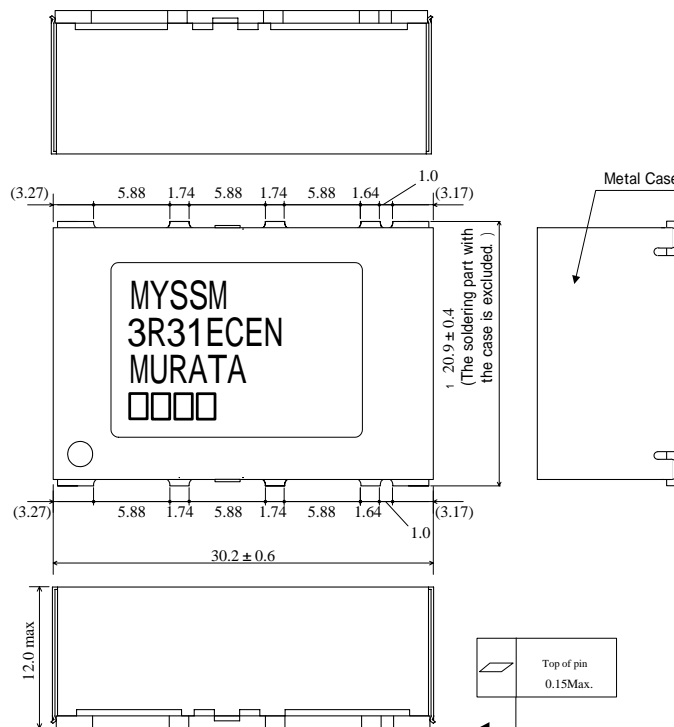
DC-DC Converter Application Manual

MYSSM3R31ECEN

1. Features

- Single output/SMD/non-isolated type DC-DC converter with high power (30W).
- High efficiency and small mounting area have been achieved.
- Wide input range (17.0V to 40.0V).
- Wide adjustable output voltage range by connecting external resistance (5.0V to 12.0V).
- Shield case type.
- ON/OFF function and Short-circuit protection function are built in.

2. Appearance, Dimensions



【Unit : mm】

Tolerance ± 0.3mm

Tolerance is not accumulated.

Marking

- | | |
|------------------------------|---------------|
| 1. Manufacturer Parts Number | MYSSM3R31ECEN |
| 2. Manufacturer ID | MURATA |
| 3. Trace code | □ □ □ □ |
| 4. Pin No.1 Side Marking | ○ |

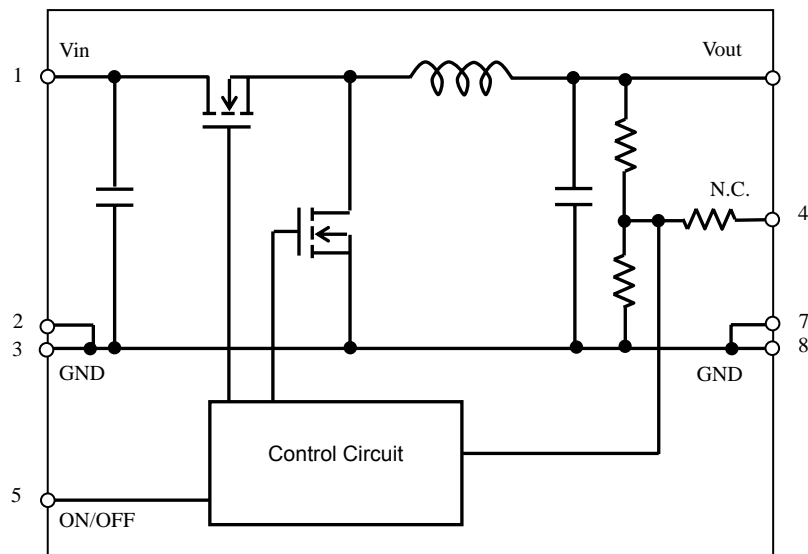
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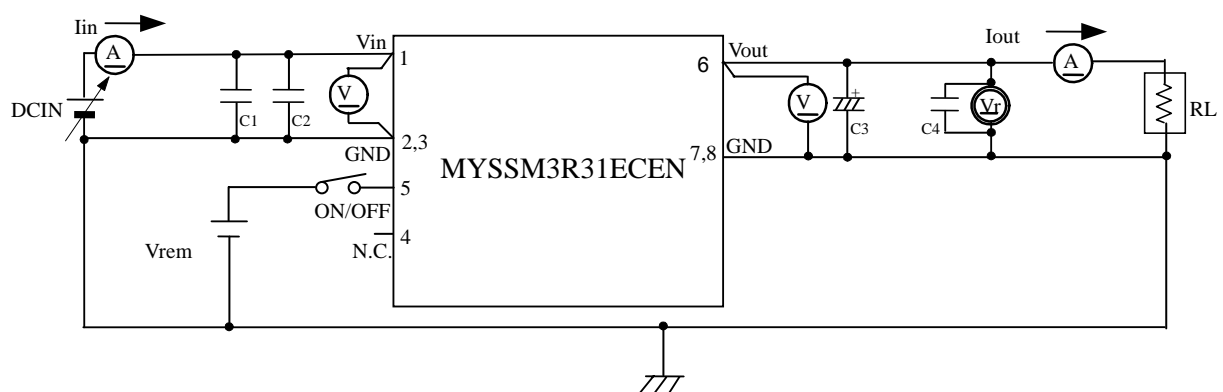
Pin Number and Function

Pin No.	Symbol	Function
1	Vin	Input
2	GND	GND
3	GND	GND
4	N.C.	N.C. (Internally used)
5	ON/OFF	Remote ON/OFF
6	Vout	Output
7	GND	GND
8	GND	GND

3. Block Diagram



4. Test Circuit



C1,C2 : 4.7 μ F/50V Ceramic Capacitor

C3 : 100 μ F/6.3V Conductive Polymer Aluminum Capacitor
(APXA6R3ARA101MF55G :Nippon Chemi-con)

C4 : 0.1 μ F Ceramic Capacitor

Please make sure to place C1,C2 and C3 nearby input and output terminal of DC-DC converter.

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5. Characteristics

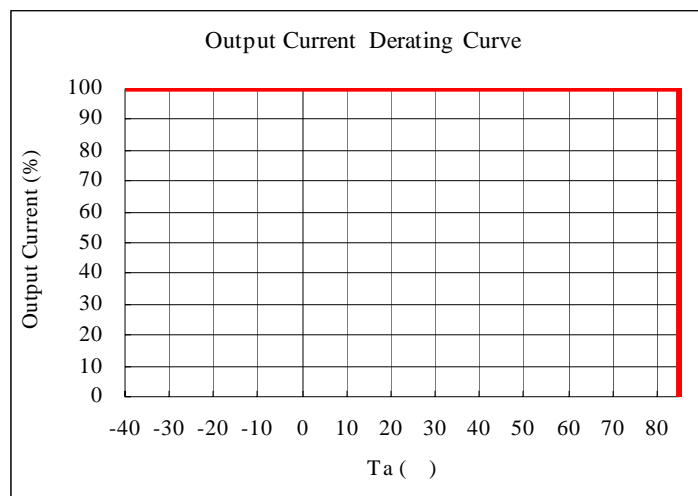
5. 1 Electrical Characteristics (Ta=25 °C)

Item	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Input Voltage Range	Vin		19.2	24.0	28.8	V
Output Voltage	Vout	Vin=19.2~28.8V, Iout=0 ~ 1.5A	3.201	3.30	3.399	V
Output Current	Iout	Vin=19.2~28.8V	0	-	1.5	A
Ripple Voltage	Vrpl	Vin=24V, Iout=1.5A, BW = 20MHz,	-	15	-	mV(pp)
Efficiency	EFF	Vin =24V, Iout=1.5A,	-	88	-	%
Protection Output Current	ISCP	Vin= Vin=19.2~28.8V V	1.6	-	-	A
Short Circuit Protection	SCP	If output is shorted to GND, DC-DC Converter shall be operated in a hiccup mode. After the short circuit event has cleared, the output is automatically brought back into regulation.				

⚠ Caution

The above electrical characteristics are guaranteed with the condition that the impedance of the input voltage source is sufficiently low as shown in section 4. Connecting an input inductance or using an input power supply with output inductance may cause an unstable operation of this device. Please check the proper operation of this device with the peripheral circuits on your system.

5. 2 Thermal Derating



6. Pin Description

6.1. ON/OFF Control

ON/OFF function

Using the ON/OFF feature, the operation of this product can be disabled without removal of the input voltage. Sequencing of a power supply system and power-saving control can be easily achieved using this function.

ON/OFF Control Operation

When ON/OFF-pin(5pin) is connected to Vin

..... Output Voltage =OFF

When ON/OFF-pin(5pin) is connected to GND or open

..... Output Voltage=ON

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7. Typical Characteristics Data

7.1 Static Electrical Characteristics

$V_{in}=24V$, $V_{out}=3.3V$

($T_a=25^\circ C$, $C_{in}=GRM31CR71H475KA12L \times 2$, $C_{out}=APXA6R3ARA101MF55G \times 1$)

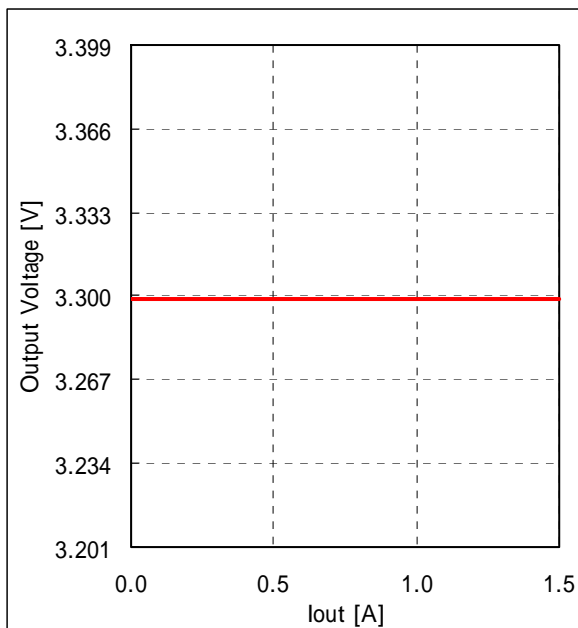


Fig.7-1-1. Output Voltage v.s. Output Current

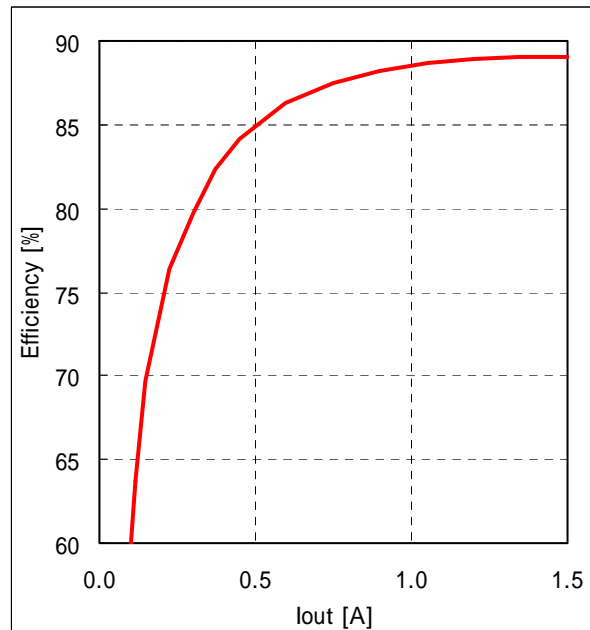


Fig.7-1-2. Efficiency v.s. Output Current

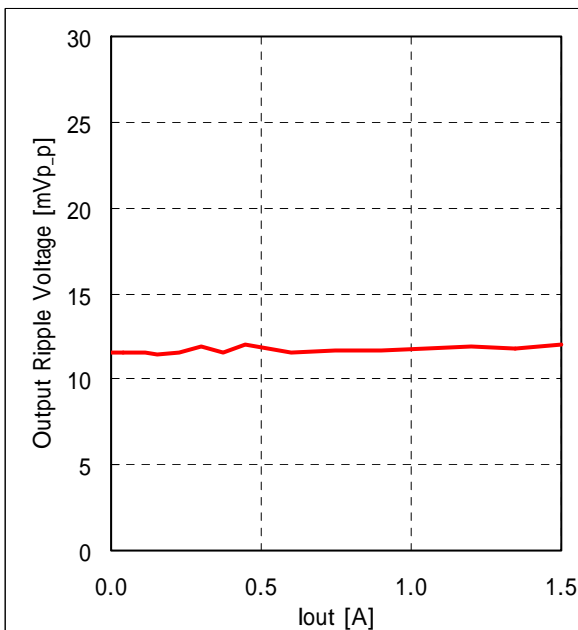


Fig.7-1-3. Ripple Voltage v.s. Output Current

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7. 2 Dynamic Electrical Characteristics

$V_{in}=24V$, $V_{out}=3.3V$

($T_a=25^\circ C$, $C_{in}=GRM31CR71H475KA12L \times 2$, $C_{out}=APXA6R3ARA101MF55G \times 1$)

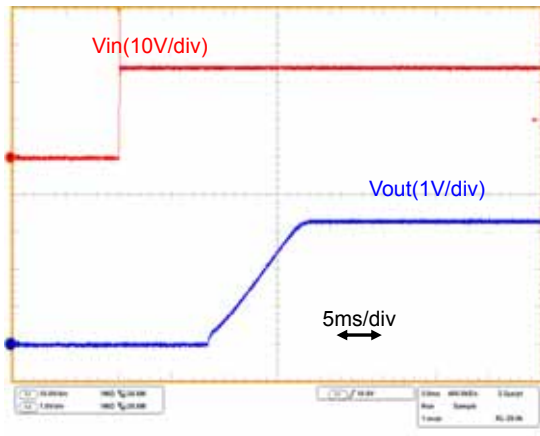


Fig.7-2-1. Start-up Waveform($I_o=0A$)

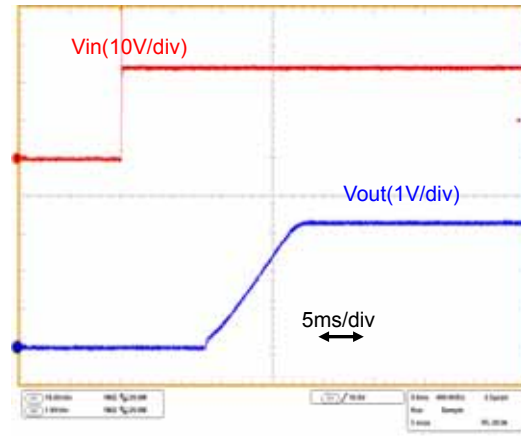


Fig.7-2-2. Start-up Waveform($I_o=1.5A$)

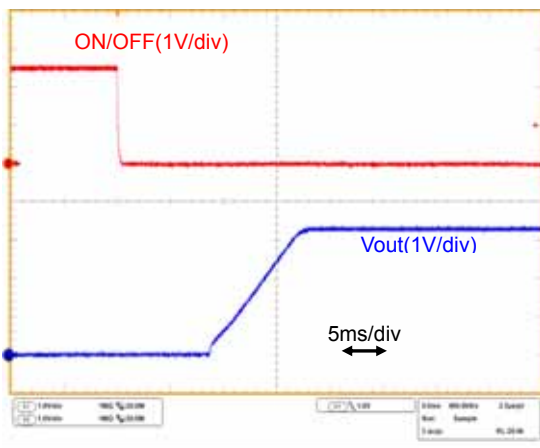


Fig.7-2-3. Start-up Waveform($I_o=0A$)

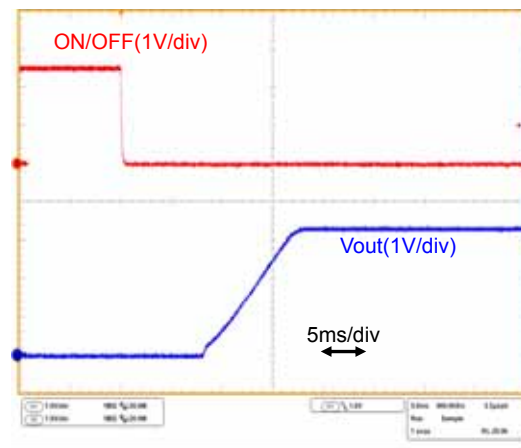


Fig.7-2-4. Start-up Waveform($I_o=1.5A$)

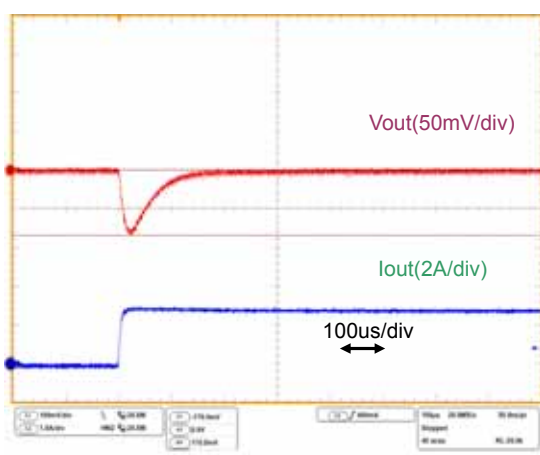


Fig.7-2-5. Load Transient Response
($I_o=0$ 1.5A)

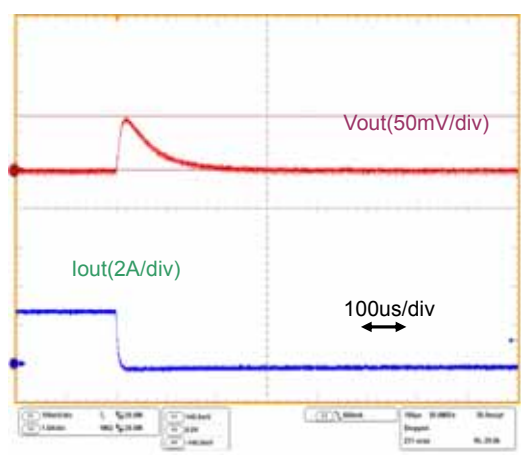


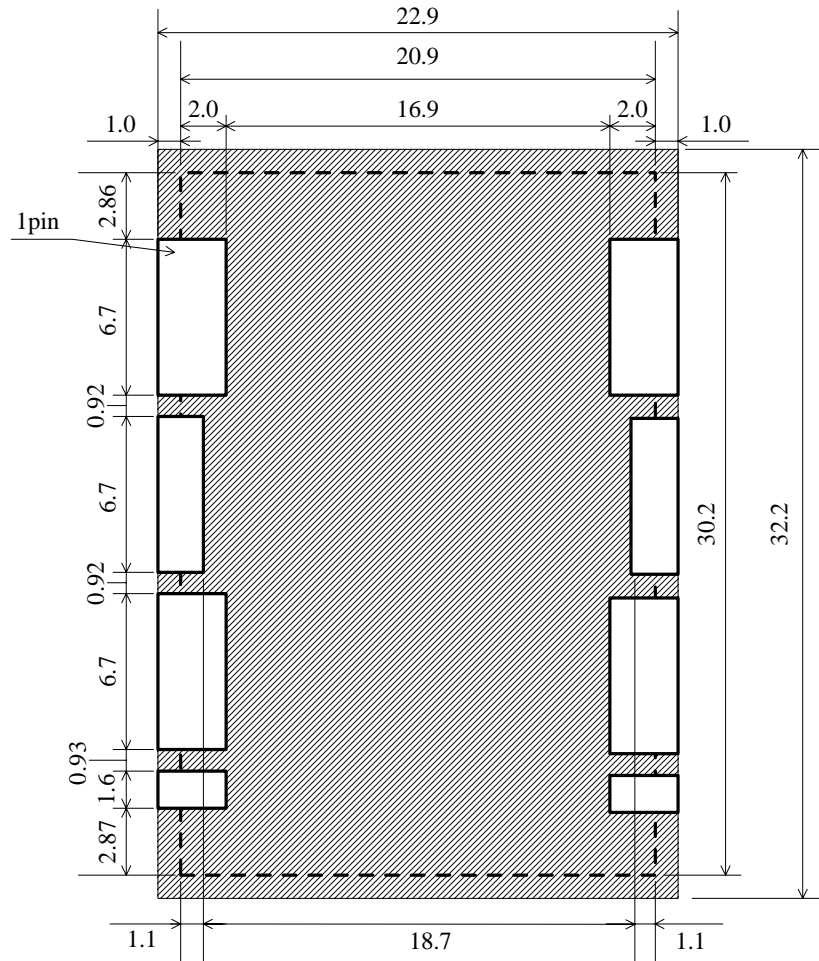
Fig.7-2-6. Load Transient Response
($I_o=1.5A$ 0A)

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8. Mounting Condition

8. 1 PCB Land Pattern Recommendation



In the above-mentioned chain line area , wirings other than land are assumed to be a prohibition.

There are wiring coppers or through-hole via at the bottom side of the DC-DC converter.

When you design your PCBs, please be careful not to short the circuit of the DC-DC converter or PCBs.

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8. 2 Recommended Soldering Conditions

Reflow Soldering

This product is RoHS compliant. The following profile is recommended for the reflow of this product using Pb-free solder paste (Sn-Ag-Cu).

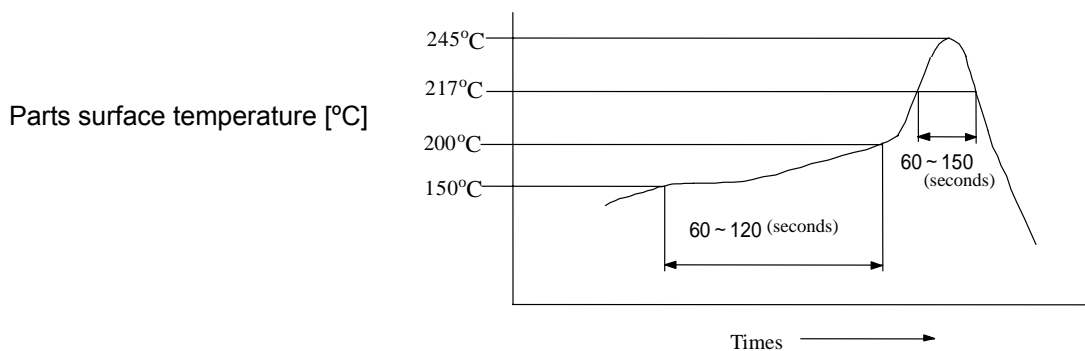
Method : Full convection reflow soldering

Reflow Soldering Profile

JEDEC IPC/JEDEC J-STD-020D
Table 5-2 Classification Reflow Profile
Pb-Free Assembly Large Body

Profile details

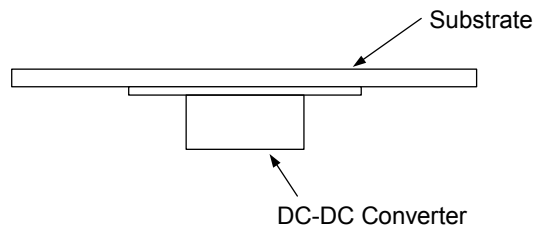
Soldering temperature : 245°C+0/-5°C
Soldering time : 30 seconds, 240 to 245°C
Heating time : 60 to 150 seconds, over 217°C
Preheating time : 60 to 120 seconds, 150 to 200°C
Programming rate : 3°C/ sec. Max., 217 to 245°C
Descending rate : 6°C/ sec. Max.
Total soldering time : 8 minutes Max., 25 to 245°C
Times : 1 time



Do not vibrate for the products on reflow.

Please need to take care temperature control because mounted parts may come off if the product are left under the high temperature.

Do not reflow DC-DC converter as follows, because DC-DC converter may fall down from a substrate during reflowing.



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9. Packaging Specification

9.1. Packing Form

These are packed in a tray(See Fig.9-1)

9.2. The number of products in pack specification form.

32pcs./tray

If the products have fraction, may not follow this specification.

9.3. Packaging Form

These trays packed products are packaging in a corrugated box alternately.

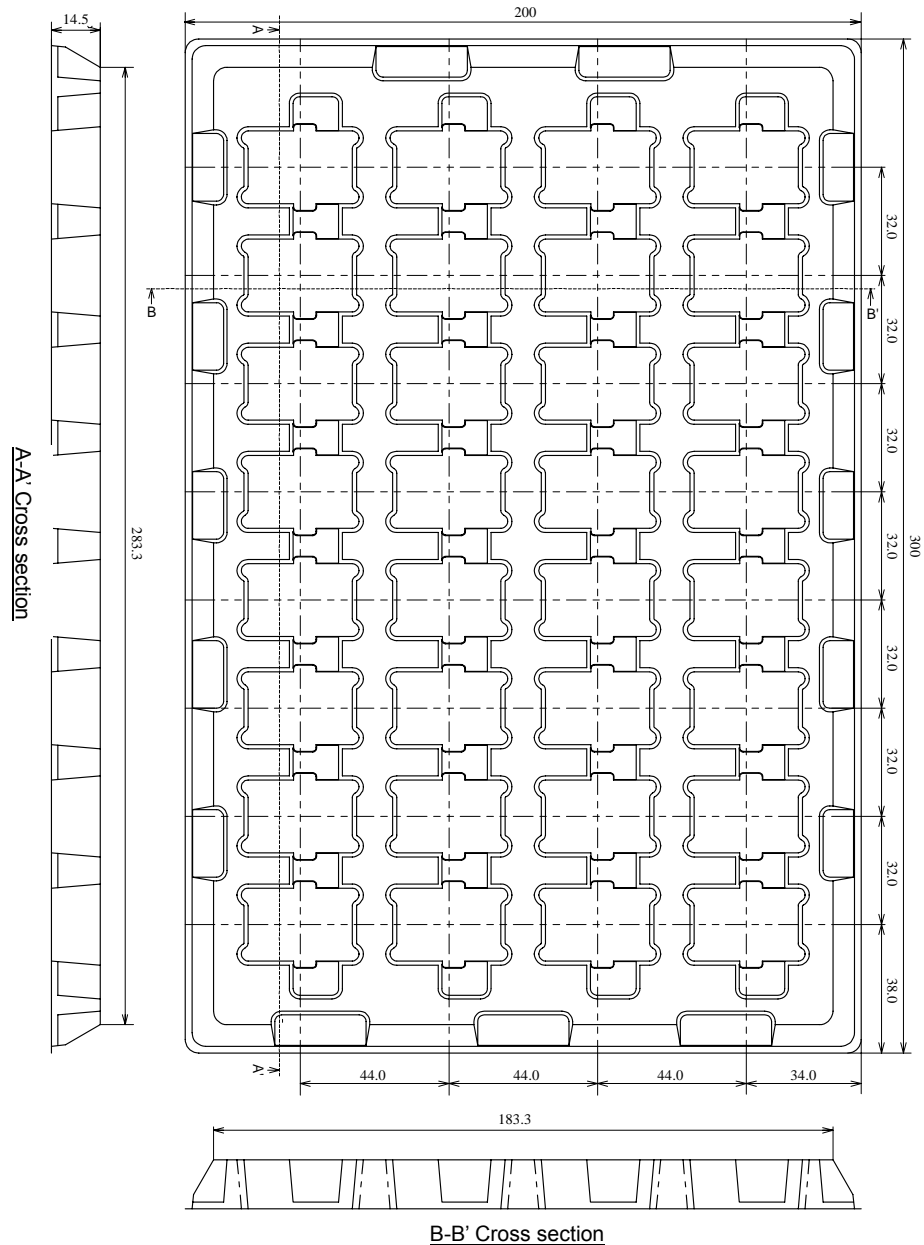


Fig.9-1

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10.  Notice

10.1. Input / Output capacitor

When an inductance or a switch device are connected to the input line, or when you use a power supply with output inductance as the input voltage source, the input voltage of the DC-DC converter will be fluctuated. By this input voltage fluctuation, the transient load response of the DC-DC converter may be deteriorated or abnormal oscillation may occur. So please confirm normal operation on each application.

Please use external input capacitor in order to decrease inductance of input line.

In case you use external output capacitor in order to improve transient load response, please use input capacitor to prevent abnormal oscillation. When you use external capacitors, following capacitors are recommendable.

Output capacitor (C3+C4) : Please use capacitors less than $300\mu\text{F}$

10.2. Wiring of input / output capacitor

In the case of input / output capacitor connection, in order to reduce electrical noise, please design PCBs with consideration of the following item.

.Please be sure to check normal operation on your system.

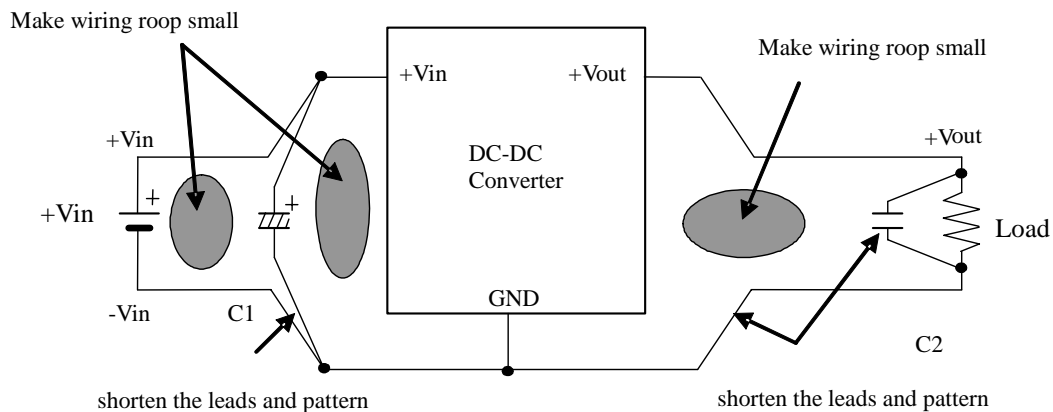
.Please use low impedance capacitors with good high frequency characteristic.

.Please shorten those leads of each capacitor as much as possible, and make sure the lead inductance low.

.Both input-side and output side, please make the wiring loop between plus and minus as small as possible.

The influence of leakage inductance can be reduced.

.Please design the print pattern of the main circuit as wide and short as possible.



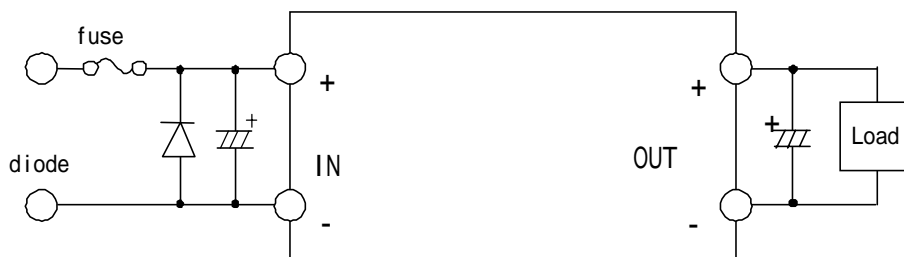
10.3. This product should not be operated in parallel or in series.

10.4. Please do not use a connector or a socket to connect this product to your product.
The electric characteristics may be deteriorated by the influence of contact resistance.

10.5. Be sure to provide an appropriate fail-safe function on your product to prevent secondary damage that may be caused due to abnormal functional or failure of this product.

10.6. Inrush current protection is not a feature of this product.

10.7. Please connect the input terminals with the correct polarity. If an error in polarity connection is made this product may be damaged. If this product is damaged internally, an elevated input current may flow, and so this product may exhibit an abnormal temperature rise, or your product may be damaged. Please add a diode and fuse per the following diagram to protect them.



Please select diode and fuse after confirming the operation of your product.

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Aerospace equipment
Undersea equipment
Power plant control equipment
Medical equipment
Transportation equipment (vehicles, trains, ships, etc.)
Traffic signal equipment
Disaster prevention /crime prevention equipment
Data-processing equipment
Application of similar complexity and/or reliability requirements to the applications listed in the above.

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