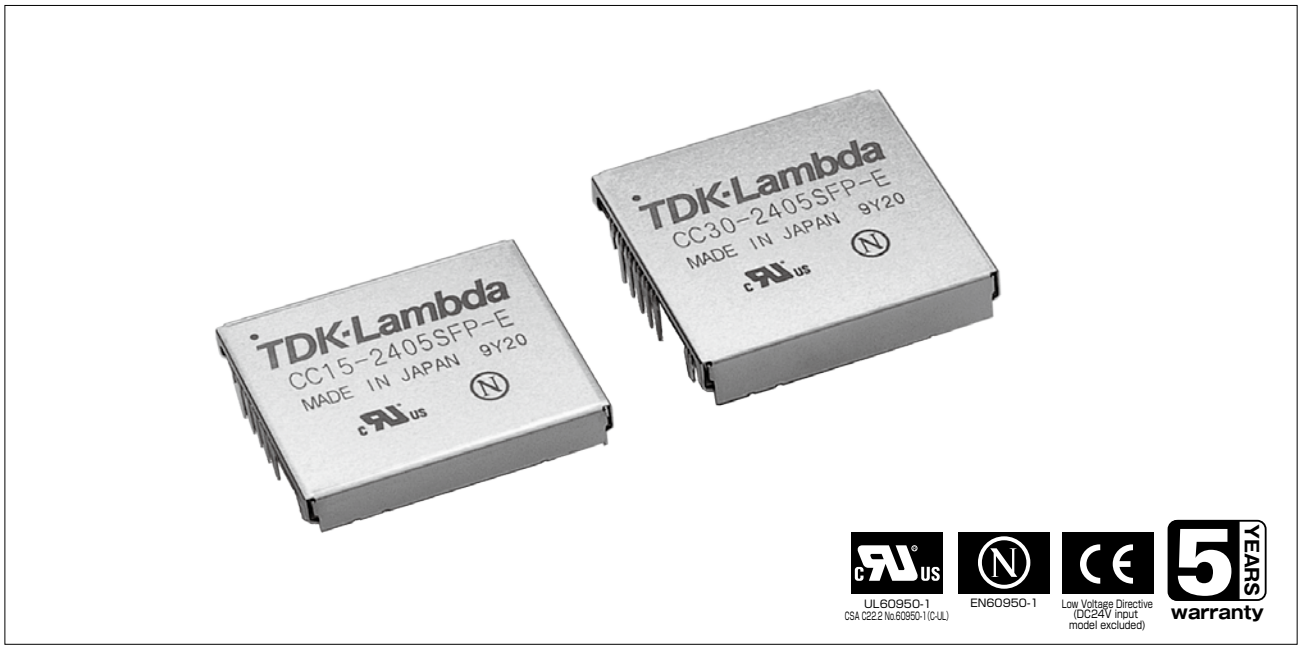
*This catalog is for 48VDC input type.

TDK·Lambda

CC-P-E

Insulation type DC-DC converter



UL60950-1
CSA C22.2 No.60950-1(C-UL)

EN60950-1

Low Voltage Directive
(DC24V input
model excluded)

5 YEARS warranty

■ Features

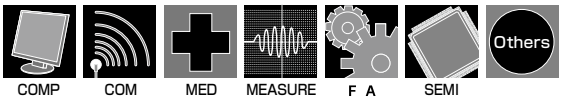
- ●Compact, High Efficiency
- ●Photo coupler unused
- ●Tantalum, aluminum electrolytic capacitors unused
- ●Remote ON/OFF function
- ●Alarm function
- ●Parallel operation capable, simultaneous/delayed start up functions
- ●Output overcurrent, overvoltage, low-voltage protection
- ●DIP insertion, SMD installation compatible
- ●Caseless type is high withstand voltage (1500VDC)
- ●UL60950-1, CSA C22.2 No.60950-1(C-UL), and EN60950-1(NEMKO) recognition.

■ Model-naming method

CC 30 - 24 05 S R P -E

- Parallel operation
  P: Possible
  H: Possible, High withstand voltage (Caseless type)
- Symbol of Mount
  F: DIP Type
  R: SMD Type
- Symbol for number of outputs
  S: Single output
- Nominal output voltage
  03: 3.3V、05: 5V、12: 12V、15: 15V
- Nominal input voltage
  24: 24V、48: 48V
- Maximum output power
  15: 15W、30: 30W
- Representing series name by combination with "-E"at the end

■ Applications



■ Conformity to RoHS Directive

■ Product Line up

Output power	Input power	Output voltage : 3.3V					Output voltage : 5V				
			Model name					Model name			
		Output current	DIP type	SMD type	High withstand voltage(Caseless)		Output current	DIP type	SMD type	High withstand voltage(Caseless)	
					DIP type	SMD type				DIP type	SMD type
15W	24V	4.5A	CC15-2403SFP-E	CC15-2403SRP-E	CC15-2403SFH-E	CC15-2403SRH-E	3A	CC15-2405SFP-E	CC15-2405SRP-E	CC15-2405SFH-E	CC15-2405SRH-E
	48V	4.5A	CC15-4803SFP-E	CC15-4803SRP-E	CC15-4803SFH-E	CC15-4803SRH-E	3A	CC15-4805SFP-E	CC15-4805SRP-E	CC15-4805SFH-E	CC15-4805SRH-E
30W	24V	9A	CC30-2403SFP-E	CC30-2403SRP-E	CC30-2403SFH-E	CC30-2403SRH-E	6A	CC30-2405SFP-E	CC30-2405SRP-E	CC30-2405SFH-E	CC30-2405SRH-E
	48V	9A	CC30-4803SFP-E	CC30-4803SRP-E	CC30-4803SFH-E	CC30-4803SRH-E	6A	CC30-4805SFP-E	CC30-4805SRP-E	CC30-4805SFH-E	CC30-4805SRH-E

Output power	Input power	Output voltage : 12V					Output voltage : 15V				
			Model name					Model name			
		Output current	DIP type	SMD type	High withstand voltage(Caseless)		Output current	DIP type	SMD type	High withstand voltage(Caseless)	
					DIP type	SMD type				DIP type	SMD type
15W	24V	1.25A	CC15-2412SFP-E	CC15-2412SRP-E	CC15-2412SFH-E	CC15-2412SRH-E	1A	CC15-2415SFP-E	CC15-2415SRP-E	CC15-2415SFH-E	CC15-2415SRH-E
	48V	1.25A	CC15-4812SFP-E	CC15-4812SRP-E	CC15-4812SFH-E	CC15-4812SRH-E	1A	CC15-4815SFP-E	CC15-4815SRP-E	CC15-4803SFH-E	CC15-4815SRH-E
30W	24V	2.5A	CC30-2412SFP-E	CC30-2412SRP-E	CC30-2412SFH-E	CC30-2412SRH-E	2A	CC30-2415SFP-E	CC30-2415SRP-E	CC30-2415SFH-E	CC30-2415SRH-E
	48V	2.5A	CC30-4812SFP-E	CC30-4812SRP-E	CC30-4812SFH-E	CC30-4812SRH-E	2A	CC30-4815SFP-E	CC30-4815SRP-E	CC30-4815SFH-E	CC30-4815SRH-E

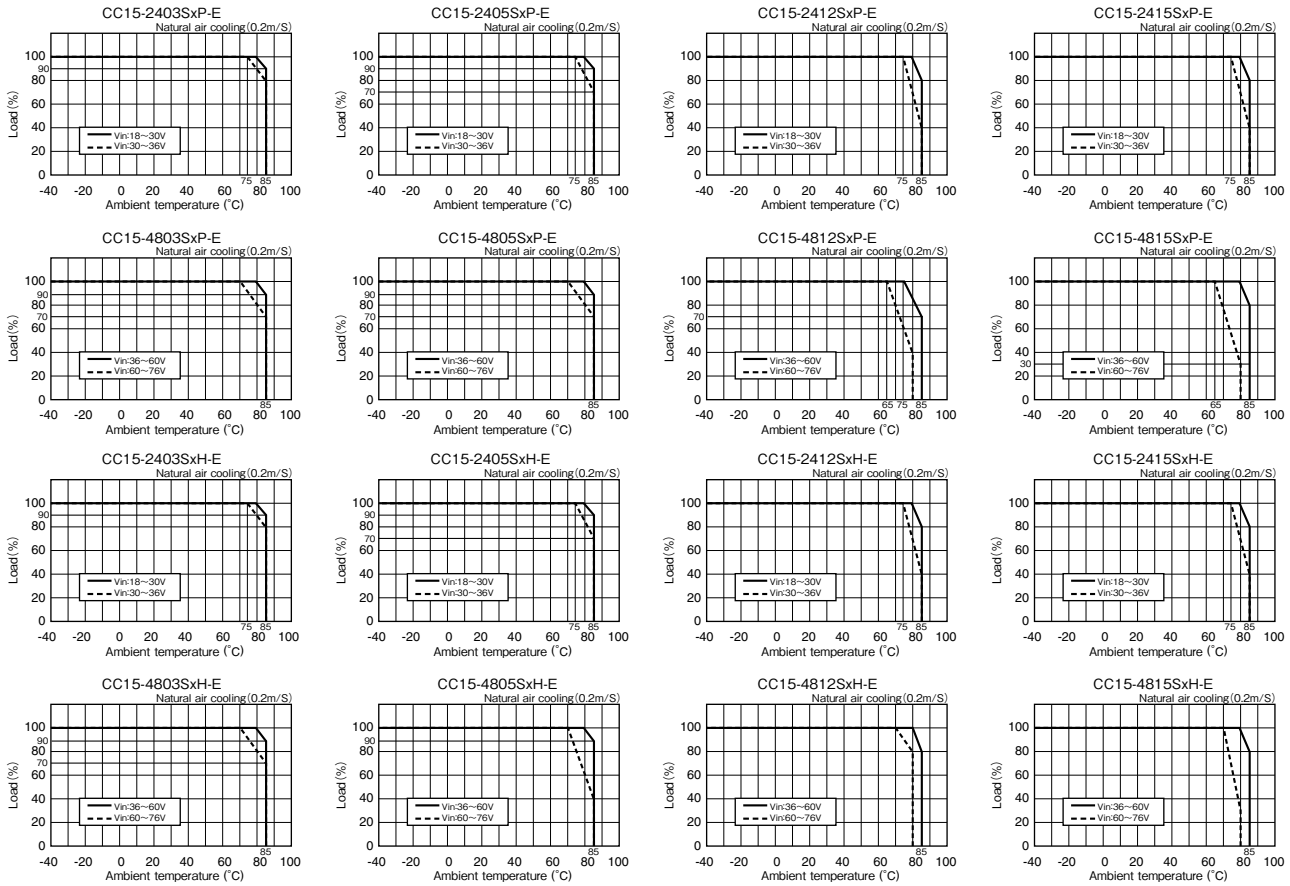
CC15-P-E Specifications

ITEMS/UNITS			MODEL	CC15-2403Sxx-E	CC15-2405Sxx-E	CC15-2412Sxx-E	CC15-2415Sxx-E	CC15-4803Sxx-E	CC15-4805Sxx-E	CC15-4812Sxx-E	CC15-4815Sxx-E
Input	Nominal Voltage		V	DC24.0				DC48.0			
	Voltage Range		V	DC18 - 36				DC36 - 76			
	Efficiency (typ)	(*1)	%	89	90	89		89	90	89	
	Current (typ)	(*1)	A	0.7	0.69	0.7		0.35			
	Start-Up Voltage		V	DC16 - 18				DC32 - 36			
	Hysteresis Voltage		V	DC1min				DC2min			
Output	Nominal Voltage		VDC	3.3	5	12	15	3.3	5	12	15
	Maximum Current		A	4.5	3	1.25	1	4.5	3	1.25	1
	Output Voltage Setting	(*1)	%	± 1% of nominal output voltage							
	Max Power Total Regulation (max)		%	+5%, -3%							
	Maximum Ripple & Noise	(*2)	mVp-p	Vo:3.3V, 5V / 50 ,Vo:12V, 15V / 150							
	Start-Up Time		ms	20 - 100							
Function	Over Current Protection		A	Works over 103% of maximum current							
	Over Voltage Protection		VDC	Works at 115 - 145% of rating							
	Low Voltage Protection		VDC	Works at 90% max of rating							
	Remote ON/OFF Control			Possible (RC open:On, RC connected to +Vin:Off)							
Environment	Operating Temperature		℃	-40 - +85							
	Storage Temperature		℃	-40 - +85							
	Operating Humidity		% RH	5-95 (the conditions of maximum 38° C in wet bulb temperature and non-condensation should be ensured.)							
	Storage Humidity		% RH	5-95 (the conditions of maximum 38° C in wet bulb temperature and non-condensation should be ensured.)							
	Vibration			10-55Hz, 15 minutes sweep and 1.52mm total amplitude, 3 directions, 2h for each							
	Shock			980m/s² (100G), 6ms, 6 directions, 3 times for each, in non-operation							
Isolation	Withstand Voltage			With case/ Input - output :DC1000V or AC500V 1 minute, Cutoff current = 100mA (20 ± 15℃) With case/ Input - case :DC500V or AC500V 1 minute, Cutoff current = 10mA (20 ± 15℃) With case/ Output - case :DC500V or AC500V 1 minute, Cutoff current = 10mA (20 ± 15℃) Caseless/ Input - output :DC1500V 1 minute (20 ± 15℃)							
	Isolation Resistance			With case/ Input - output, Input - case, Output - case ：DC500V 50M Ω min (20 ± 15℃) Caseless/ Input - output ：DC500V 50M Ω min (20 ± 15℃)							
Standards	Safety Standards			UL60950-1、CSA C22.2 No.60950-1(C-UL)、EN60950-1(NEMKO)							
Mechanical	Weight (typ)		g	With case : 12.5typ, Caseless : 8typ							
	Size (W × H × D)		mm	With case：DIP：38.4 × 6.8 × 29.6、SMD：39.9 × 6.8 × 29.6 Caseless：DIP：37.9 × 5.0 × 27.6、SMD：39.9 × 5.0 × 27.6							

Note: "x" in model names is to be replaced by a symbol which represents the terminal configuration (F : DIP / R :SMD) and with or without the metal case (P : with case /H : caseless) for actual model names.
Note: With nominal input/output voltage, maximum output current, and Ta=25℃ , if not specified separately.

(*1) With nominal input voltage, maximum output current, and Ta=25℃ .
(*2) In 100MHz、Ta=25℃

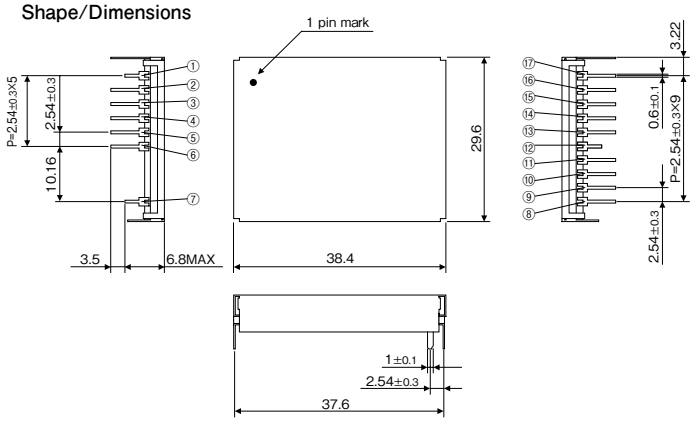
Derating Curve



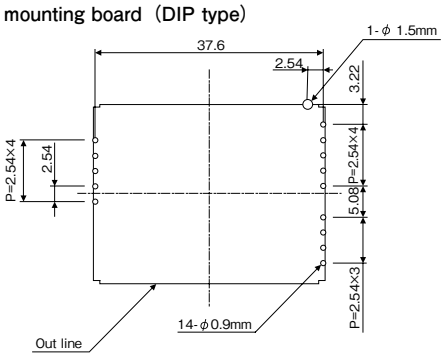
Outline Drawing

CC15-xxxxSFP-E (DIP type)

Shape/Dimensions

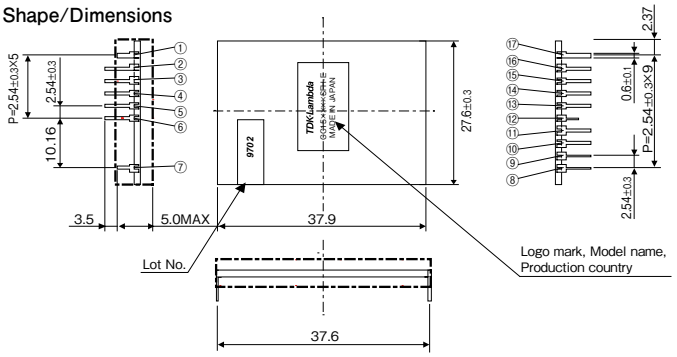


Recommended measurements for mounting board (DIP type)



CC15-xxxxSFH-E (DIP type)

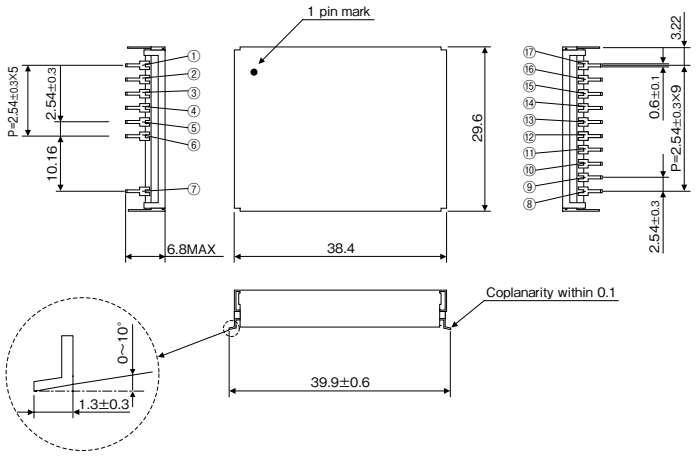
Shape/Dimensions



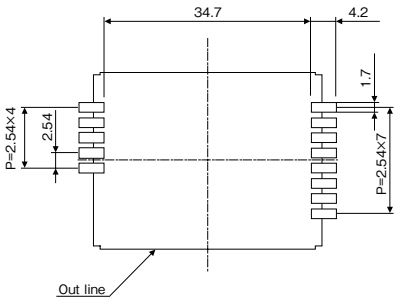
Unit: mm
Allowable tolerance is ±0.5 if not specified separately.
Terminal thickness : 0.3±0.1

CC15-xxxxSRP-E (SMD type)

Shape/Dimensions



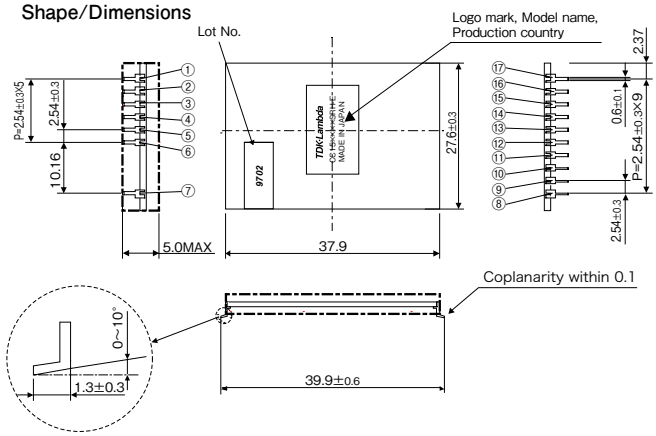
Recommended measurements for mounting board (SMD type)



Unit: mm
Allowable tolerance is ±0.5 if not specified separately.
Terminal thickness : 0.3±0.1

CC15-xxxxSRH-E (SMD type)

Shape/Dimensions



Terminal connections

Terminal pin No.	Pin name	Function
No.1	Stopper	Stopper
No.2	+Vout	+DC output
No.3	+Vout	+DC output
No.4	+Vout	+DC output
No.5	−Vout	−DC output
No.6	−Vout	−DC output
No.7	Stopper	Stopper
No.8	NC	Not connected
No.9	ALM	Alarm
No.10	RC	Remote control
No.11	PO	Start in / out
No.12	Stopper	Stopper
No.13	+Vin	+DC input
No.14	+Vin	+DC input
No.15	−Vin	−DC input
No.16	−Vin	−DC input
No.17	NC	Not connected

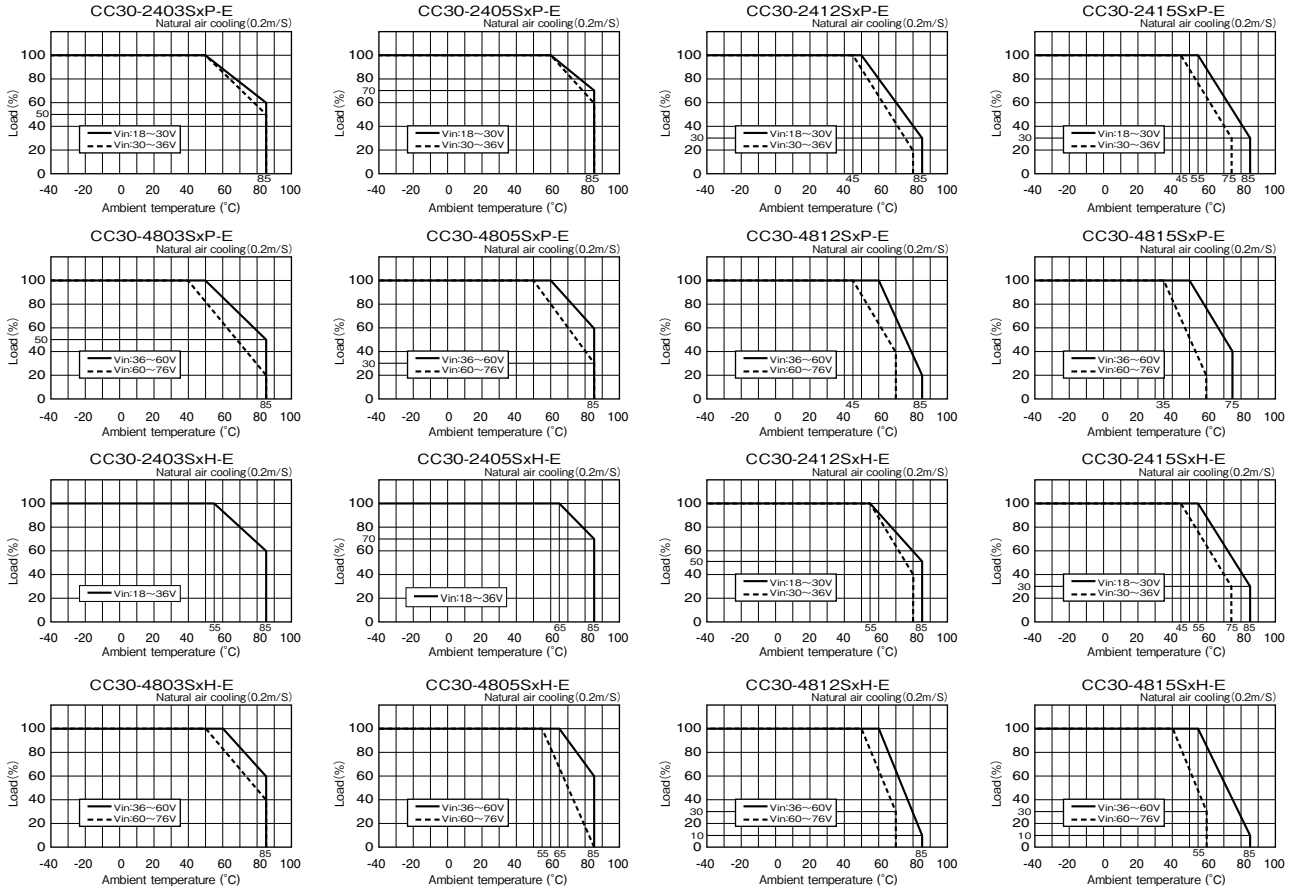
CC30-P-E Specifications (ご使用の前にご覧ください)

ITEMS/UNITS			MODEL	CC30-2403Sxx-E	CC30-2405Sxx-E	CC30-2412Sxx-E	CC30-2415Sxx-E	CC30-4803Sxx-E	CC30-4805Sxx-E	CC30-4812Sxx-E	CC30-4815Sxx-E
Input	Nominal Voltage		V	DC24.0				DC48.0			
	Voltage Range		V	DC18 - 36				DC36 - 76			
	Efficiency (typ)	(*1)	%	91.5	92			92.5			92
	Current (typ)	(*1)	A	1.36				0.67	0.68		
	Start-Up Voltage		V	DC16 - 18				DC32 - 36			
	Hysteresis Voltage		V	DC1min				DC2min			
Output	Nominal Voltage		VDC	3.3	5	12	15	3.3	5	12	15
	Maximum Current		A	9	6	2.5	2	9	6	2.5	2
	Output Voltage Setting	(*1)	%	± 1% of nominal output voltage							
	Max Power Total Regulation (max)		%	+5%, -3%							
	Maximum Ripple & Noise	(*2)	mVp-p	Vo:3.3V, 5V / 50 ,Vo:12V, 15V / 150							
	Start-Up Time		ms	20 - 100							
Function	Over Current Protection		A	Works over 103% of maximum current							
	Over Voltage Protection		VDC	Works at 115 - 145% of rating							
	Low Voltage Protection		VDC	Works at 90% max of rating							
	Remote ON/OFF Control			Possible (RC open:On, RC connected to +Vin:Off)							
Environment	Operating Temperature		℃	-40 - +85							
	Storage Temperature		℃	-40 - +85							
	Operating Humidity		% RH	5-95 (the conditions of maximum 38° C in wet bulb temperature and non-condensation should be ensured.)							
	Storage Humidity		% RH	5-95 (the conditions of maximum 38° C in wet bulb temperature and non-condensation should be ensured.)							
	Vibration			10-55Hz, 15 minutes sweep and 1.52mm total amplitude, 3 directions, 2h for each							
	Shock			980m/s² (100G), 6ms, 6 directions, 3 times for each, in non-operation							
Isolation	Withstand Voltage			With case/ Input - output ：DC1000V or AC500V 1 minute, Cutoff current = 100mA (20 ± 15℃) With case/ Input - case ：DC500V or AC500V 1 minute, Cutoff current = 10mA (20 ± 15℃) With case/ Output - case ：DC500V or AC500V 1 minute, Cutoff current = 10mA (20 ± 15℃) Caseless/ Input - output ：DC1500V 1 minute (20 ± 15℃)							
	Isolation Resistance			With case/ Input - output, Input - case, Output - case ：DC500V 50M Ω min (20 ± 15℃) Caseless/ Input - output ：DC500V 50M Ω min (20 ± 15℃)							
Standards	Safety Standards			UL60950-1、CSA C22.2 No.60950-1(C-UL)、EN60950-1(NEMKO)							
Mechanical	Weight (typ)		g	With case : 18typ, Caseless : 13.5typ							
	Size (W × H × D)		mm	With case：DIP：38.4 × 8.3 × 33.5、SMD：39.9 × 8.3 × 33.5 Caseless：DIP：37.9 × 6.5 × 31.6、SMD：39.9 × 6.5 × 31.6							

Note: "x" in model names is to be replaced by a symbol which represents the terminal configuration (F : DIP / R :SMD) and with or without the metal case (P : with case / H : caseless) for actual model names.
Note: With nominal input/output voltage, maximum output current, and Ta=25℃ , if not specified separately.

(*1) With nominal input voltage, maximum output current, and Ta=25℃ .
(*2) In 100MHz、Ta=25℃

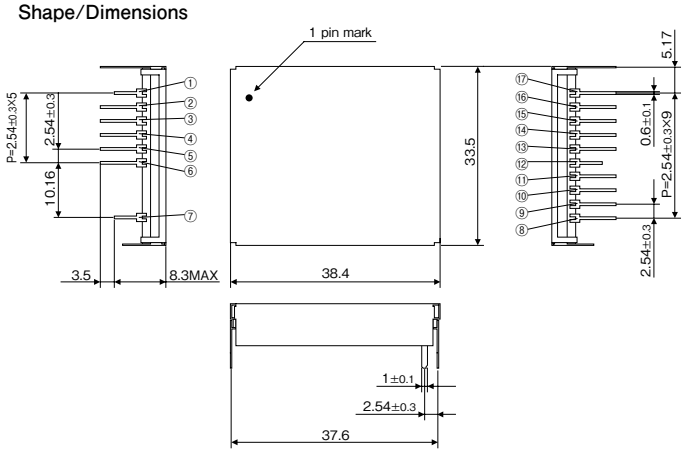
Derating Curve



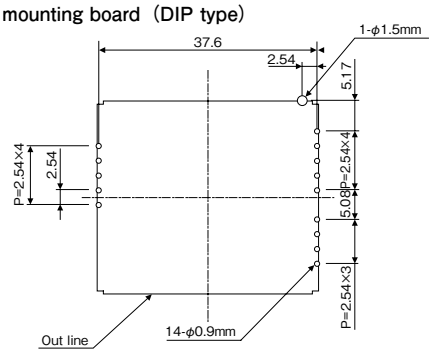
Outline Drawing

CC30-xxxxSFP-E (DIP type)

Shape/Dimensions

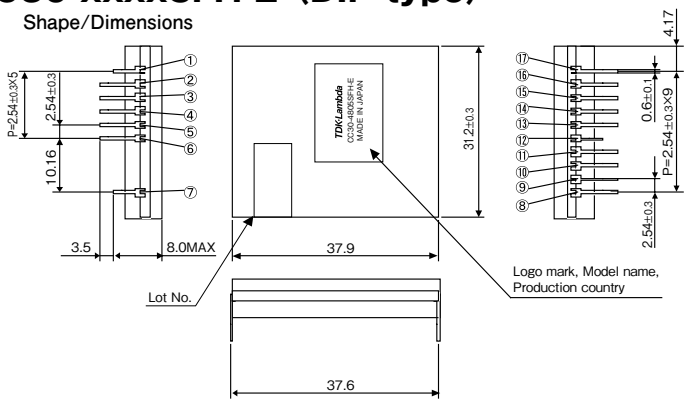


Recommended measurements for mounting board (DIP type)



CC30-xxxxSFH-E (DIP type)

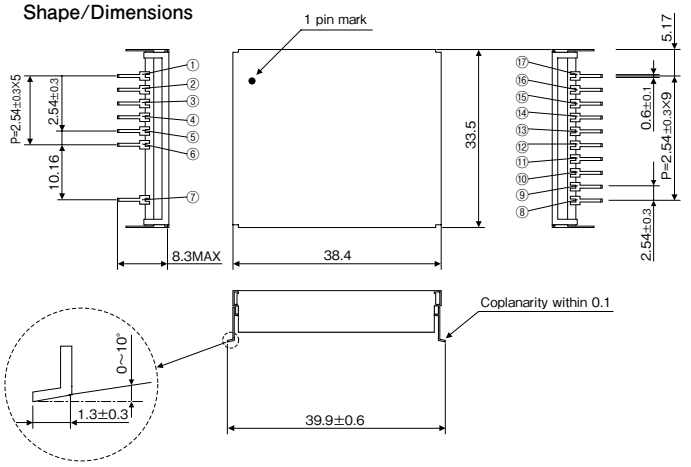
Shape/Dimensions



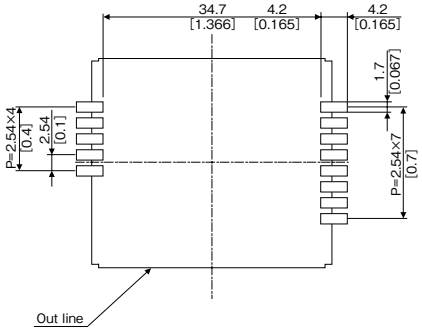
Unit: mm
Allowable tolerance is ±0.5 if not specified separately.
Terminal thickness : 0.3±0.1

CC30-xxxxSRP-E (SMD type)

Shape/Dimensions



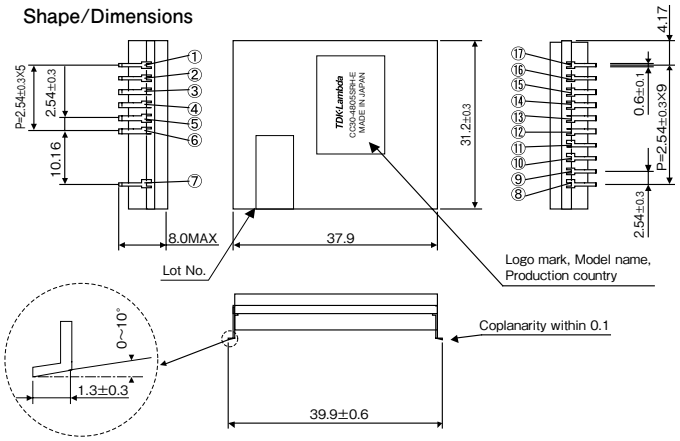
Recommended measurements for mounting board (SMD type)



Unit: mm
Allowable tolerance is ±0.5 if not specified separately.
Terminal thickness : 0.3±0.1

CC30-xxxxSRH-E (SMD type)

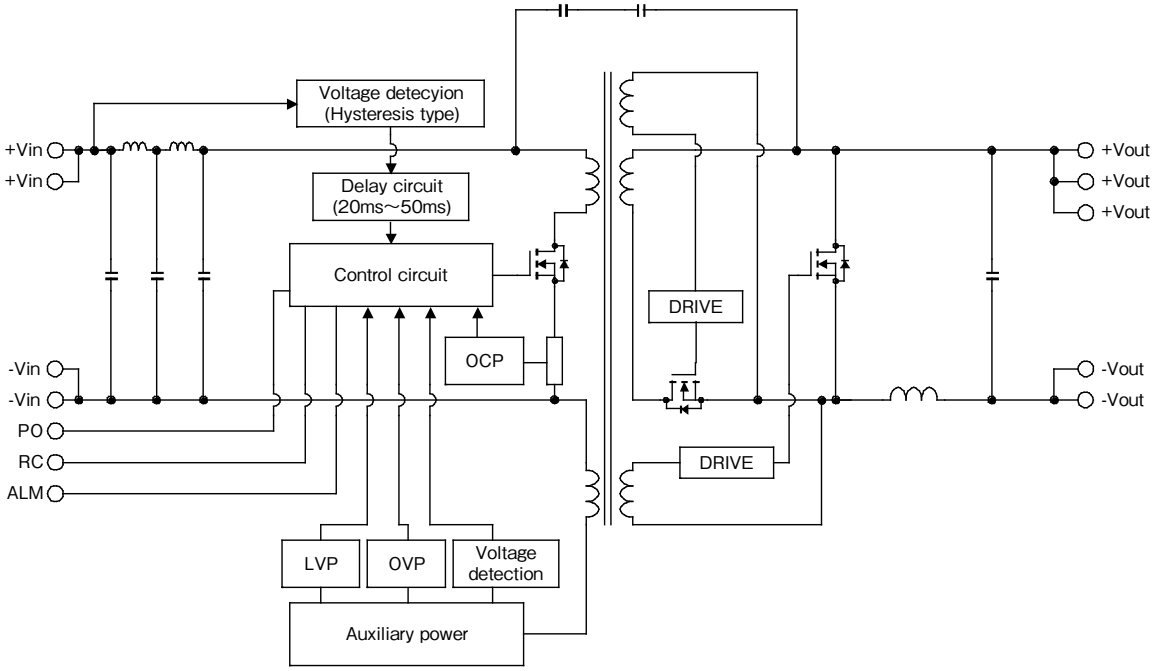
Shape/Dimensions



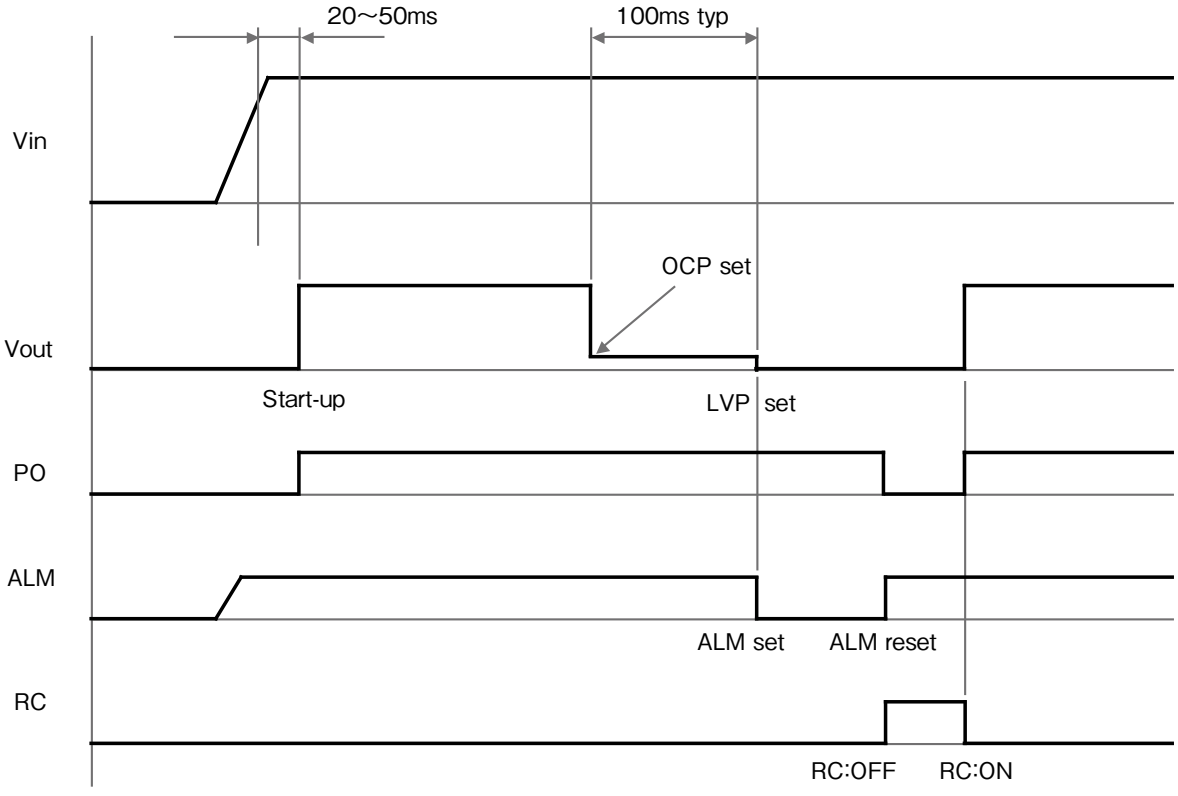
Terminal connections

Terminal pin No.	Pin name	Function
No.1	Stopper	Stopper
No.2	+Vout	+DC output
No.3	+Vout	+DC output
No.4	+Vout	+DC output
No.5	−Vout	−DC output
No.6	−Vout	−DC output
No.7	Stopper	Stopper
No.8	NC	Not connected
No.9	ALM	Alarm
No.10	RC	Remote control
No.11	PO	Start in / out
No.12	Stopper	Stopper
No.13	+Vin	+DC input
No.14	+Vin	+DC input
No.15	−Vin	−DC input
No.16	−Vin	−DC input
No.17	NC	Not connected

Block Diagram



Sequence Time Chart



CC-P-E Series Instruction Manual

1. Standard Connection Method

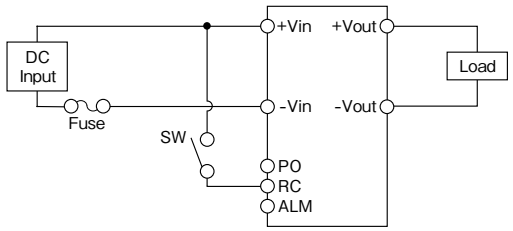


Fig.1 Connection Method

- When not using the Remote Control function, use it with either the RC terminal open or connected to the –Vin terminal.
- When not using the Alarm function, use it with the ALM terminal in an open condition.
- Use the PO terminal for controling multiple unit operation (series, parallel operation etc.). For single unit operation, use the PO terminal in an open condition.
- The converter is to be operated exclusively on DC input. Use of AC input will cause damage.

2. Input / Output Line Connection

1 Fuse

Because there is no built-in fuse, use an external fuse in accordance with Table 2-1.
In addition, when supplying input voltage from one DC power supply to multiple DC-DC converters,
attach a fast breaking fuse to the input of each converter upon use.

- Put the fuse on the +Vin side when the –Vin side is used for GND, and on the -Vin side when the +Vin side is used for GND.
- When a fuse breaks, the Alarm Signal does not operate.

Table 2-1 Recommended Fuse Capacity

Converter Type	CC15-24xxSxx-E	CC30-24xxSxx-E
Fuse Capacity	2A	4A
Converter Type	CC15-48xxSxx-E	CC30-48xxSxx-E
Fuse Capacity	1A	2A

2 Input Side External Capacitor

This converter is equipped with a capacitor on the input side and does not need an external capacitor to be attached to the input terminal side when the length of the line connection from the DC power source is short (less than 1 meter is estimated).
However, when the line to the input terminal is long, or when the inductance increases, operation may become unstable, therefore insert external capacitor Cin between the +Vin and –Vin terminals.

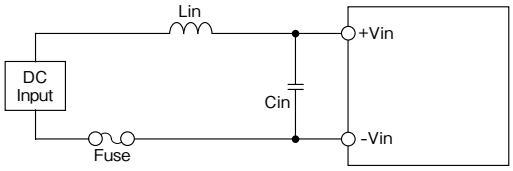


Fig.2-2-1 Cin is necessary when an inductance filter is inserted in the input line.

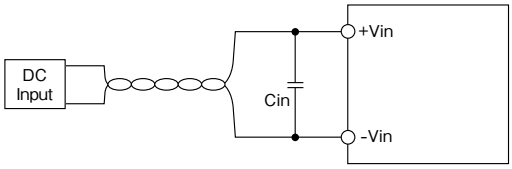


Fig.2-2-2 Cin is necessary when the input line is long.

Table 2-2 Recommended External Capacitor Cin Values

Converter Type	CC15-24xxSxx-E	CC30-24xxSxx-E
Recommended Cin Value	33uF	68uF
Converter Type	CC15-48xxSxx-E	CC30-48xxSxx-E
Recommended Cin Value	10uF	22uF

This converter has a built-in input filter circuit, in addition, by connecting an input filter as shown in Figure 2-2-3,input ripple noise voltage (conducted emission noise) can be decreased.

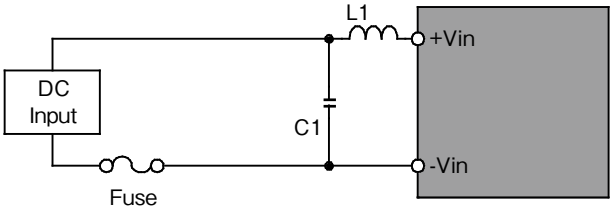


Fig. 2-2-3 Connection Diagram for Input Ripple Noise Reduction Filter

3 Prevention of Reverse Connection

This converter does not have a protection circuit to protect against an input voltage reverse polarity connection. Damage may occur if reverse polarity voltage is applied to the input terminal. When the possibility of the application of reverse polarity voltage exits, attach an external protection circuit as shown in Figure 2-3.

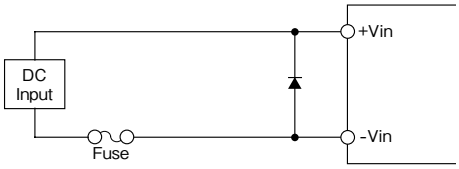


Fig.2-3 Reverse Connection Prevention Circui

4 Output Side External Capacitor

When connecting a pulse load to this converter, connect capacitor Cout between the +Vout and –Vout terminals.

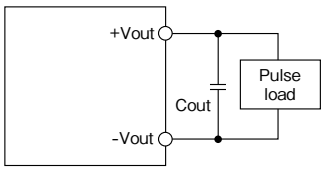


Fig.2-4 Output Side External Capacitor Connection Methoc

Table2-4 Recommended External Capacitor Cout Values

Converter Type	CCxx-xx03Sxx-E CCxx-xx05Sxx-E (3.3V, 5V Output)	CCxx-xx12Sxx-E CCxx-xx15Sxx-E (12V, 15V Output)
Recommended Cout Value	22 ~ 4700uF	22 ~ 2200uF

CC-P-E

5 Output Ripple Noise Voltage Measurement Method

When measuring the output ripple noise voltage of this converter, the value differs greatly, depending on the measurement method. Measurement is to be made close to the output terminal, do not make a loop when connecting the probe in order to avoid picking up magnetic flux. Also, note that the measured value will vary greatly as a result of the frequency band of the ripple voltmeter or oscilloscope used for measuring. The TDK ripple noise measurement is External capacitor Cout may influence the output ripple voltage by the ESR and ESL and inductance of the wiring. In particular, caution is required if low ESR ceramic capacitors, etc. are connected, resonance will occur between the capacitor and the wiring inductance and the ripple component may incrade according to the method shown in Figure 2-5.

External capacitor Cout may influence the output ripple voltage by the ESR and ESL and inductance of the wiring. In particular, caution is required if low ESR ceramic capacitors, etc. are connected, resonance will occur between the capacitor and the wiring inductance and the ripple component may increase.

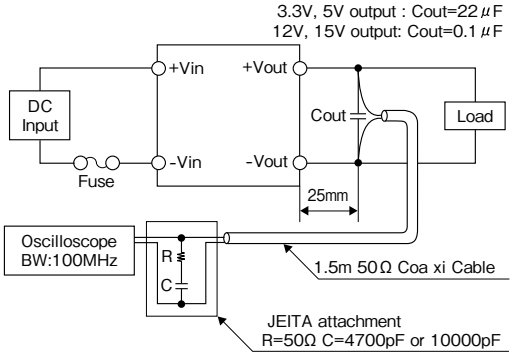


Fig.2-5 Ripple Noise Voltage Measurement Circuit

3. Terminal Function / Protection Function / Series Connection · Parallel Connection

1 Remote Control(RC Terminal)

When the input voltage is in an ON condition, the RC terminal can be used to control output ON/OFF.

When not using the Remote Control function, either open the RC terminal or connect it to the –Vin terminal.

We recommend connection to the –Vin terminal in order to prevent malfunction caused by noise.

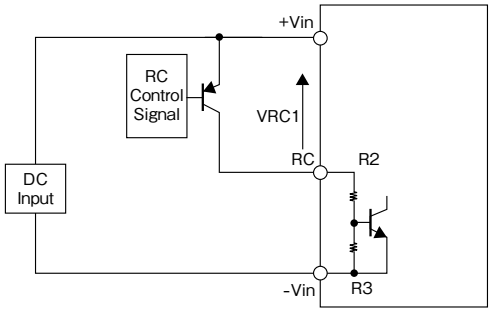


Fig.3-1-1 RC Terminal Connection Method 1

Table 3-1-1 RC Terminal Specifications 1

+Vin - RC Voltage (VRC1)	Output Condition
Open	ON
0≦VRC1≦1.2V or Short	OFF

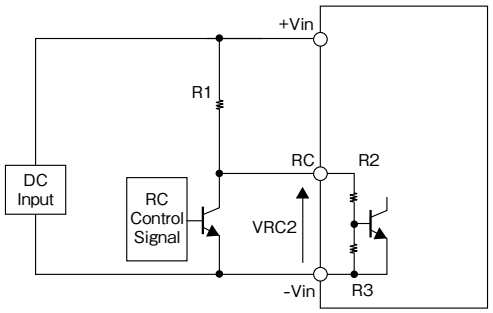


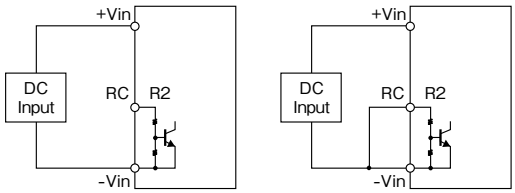
Fig.3-1-2 RC Terminal Connection Method 2

Converter Type	CCxx-24xxSxx-E	CCxx-48xxSxx-E
R1 Recommended Value	22kΩ	220kΩ
R2 (Typical)	91kΩ	194kΩ
R3 (Typical)	15kΩ	47kΩ

Table 3-1-2 RC Terminal Specifications 2

RC - Vin Voltage (VRC2)	Output Condition
0≦VRC2≦1.2V or Short	ON
10V≦ VRC2 or Open	OFF

When a connection method as shown in Fig. 3-1-1 is used, and if capacitance exists between the +Vin and RC terminals, there is the possibility of the RC terminal voltage becoming unstable because of the capacitance in the case when the input voltage is changed suddenly (it becomes a factor causing malfunction).



RC terminal Open RC - -Vin Short

In that case, we recommend the connection method shown in Fig. 3-1-1. In addition, the rating of the external transistor used is as follows: Vce: greater than the Vin, Ic: minimum 10mA.

2 Over-Current Protection(OCP) & Low-Voltage Protection(LVP)

These converters are equipped with built-in over-current protection and low-voltage protection circuits.
When the output current exceeds the over-current setting point the over-current protection circuit operates and the output voltage begins to fall. When the output voltage falls below 90% of the rated voltage, the low-voltage protection circuit operates and shuts down the output.
There is a time lag of approx. 100 ms from the time the LVP circuit detects an abnormality until the output is shut down.
When the output shuts down, the alarm signal operates.
When the output shuts down and operation stops, after the cause of the over-current or low-voltage is removed, recovery can be achieved either by restarting the input power source or by using the remote control function.

3 Over-Voltage Protection

These converters are equipped with a built-in over-voltage protection circuit.
When the output voltage becomes 115%-145% of the rated voltage, the over-voltage protection circuit operates.
When the output current is less than 50% of the rated current, depending on the failure mode, operation at voltage exceeding the upper limit may occur.
When the output shuts down, the alarm signal operates.
When the output shuts down and operation stops, after the cause of the over-current or low-voltage is removed, recovery can be achieved either by restarting the input power source or by using the remote control function.

4 Alarm(ALM Terminal)

By means of the ALM terminal the presence / absence of an abnormal state can be monitored.
When not using the alarm output function, set the ALM terminal in the open condition.

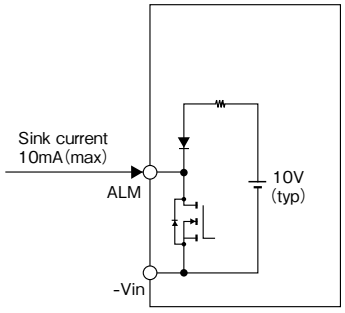


Fig.3-4 Alarm Terminal Internal Circuit

- When the output turns OFF as a result of over-current protection, low-voltage protection, over-voltage protection, the Alarm Signal will operate. At that time, the ALM terminal voltage is L level (the –Vin terminal is 0.3V or less).
- When multiple units are operated in series or in parallel, etc., and the ALM terminals are connected together, when an abnormality occurs and the alarm signal operates in 1 unit, the other connected units can be stopped.
- Converters having different output voltages can be connected. (This applies only to converters belonging to this series).
- Use the ALM terminal at a maximum sink current of 10mA.
- The maximum number of units to which the ALM terminal can be connected is 20 units.

5 Simultaneous Start-Up / Stop (PO Terminal)

By means of the PO terminal, the start-up / stop timing of multiple converter units can be synchronized.
To do so, connect the PO terminals to each other.
When not using the simultaneous start-up / stop function, set the PO terminal in the open position.

- Converters having different output voltages can be connected. (This applies only to converters belonging to this series).
- The maximum number of units to which the PO terminal can be connected is 20 units.

6 Series Operation

For this converter series, it is possible to operate models of the same type in series.
The maximum number of converters which can be operated in series is 2.
When using series operation, connect the +Vin terminal, -Vin terminal, PO terminal and ALM terminal of each converter to the same terminal of the other.

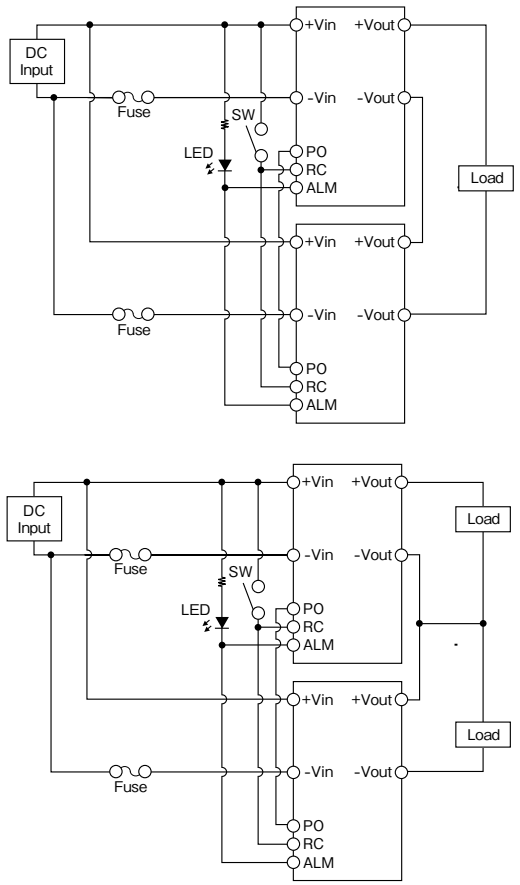


Fig.3-6 Example Series Operation Connection

7 Parallel Operation

For this converter series, it is possible to operate models of the same type in parallel.

- The maximum number of converters which can be operated in parallel is 10.
- When using parallel operation, connect the PO terminal and ALM terminal of each converter to the same terminal of the other.
- As much as possible, insure that the width, length and material of the wiring used for connecting each converter to the load are identical. There is the possibility that the current balance will collapse if there is a difference in the wiring from each respective converter to the load.

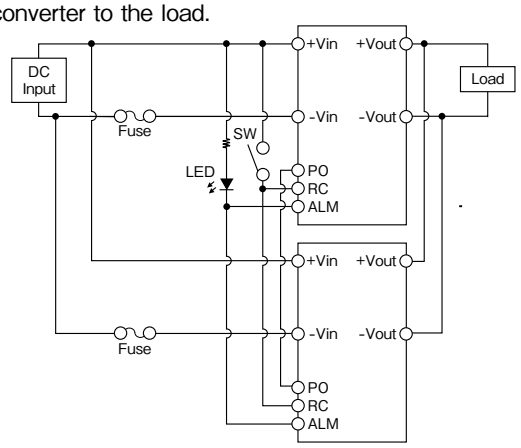


Fig.3-7 Example Parallel Operation Connection

4. Soldering conditions / Cleaning conditions / Installation Method

1 Soldering conditions

【DIP models】

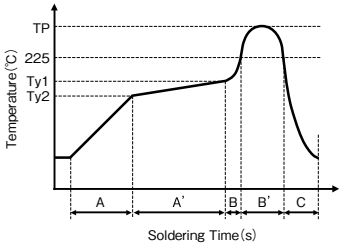
Perform soldering of the converter to the board according to the conditions shown in Table 4-1.

Table 4-1 Solder Conditions for DIP Models

Method	Condition
Solder dip	260℃, 10s max., 1 time
Soldering copper	380℃, 3s max., 1 time/PIN

【SMD models】

Lead free solder / high temperature reflow process conditions are shown in Fig.4-1.



A	1.0-3.0℃/s
A'	Ty1 : 150±10℃ Ty2 : 170±10℃ Ty1-Ty2 : 20-100s
B	1.0-4.0℃/s
B'	TP : 245℃ max. 225℃≦ : 20-40s
C	-1.0-5.0℃/s

Fig.4-1 Reflow Process Conditions for SMD Models

The reflow must be 1 time only.

2 Cleaning method

Board cleaning after soldering is not recommended. However,the cleaning fluids and conditions shown in the table below have been tested and proved to have no problem.These fluids and conditions can be used. Consult us for using cleaning fluids other than those shown below.

Cleaning fluids and test conditions

Isopropyl alcohol

(1) Ultrasonic waves at 60℃ for 1 minute

(2) Cool bath cleaning R.T. for 1 minute

(3) Vapor cleaning at 83℃ for 1 minute

3 Installation Method

When installing the converter on the board, avoid having trace pattern, etc. in the slanted line area shown in Figure 4-2 because

there is the possibility of an insulation defect occurring.

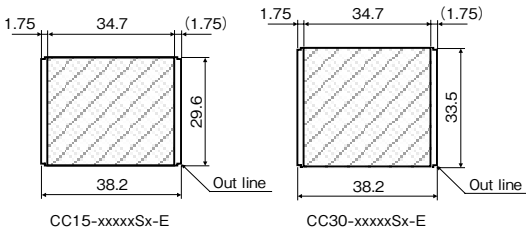


Fig.4-2 Trace Pattern Prohibited Area

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