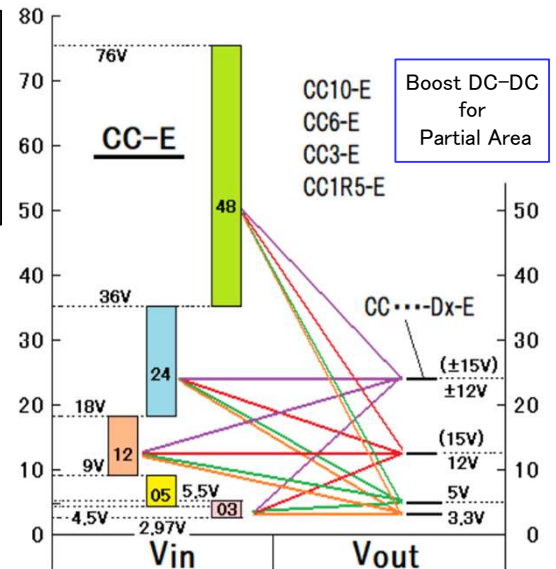


1. Features

- (1) Isolated DC-DC Converter (500VAC Withstand for Input-Output, I/O-Case)
- (2) Abundant Product Line up (4 Kinds of Pout, 5 Kinds of Vin, 6 Kinds of Vout)
- (3) No Built in Aluminum / Tantalum Electrolytic Capacitors (Long Life, High Reliability)
- (4) 5 Side-Shield for Noise Reduction, Metal Case Covers PCB except for the Bottom
- (5) No Resin Filling inside Case for Lightweight / Compatible with DIP/SMD mounting
- (6) Function Pins : Remote ON/OFF(RC), Output Trimming (TRM) for all CC-Es

2. Product Line up

- (1) 5 kinds of input voltage range (3.3V, 5V, 12V, 24V, 48V) and 6 kinds of output (3.3V, 5V, 12V, 15V, ±12V, ±15V) models realize wide product line up.
- (2) When 15V or ±15V output is need, please use 12V or ±12V output model, and by shorting TRM terminal and -Vout terminal each other.
- (3) For dual output models (±12V, ±15V), they can be used as 24V or 30V output DC-DC by using both ± rails. (The COM terminal must be opened.)
- (4) By multiple CC-Es combination (output series connection), various output voltage can be attained. Output current is limited by lower power CC-E maximum current.

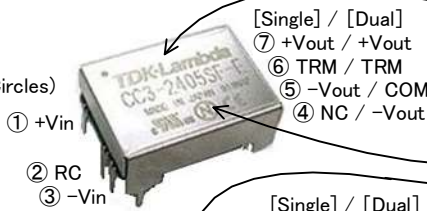


3. Outline Structure (CC3-E Representative Model)

< Top View >

(Pin Numbers in Circles)

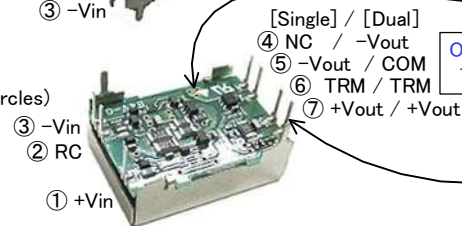
Input Side Terminals



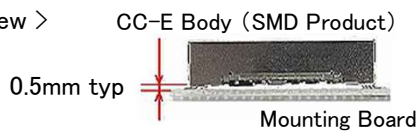
< Bottom View >

(Pin Numbers in Circles)

Input Side Terminals



< Side View >



[Explanation]

Metal Case [SUS304 with Ni Plating]

The case is not connected to CC-E circuit inside. (Floating potential.) Also, the inside of the case is hollow (No resin filling etc.).

Production Name, Lot Number, Safety Indication (Laser Mark)

PCB [CEM-3 (UL94V-0)] (* 1)

The product underside components are exposed (* 2), so do not touch them. In order to prevent them from contacting with the mounting board, part of the legs of the metal case are also used as spacers. SMD products do not have case legs and only have a spacer function.

Terminal Pins [Phosphor bronze with Ni-Sn Plating]

Please refer the instruction manual for the pins function in detail.

Note * 1 : The flame retardant grade of the parts and materials used in the CC-E Series is UL94V-0, but the product itself has not received flame retardant certification.

* 2 : Although there is no prohibition copper patterns under the product on mounting PCB, it is recommended to avoid pattern wiring if there is a risk of conductive dust or dirt existence. (As an optional item, a model with resin coating on the board is also available.)

4. Abstract Internal Circuit (CC3-E Representative Model)

(1) Schematic Construction

Self-excited RCC Converter (1.5W, 3W, 6W)
(RCC: Ringing Choke Converter)
Separately excited Flyback Converter (10W)

(2) Isolation, Withstand Voltage

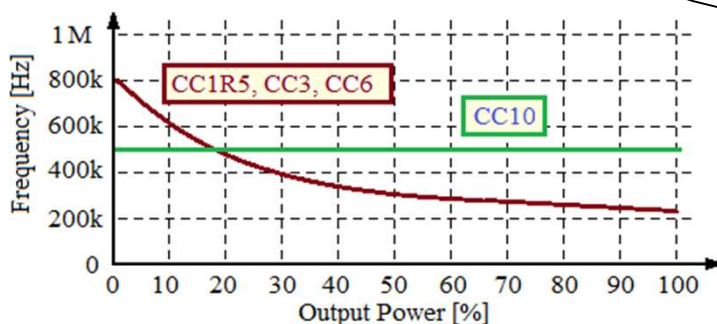
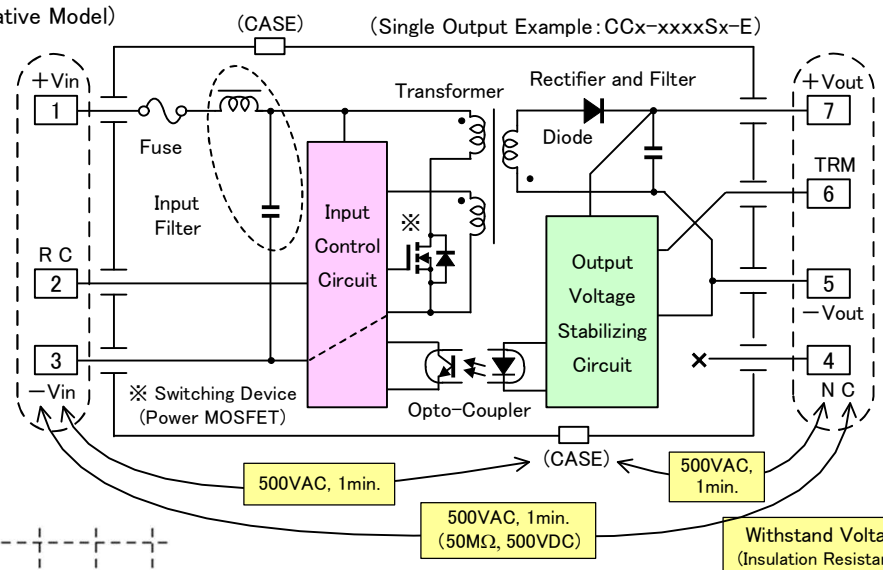
Isolation by transformer or opto-coupler.
(Isolation distance : 0.5mm or more.)

(3) Input Fuse

Built in +Vin terminal. If the input is connected in reverse, the fuse blows open and become unusable. (Please see the instruction manual.)

(4) Oscillation (Switching) Frequency

The switching frequency varies depending on the product output load (see diagram below).

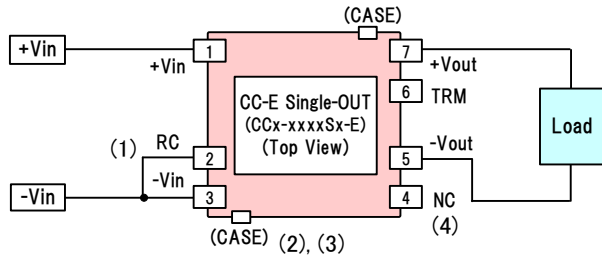


Note : Due to the structure of the product, it is not possible to increase the withstand voltage.

The frequency of the CC1R5, CC3, or CC6 varies according to loads ratio or input voltage level as the figure on the left side. The frequency of the CC10 is fixed, 500kHz typically. These frequency accuracy is ±20%.

(To be continued to the next page 2.)

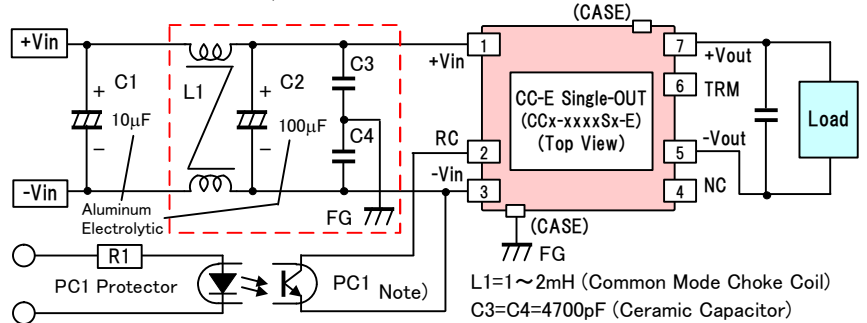
5. Basic Connection, Application Hint



- (1) The CC-E series can operate without any external components. When using, short the RC terminal and -Vin terminal (REmote-ON state).
- (2) The metal case is not connected to the internal circuit (floating potential). The connection destination can be the input side, output side, or left open.
- (3) SMD products do not have metal case legs, so they are used open. (Even if used open, it will not affect EMI or output noise.)
- (4) The NC pin is also not connected internally (if connected, -Vout terminal is recommended).

(5) If EMI countermeasures are needed for the mounting board with the CC-E, it is necessary to add an input filter as shown within the red dashed line in the circuit diagram on the right side (Example for Class-A EMI). Also, if further output noise reduction than the spec. value is needed, please consider adding an output capacitor or LC filter (see the instruction manual in details).

Note) Opto-Coupler PC1 is needed when using remote ON/OFF function across the input filter.



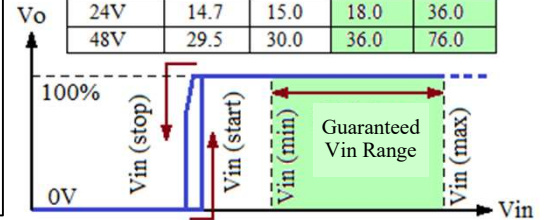
6. Various Protection of the CC-Es

	Protection	Y/N	Remarks
In-put	Over Voltage (OVP)	N	Be careful that the user does not apply overvoltage. 110% of Vin (max) will not be damaged, but no warranty.
	Low Voltage (UVLO)	Y	70 to 90% of Vin (min), refer the figure on the right side.
Out-put	Over Voltage (OVP)	N	Deleted due to market research and safety confirmation on actual equipment.
	Over Current (OCP)	Y	Fold back method, see figure on the bottom right.
Total	Over Temperature (OTP)	N	Users should be careful not to raise the ambient temperature of the CC-Es too much.

Note) The protection of Vin-UVLO, Output OCP operate quickly (about 100 µs). If the Vin exceeds 10% of the max. spec, there will be no damage, but it is not covered by the warranty. OVP is possible by external circuit in addition.

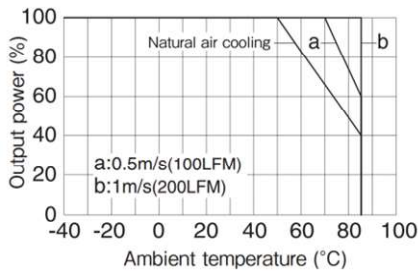
Example of Vin-UVLO (CC6 Type)

Vin Type	Stop	Start	Min.	Max.
3.3V	2.4	2.5	2.97	5.5
5V	3.9	4.0	4.5	9.0
12V	6.8	7.0	9.0	18.0
24V	14.7	15.0	18.0	36.0
48V	29.5	30.0	36.0	76.0

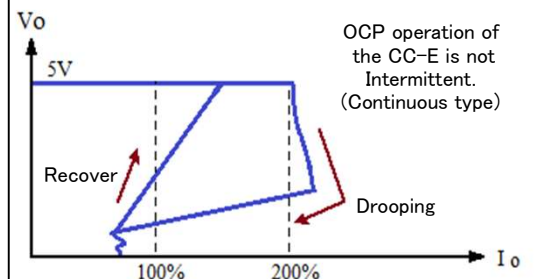


7. Temperature Derating

Output power should be derated based on the ambient temperature as the figure below, for all CC-Es. There are no regulations for thermal resistance between the body and case. For the other method, users remove the metal case and measure the components temperature on the built-in board. There is also a way to check the temperature. Please contact us for more information.



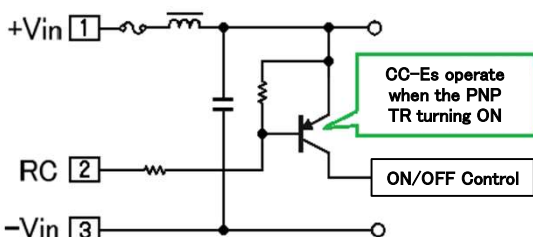
OCP Curve Example (CC6-2405 Sx-E)



Note) Please note that the fold-back OCP characteristics may not recover if the load is in constant current. Therefore, constant resistance load recommended.

8. RC Terminal Characteristics

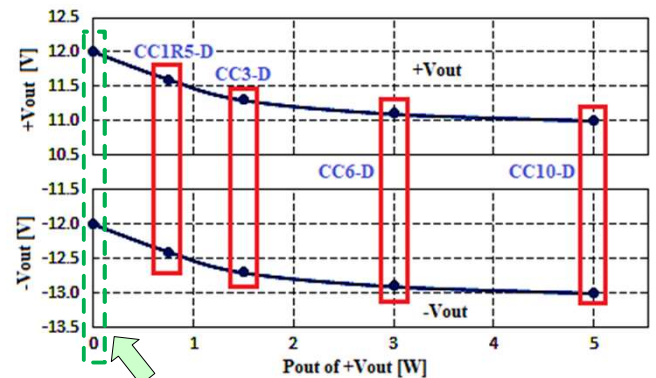
The CC-Es operate when the RC and -Vin terminals are shorted, or when the RC terminal current exceeds 200µA typ. Internal circuit is shown below. RC function is current-driven and ON/OFF operates by shorting or opening this RC to -Vin. Although it is difficult to specify the voltage threshold of the RC terminal, the approximate values are as follows.
 3.3V Input : Vin-1V, 5V Input : Vin-1.5V, 12V Input : Vin-2V,
 24V Input : Vin-4V, 48V Input : Vin-12V (Based on -Vin terminal)
 Please contact us for details regarding internal component values.



Note) The start-up time (when Vin turning on or RC-ON) is not specified, so please refer to the Evaluation Data.

9. Unbalance load using on the Dual Output CC-E

Dual output CC-Es assume ± output currents are the same (balanced). If the ± load is unbalanced, the output voltage will deviate from spec. (Example in the figure below: ± 12V model +Vout=full load, -Vout=no load)



No load or balanced load condition for each Dual output CC-E.