

MESSRS :

PRODUCT SPECIFICATIONS

CUSTOMER'S PRODUCT NAME :

TDK PRODUCT NAME DC-DC CONVERTER UNIT
: CC3-xxxxxS-E Series (SIP model)

TDK-Lambda

TDK Corporation
Power Systems Business Group

DWG.No.	TRSA-0294-2
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Revised 2006/12/01

**The specifications may be changed without prior notice.
 When placing orders,
 please confirm the product specifications through TDK sales or the distributors.**

Part Name

The part name is the CC3-xxxxS-E Series.
 (SIP model)

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SAFETY INSTRUCTIONS

Please be sure to read these instructions for safe design when using the product.
Improper use may pose the danger of smoke or fire.



CAUTION Notes

Storage

- Store the converter unit in the manner specified in the purchase specifications or catalog.
- Do not store the converter unit in a corrosive gas or corrosive dust environment.
- Do not store the converter unit in a strong electrical or magnetic field. It will cause damage.

Environment & Conditions of Use

- Do not operate the converter unit in a corrosive gas or corrosive dust environment.
- Operate the converter unit in the environment and under the conditions specified in the purchase specifications or catalog.
- Operate the input and output voltage, output current, etc. within the rated electrical specifications.
- This converter has no built-in over voltage protection.
- A continuous over current condition may damage the converter.
- This DC to DC converter has a built-in input fuse, over current of any kind will cause the input to open.
- Be sure to insulate the metal case bottom from surrounding components and trace pattern.
- Do not operate the converter unit in a strong electrical or magnetic field.
- If there is the possibility of surge voltages occurring, take surge voltage prevention countermeasures.
- The metal case of this DC to DC converter is insulated from internal components. However, if high voltage parts contact the metal case, it may damage the internal components.
- Do not change or modify the product , TDK will not be responsible for any damage due to modification.
- Do not remove or disassemble the case.
- The converter unit is not designed to be resistant to radiation. Do not use it in nuclear power controls medical equipment, etc.
- Give due design consideration for safeguarding against personal injury, fire and other accidents.
- The converter unit must be wired according to the measurement circuits given in the purchase specifications or catalog. Consult TDK concerning any other connection schemes in order to avoid possible damage. These converter units cannot be connected in parallel (Fig.1).
- These converters may be connected in series, to ensure reliable operation, TDK recommends the connection shown in Figure 2. The output current must not exceed the rated current of the smaller converter unit.
- Consult us when using this product in vehicles or in an environment where vibration is regularly applied.

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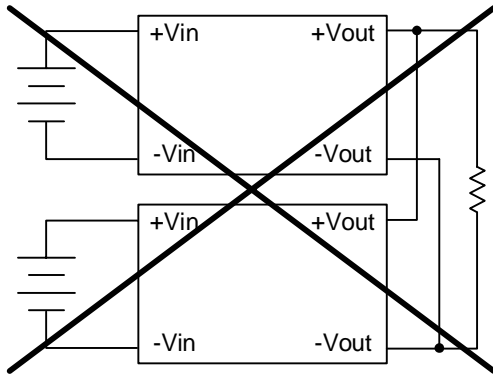


Fig.1 Parallel Connection

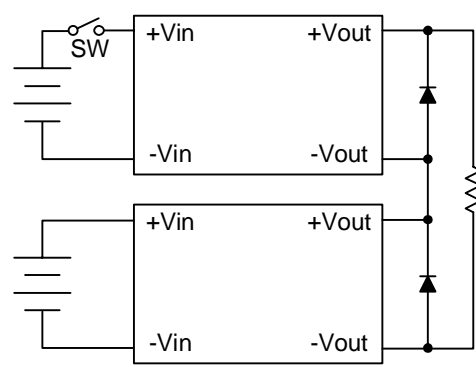


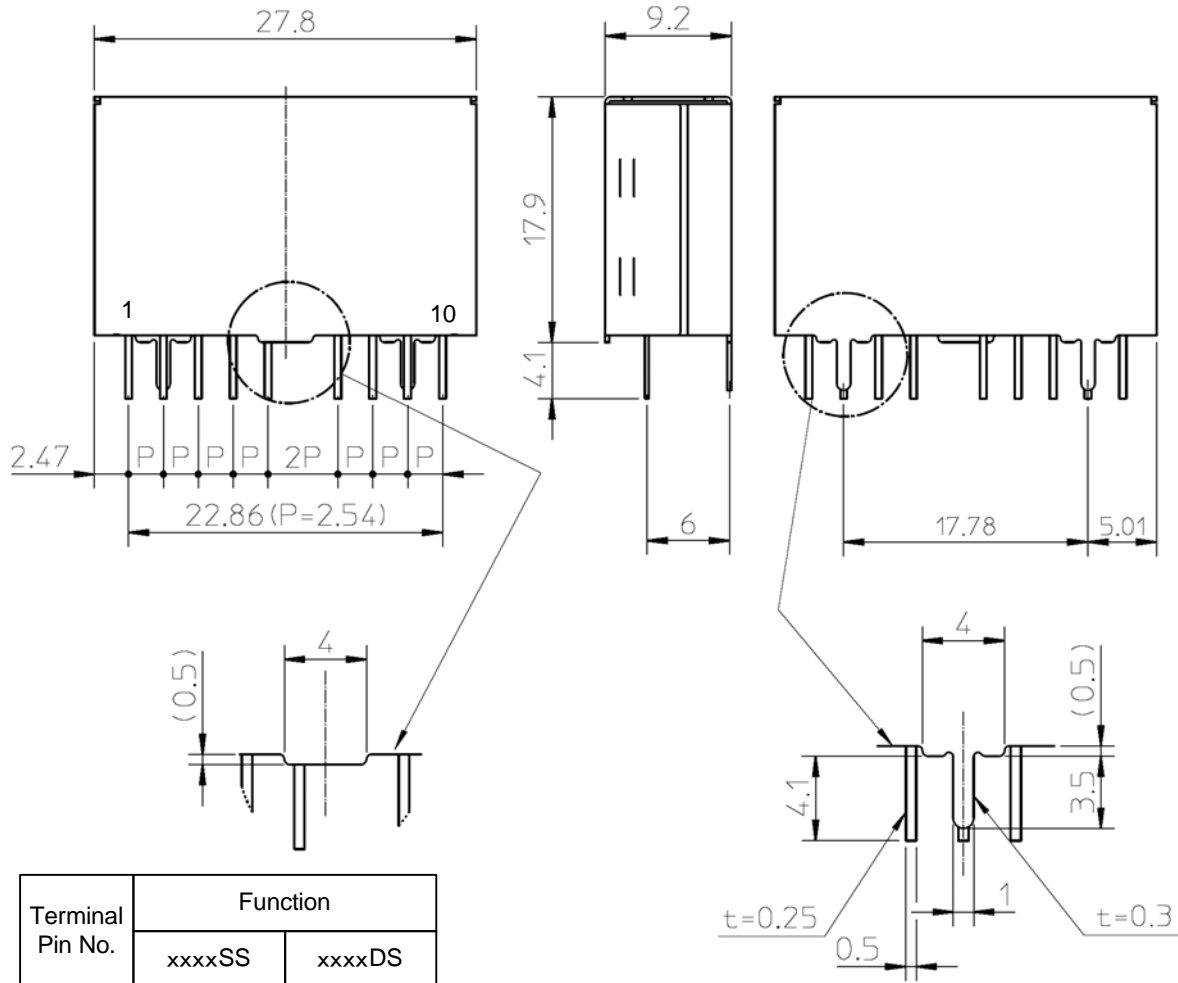
Fig.2 Connection to Ensure Reliable Series Operation

Other

- The converters in this document have limited 5 years warranty for defect in workmanship and components. The warranty is voided if the unit malfunction or damaged due to negligence and any of following reason but not limited to
 - * Unauthorized modification or improper application
 - * Mishandling such as improper transportation after product has been delivered to customer
 - * Damage caused by natural disasters such as earthquake, fire, flood, wind
- It is not recommended for the converters to be stored for extended period (over one year) in high temperature, humidity or sudden temperature fluctuation environment as solder connections may be deteriorated.
- It is not recommended to apply strong shock to the converter unit as it may be damaged.

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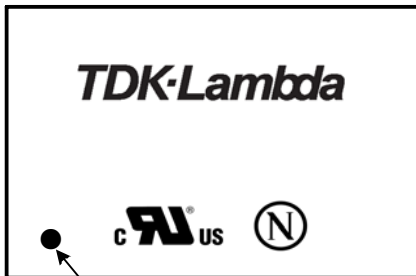
[1] Mechanical Spec.



Terminal Pin No.	Function	
	xxxxSS	xxxxDS
1	+Vout	+Vout
2, 3	NC	COM
4	-Vout	-Vout
5	TRM	TRM
7, 8	-Vin	-Vin
9, 10	+Vin	+Vin

Tolerance : ±0.5
Dimensions in mm

Weight : 7.0g(Typ)



First terminal mark

Marking: Followings are marked on the conveter case
Company trademark, model number, country of origin,
production lot number, first terminal mark, and safety agencies(UL and Nemko mark)

Lot number details : September 1,2006 = 6901

6 9 0 1

Day

Month: month

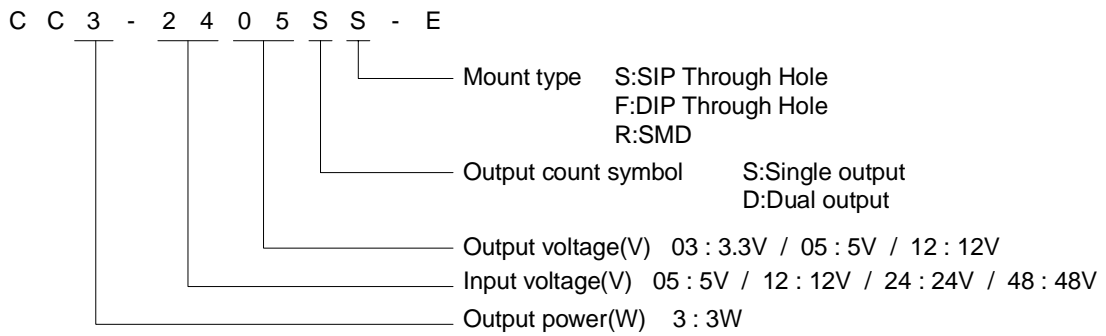
(Jan: 1~ Sep: 9, Oct: X, Nov: Y, Dec: Z)

Year : final digit of year

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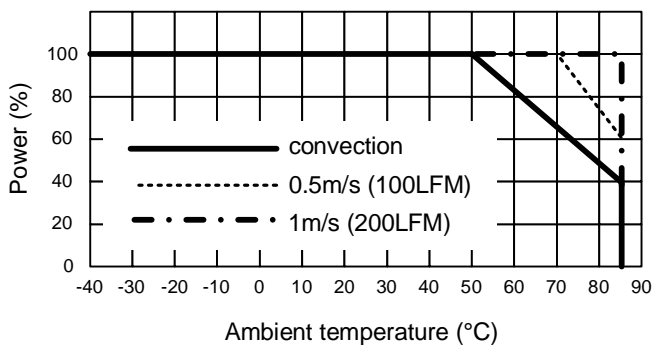
[2] Composition of product name



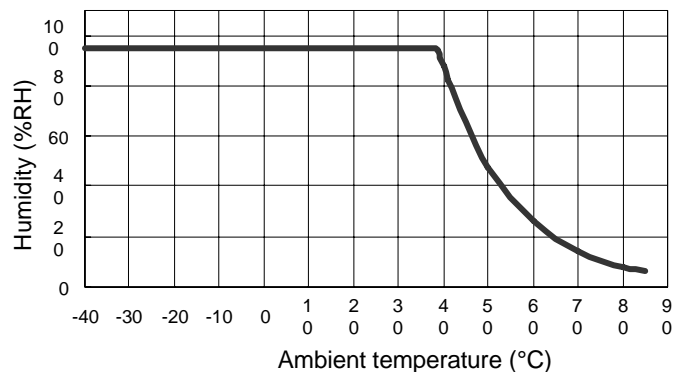
[3] Absolute Maximum Ratings

Item	Symbol	Specification	Notes
Input Voltage	Vin	See Table 1	
Output Current	Iout	See Table 1	
Operating Temperature	Topr	-40°C~85°C	At 50°C or above, refer to the power derating curve.
Storage Temperature	Tstg	-40°C~85°C	
Storage Humidity	Hstg	95%R.H.	Maximum Wet Bulb Temperature: 38°C refer to the humidity derating curve.

Power derating curve



Humidity derating curve



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Table 1

Item	Output Voltage(V)	Absolute Maximum Ratings		
		Input Voltage(V)	Output Current(A)	Output Power(W)
CC3-0503SS-E	3.3	9	0.8	2.64
CC3-0505SS-E	5		0.6	3.0
CC3-0512SS-E	12		0.25	
	15		0.2	
CC3-0512DS-E	±12		0.125	
	±15		0.1	
CC3-1203SS-E	3.3	18	0.8	2.64
CC3-1205SS-E	5		0.6	3.0
CC3-1212SS-E	12		0.25	
	15		0.2	
CC3-1212DS-E	±12		0.125	
	±15		0.1	
CC3-2403SS-E	3.3	36	0.8	2.64
CC3-2405SS-E	5		0.6	3.0
CC3-2412SS-E	12		0.25	
	15		0.2	
CC3-2412DS-E	±12		0.125	
	±15		0.1	
CC3-4803SS-E	3.3	76	0.8	2.64
CC3-4805SS-E	5		0.6	3.0
CC3-4812SS-E	12		0.25	
	15		0.2	
CC3-4812DS-E	±12		0.125	
	±15		0.1	

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[4] Electrical Characteristics

Item	Input Voltage (V)	Output Voltage (V) ^{*1}		Output Current (A)	Output Voltage Stability ^{*2}			Output Noise Voltage (mVp-p) max. ^{*3}	Eff (%) typ. ^{*4}	Input to Output Iso-lation
					Line (mV) max.	Load (mV) max.	Temp. (mV) max.			
CC3-0503SS-E	4.5~9	3.3	±3%	0.8	20	40	80	120	73	Input to Output Voltage 500VAC 1min. DC Resistance 500VDC 50MΩmin.
CC3-0505SS-E	4.5~9	5.0	±3%	0.6	20	40	80	120	77	
CC3-0512SS-E	4.5~9	12	±3%	0.25	40	100	200	120	82	
	4.5~9	15 ^{*6}	±3%	0.2	40	100	200	120	82	
CC3-0512DS-E ^{*5}	4.5~9	±12	±5%	0.125	80	600	300	120	81	
	4.5~9	±15 ^{*6}	±5%	0.1	80	600	300	120	81	
CC3-1203SS-E	9~18	3.3	±3%	0.8	20	40	80	120	73	
CC3-1205SS-E	9~18	5.0	±3%	0.6	20	40	80	120	79	
CC3-1212SS-E	9~18	12	±3%	0.25	40	100	200	120	82	
	9~18	15 ^{*6}	±3%	0.2	40	100	200	120	82	
CC3-1212DS-E ^{*5}	9~18	±12	±5%	0.125	80	600	300	120	82	
	9~18	±15 ^{*6}	±5%	0.1	80	600	300	120	82	
CC3-2403SS-E	18~36	3.3	±3%	0.8	20	40	80	120	73	
CC3-2405SS-E	18~36	5.0	±3%	0.6	20	40	80	120	78	
CC3-2412SS-E	18~36	12	±3%	0.25	40	100	200	120	82	
	18~36	15 ^{*6}	±3%	0.2	40	100	200	120	82	
CC3-2412DS-E ^{*5}	18~36	±12	±5%	0.125	80	600	300	120	81	
	18~36	±15 ^{*6}	±5%	0.1	80	600	300	120	81	
CC3-4803SS-E	36~76	3.3	±3%	0.8	20	40	80	120	73	
CC3-4805SS-E	36~76	5.0	±3%	0.6	20	40	80	120	79	
CC3-4812SS-E	36~76	12	±3%	0.25	40	100	200	120	82	
	36~76	15 ^{*6}	±3%	0.2	40	100	200	120	82	
CC3-4812DS-E ^{*5}	36~76	±12	±5%	0.125	80	600	300	120	82	
	36~76	±15 ^{*6}	±5%	0.1	80	600	300	120	82	

^{*1} Total output voltage range.

^{*2} Input Voltage : Vin = min.~ max., Iout = max., Topr = 25°C

Output Current : Vin = typ., Iout = 0~ max., Topr = 25°C

Products with Two Outputs: at Balanced Load (the +output and -output load currents are in equal condition)

Temperature : Vin = typ., Iout = max., Topr = -40 ~ +50°C

^{*3} Measured with a 50MHz bandwidth oscilloscope

^{*4} Vin = typ. Iout = max.

^{*5} Dual outputs units can be used as a single output units with output voltage range of 24~30V when output return (COM) is not used.

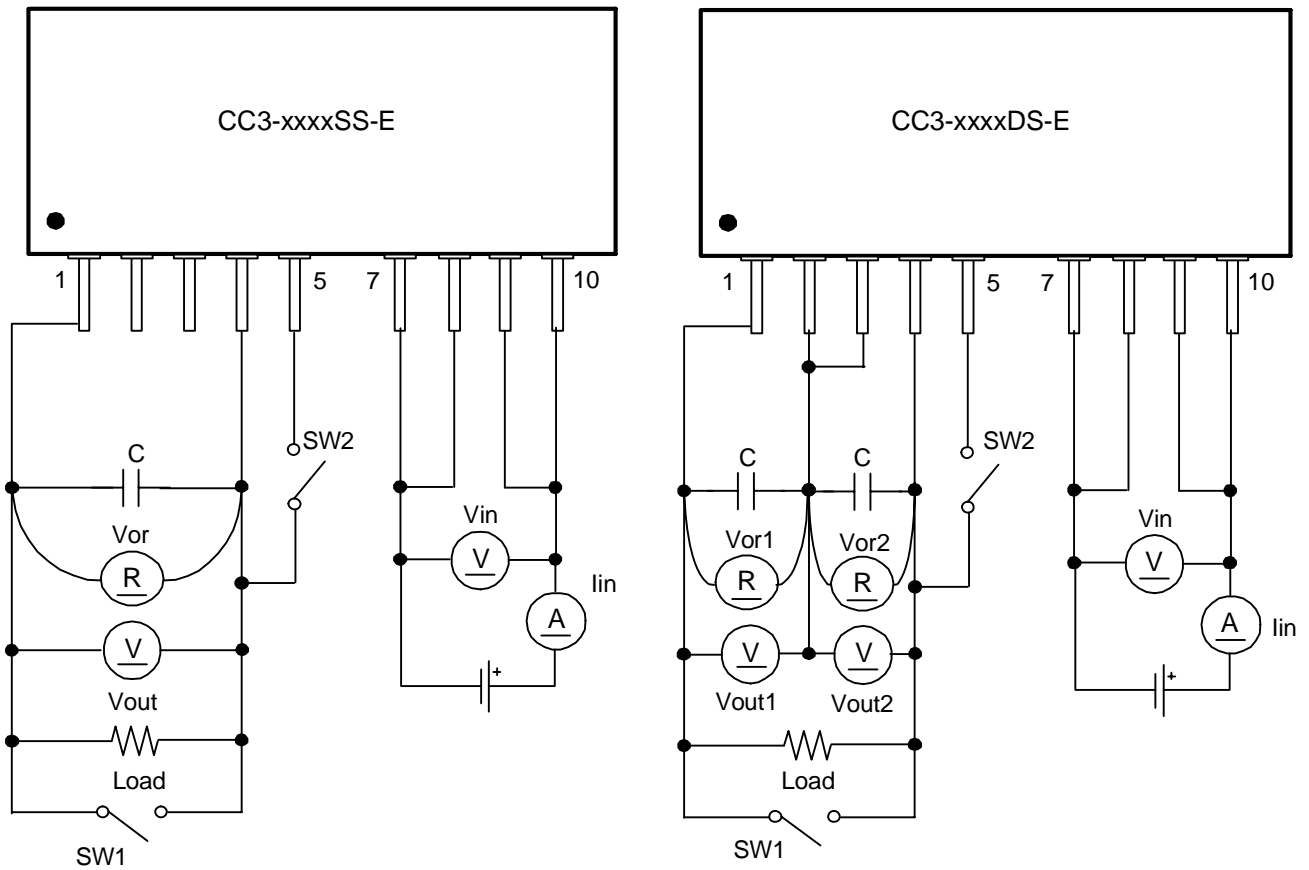
^{*6} When using the 15V output, short the Vout and TRM terminals.

^{*7} The output voltage can be varied as follows:

3.3V: 3.15~3.67V 5V: 4.75~6V 12V: 11.4~15V ±12V: ±11.4~±15V (22.8~30V)

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[5] Test circuit



Test Instruments

- Ⓧ : 0.5 Class DC current ammeter 2012 (YEW) or equivalent
- ⓐ : Digital voltmeter HP3455A (HP) or equivalent
- Ⓡ : Ripple voltmeter RM-100 (Keisoku Giken, BW 50MHz) or equivalent
- C : Multi-layer ceramic capacitor 0.1 μ F

- SW1 : Switch for load short-circuit
- SW2 : Switch for maximum output voltage setting

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[6] Reliability

Item	Test Conditions	criteria
High Temperature	Temperature : 50 ⁺⁵ ₋₀ °C Time : 1000hours Operation : Vin = Typical Load = Maximum	No abnormality in electrical characteristics or external appearance, either before or after, the test.
Heat Shock	Low Temperature : -40 ⁺⁰ ₋₃ °C High Temperature : +85 ⁺³ ₋₀ °C 100cycles	
humidity	Temperature : 60 ⁺⁵ ₋₀ °C Humidity : 90~95%R.H Time : 1000hours Operation : Vin = Rated Input, Load = Minimum	
Vibration	Frequency : 10~55Hz Sweep Time : 15minutes Amplitude : 1.52mmp-p Vibration Time : 2 hours each in X,Y and Z directions	
Shock	Peak Acceleration : 100G Duration of the pulse : 6msec Number of test : 3 times in each axis for total of 18 times	
High Temperature Storage	Temperature : 85°C Time : 1000hours	
Solderability	Temperature : 245±5°C Time : 5±1s	
Lead Strength	Tensile Strength : 5N 10±1s Torsion Strength : 2.5N	There must be no breakage or loosening.
Low Temperature Start	Temperature : -40±3°C Time : 72hours	Normal start.

[7] Soldering Condition

Dip soldering : 260°C 10sec. max.
Hand soldering : 380°C 3sec. max.
(soldering iron)

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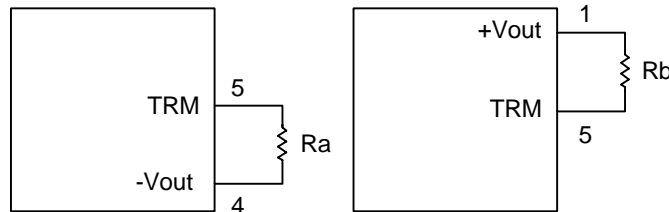
[8] Functions

8-1. Output Voltage Adjustment (TRM terminal)

It is possible to adjust the output voltage as shown below by connecting the TRM terminal to the -Vout terminal. When you don't want to adjust the output voltage, open the TRM terminal.

Product	Open	Short to -Vout terminal
CC3-xx03SS-E	3.3V	3.67V
CC3-xx05SS-E	5.0V	6.0V
CC3-xx12SS-E	12.0V	15.0V
CC3-xx12DS-E	±12.0V	±15.0V

It is possible to adjust the output voltage by connecting a resistor between the TRM terminal and the -Vout terminal or the +Vout terminal as shown below.



Product	Connecting Ra to -Vout terminal	Connecting Rb to +Vout terminal
CC3-xx03SS-E	3.3 ~ 3.67V (*1)	3.15 ~ 3.3V (*5)
CC3-xx05SS-E	5.0 ~ 6.0V (*2)	4.75 ~ 5V (*6)
CC3-xx12SS-E	12 ~ 15V (*3)	11.4 ~ 12V (*7)
CC3-xx12DS-E	±12 ~ ±15V (*4)	±11.4 ~ ±12V (*8)

(*1) $V_{out} = 3.3 + 1.04 / (2.83 + R_a)$ (V) , $R_a = 1.04 / (V_{out} - 3.3) - 2.83$ (kΩ)

(*2) $V_{out} = 5 + 12.75 / (12.69 + R_a)$ (V) , $R_a = 12.75 / (V_{out} - 5) - 12.69$ (kΩ)

(*3) $V_{out} = 12 + 48.4 / (16.18 + R_a)$ (V) , $R_a = 48.4 / (V_{out} - 12) - 16.18$ (kΩ)

(*4) $V_{out} = 12 + 54.7 / (18 + R_a)$ (V) , $R_a = 54.7 / (V_{out} - 12) - 18$ (kΩ)

(*5) $V_{out} = 3.3 - 1.69 / (3.66 + R_b)$ (V) , $R_b = 1.69 / (3.3 - V_{out}) - 3.66$ (kΩ) $R_b \geq 7.6$ (kΩ)

(*6) $V_{out} = 5 - 12.78 / (17.79 + R_b)$ (V) , $R_b = 12.78 / (5 - V_{out}) - 17.79$ (kΩ) $R_b \geq 33.3$ (kΩ)

(*7) $V_{out} = 12 - 184.1 / (35.54 + R_b)$ (V) , $R_b = 184.1 / (12 - V_{out}) - 35.54$ (kΩ) $R_b \geq 271.3$ (kΩ)

(*8) $V_{out} = 12 - 470.3 / (61.75 + R_b)$ (V) , $R_b = 470.3 / (12 - V_{out}) - 61.75$ (kΩ) $R_b \geq 722.1$ (kΩ)

Caution: Do not use the converter over its rated output power; care must be taken when output voltage is adjusted up as it could significantly affect output power.

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8-2. Output Over Current Protection (OCP)

OCP is activated when output Over Current(OC) is detected(105 to 250% of nominal output current).
Converter is auto recovery if OC condition is removed.

However, manual recovery is necessary if OC condition continues for more than 30 sec.

If auto recovery is not activated for some reason, please shut off the converter and restart the converter.

If you require the converter to be latched up during over current condition, please consult your TDK representative for recommendation of adding an external circuitry to RC terminal.

8-3. Output Over Voltage Protection

This converter does not have the function of output over voltage protection.

Consult your TDK representative for recommendation of adding external circuitry to RC terminal.

8-4. Output Under Voltage Protection

This converter does not have the function of output under voltage protection.

Consult your TDK representative for recommendation of adding external circuitry to RC terminal.

8-5. Under Voltage Lock Out

Please refer to below table for under voltage lock out voltage range. The converter cease operation when input voltage falls below the setting voltage.

Product	UVLO Setting Range
CC3-05xxxS-E	3.3 ~ 4.5V
CC3-12xxxS-E	6.0 ~ 9.0V
CC3-24xxxS-E	13.0 ~ 18.0V
CC3-48xxxS-E	27.0 ~ 36.0V

8-6. Input Circuit Protection

The converters are equipped with input fuse. Fuses rating and capacity are shown in below table.

Product	Rated Current	Fusing Current
CC3-05xxxS-E	2.5A	5A or more
CC3-12xxxS-E	1.25A	2.5A or more
CC3-24xxxS-E	0.75A	1.5A or more
CC3-48xxxS-E	0.75A	1.5A or more

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[9] Packaging and Marking

Components are packaged to prevent damage from humidity and handling. The following items shall be marked.

1. Manufacturer's part number CC3-xxxxS-E (Ex: CC3-2405SS-E)
2. Name of manufacturer TDK

[10] Environment

This product complies with Restriction of Hazardous Substances (RoHS) directive that refers to the regulation of harmful substances by the European Union (EU) effective July 1, 2006. The Directive bans the use of six specific harmful substances in electric and electronic devices and products handled within the EU. The six substances are lead, mercury, cadmium, hexavalent chromium, PBB (polybrominated biphenyls), and PBDE (polybrominated diphenylethers).

Halogen free material is used in the printed circuit board.

[11] Test Condition

Unless specified otherwise, the following specification applies:

Ambient Temperature: 20±15°C
 Relative Humidity: 65±20%

[12] Other Precautions

- The converters do not need any external output capacitor. However, if there is a desire to further decrease noise or if the pattern layout is too long, connect a capacitor within the range shown in the table below.

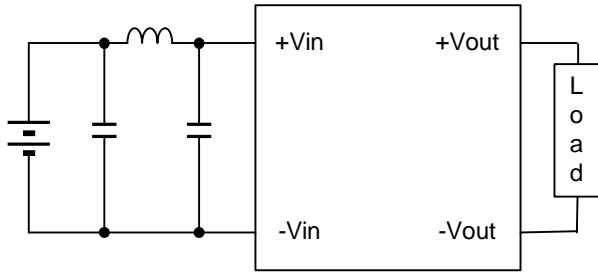
Product	Output Capacitor Range
CC3-xx03SS-E	220uF max.
CC3-xx05SS-E	
CC3-xx12SS-E	
CC3-xx12DS-E	

- We recommend that the substrate not be washed after soldering. However, depending on the conditions, it is possible in some situations, therefore consult us concerning this.
- This product is certified to the following safety standards :
 UL60950-1, CUL(CSA 60950-1), EN60950-1 (NEMKO)

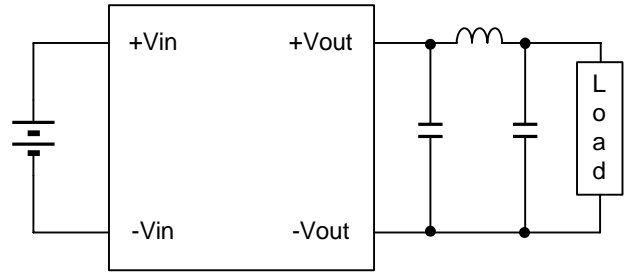
However, five following models are applying.
 CC3-1203SS-E , CC3-1212SS-E , CC3-2403SS-E , CC3-2412SS-E , CC3-4812SS-E

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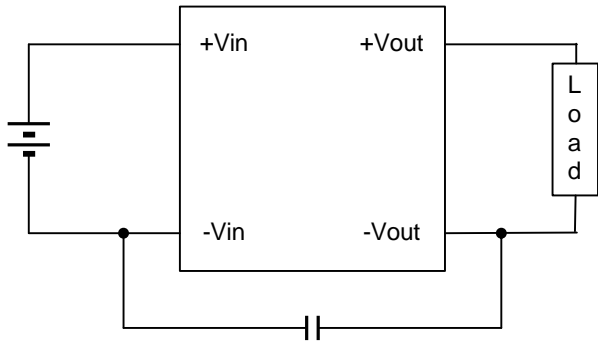
Example of Connection



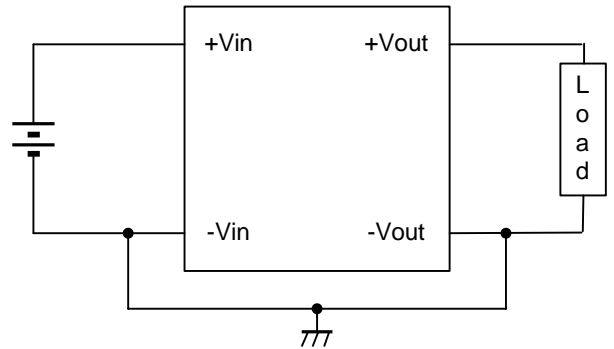
Connection to reduce input ripple voltage



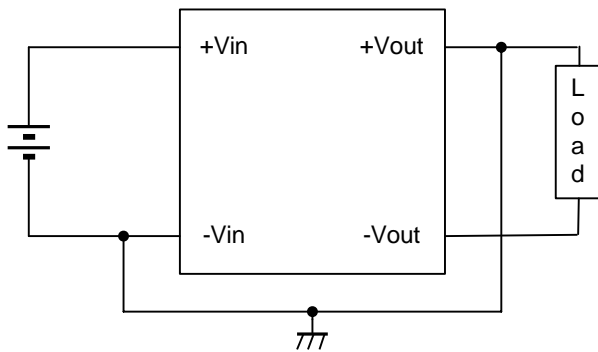
Connection to reduce output ripple voltage



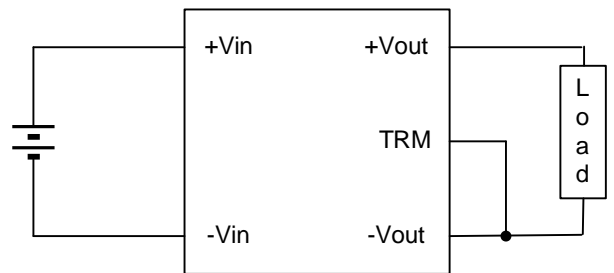
Connection to reduce common mode noise



Connection to use non-isolation



Connection to use turn around output voltage



Connection to use maximum output voltage

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Cardboard

Tray of dummy

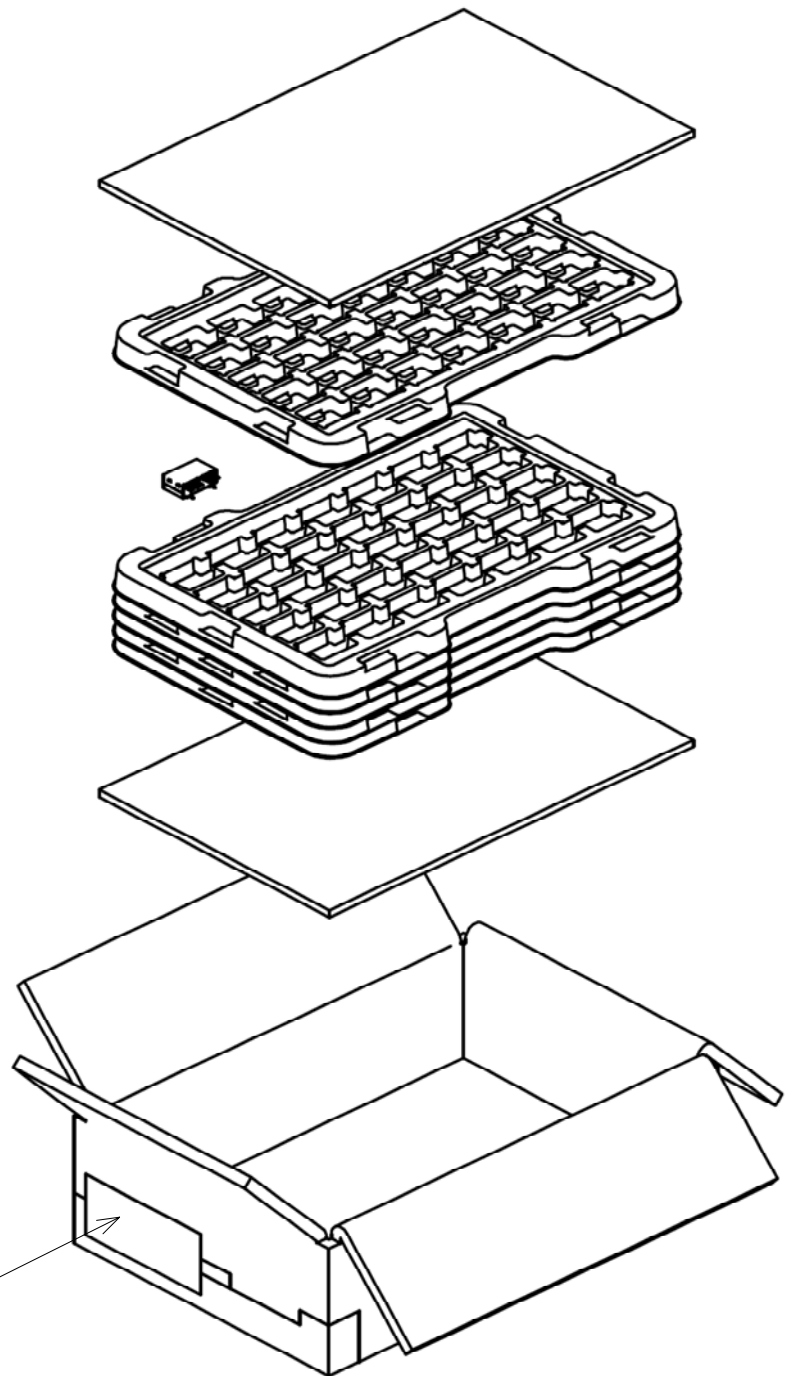
Tray

(35pcs)x5= 175pcs/ box
The tray is alternated.

Cardboard

Outer carton
(321mm:L)x(221mm:W)x(104mm:H)

LABEL
 TDK Part No.
 Manufacture
 Customer Part No.
 QTY.
 Inspection No.
 Origin Country



No.	MATERIALS NAME	QU	MATERIAL	REMARK
PRODUCT NAME or MODEL, TITLE				
DC-DC CONVERTER UNIT CC3-xxxxxS-E Series				
TDK CORPORATION	NAME OF DRAWING		DRAWING No.	PAGE
	PRODUCT SPECIFICATIONS		TRSA-0294-2	16 / 16