

# DC to DC Converters

## Non-insulation Type, Wide Input, SMD

Conformity to RoHS Directive

### CE-1003/1004/1005 Series

#### FEATURES

- Input voltage is wide range: 6 to 16V(CE-1003/1004).
- This series are high conversion efficiency design.
- A thickness dimension is a low height of 4.5mm.
- It is available in the wide temperature range from  $-40$  to  $+85^{\circ}\text{C}$ .
- ON/OFF control and external signal control are possible.
- It has over-current protection by an auto-recovery.
- Output voltage adjustment by external resistor(CE-1005).
- It is possible to set eight different output voltage patterns without using external resistance (refer to the output voltage setting method).
- Due to the shielding structure of five-side in metal, this series feature low EMI.
- SMD type is available for feeding with both tray and taping.
- It is a product conforming to RoHS directive.



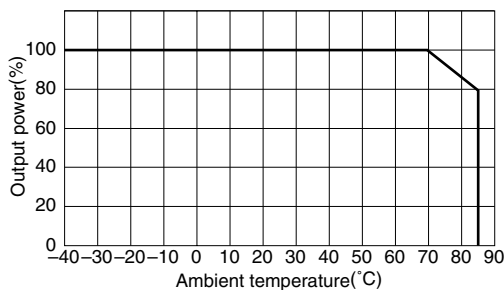
#### SPECIFICATIONS AND STANDARDS

Part No.			CE-1003	CE-1004	CE-1005
Input voltage range	$V_{in}$	V	+6 to +16	+6 to +16	+3 to +5.25
Output voltage range	$I_{out}$	A	1.5 max.	1.5 max.	2.5 max.*
Output voltage setting range	$V_{out}$	V	+1.5 to +3.3	+3.3 to +5.0	+1 to +3.3
Output voltage setting precision		%	$\pm 3$	$\pm 3$	$\pm 3$
Output voltage total variation		%	$\pm 5$	$\pm 5$	$\pm 4$
Oscillating frequency		kHz	430 max./330 min.	430 max./320 min.	550 typ.
Output ripple noise voltage		mVp-p	100 max./50 typ.	100 max./30 typ.	50 max./20 typ.
Efficiency	[5V]	%	—	86.5 min./90 typ.	—
	[3.3V]	%	83 min./86.5 typ.	83 min./86.5 typ.	—
	[2.5V]	%	80 min./83.5 typ.	—	88 min./91.5 typ.
	[1.5V]	%	73.5 min./76.5 typ.	—	—
ON/OFF control voltage	ON	V	6 max./2 min.	6 max./2 min.	0.5 max./0 min.
	OFF	V	0.6 max./0 min.	0.6 max./0 min.	2.0 min.
Overcurrent protection		A	2 typ.	2 typ.	3 typ.

\*  $V_{in}=3$  to  $3.6\text{V}$ :  $1.25+0.5\times V_{out}(A)$  $V_{in}>3.6\text{V}$ :  $0.83+0.67\times V_{out}(A)$ 

#### OUTPUT POWER - AMBIENT TEMPERATURE(DERATING)

##### CE-1003/1004



CE-1005 does not have derating.

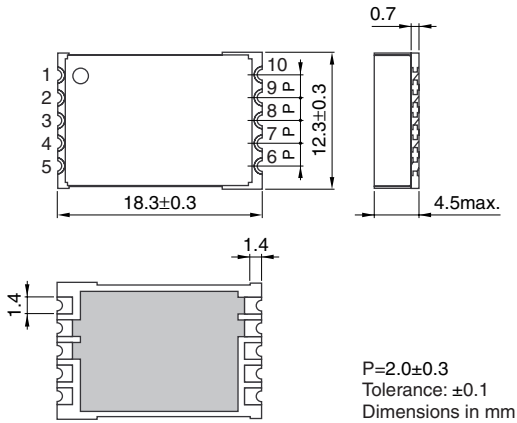
#### COMMON SPECIFICATIONS

Operating temperature range	$-40$ to $+85^{\circ}\text{C}$
Storage temperature range	$-40$ to $+85^{\circ}\text{C}$
Humidity range	10 to 90(%)RH

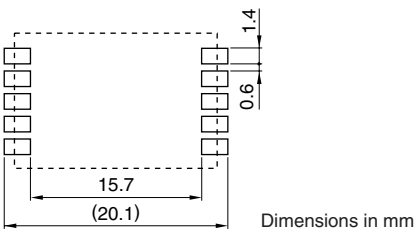
• Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

• All specifications are subject to change without notice.

## SHAPES AND DIMENSIONS

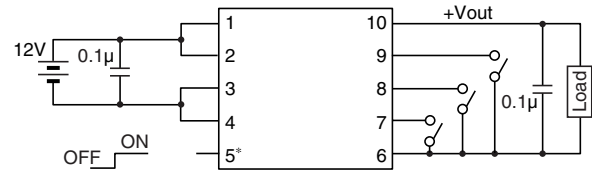


## RECOMMENDED PWB PATTERN[TOP VIEW]



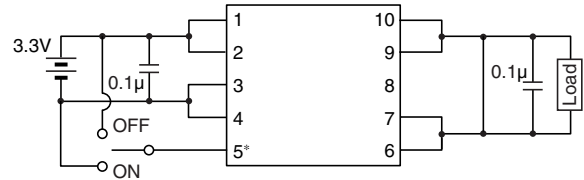
## CIRCUIT DIAGRAMS

### CE-1003/1004



\* When does not use ON/OFF control, please make it opening.

### CE-1005



\* When does not use ON/OFF control, please make it a low or opening.

Input start-up time: less than 5ms

(When it cannot satisfy this condition, please use ON/OFF terminal. And start with the conditions that input voltage was applied.)

Added input inductor: less than  $2.2\mu\text{H}$  if added

Added input condenser: added capacity 10 times or more of input inductor

Added output capacity: Less than  $100\mu\text{F}$  If capacity is large, it may not start up.

## TERMINAL CONNECTIONS

No.	CE-1003	CE-1004	CE-1005
1	Vin	Vin	Vin
2	Vin	Vin	Vin
3	GND	GND	GND
4	GND	GND	GND
5	ON/OFF	ON/OFF	ON/OFF
6	GND	GND	GND
7	Vs-0	Vs-0	GND
8	Vs-1	Vs-1	Vset
9	Vs-2	Vs-2	Vout
10	Vout	Vout	Vout

## OUTPUT VOLTAGE SETTING METHOD

### CE-1003/1004

7-pin	8-pin	9-pin	Vout	
			CE-1003	CE-1004
0	0	0	3.3V	5.0V
0	0	1	3.0V	4.8V
0	1	0	2.8V	4.5V
0	1	1	2.5V	4.3V
1	0	0	2.3V	4.0V
1	0	1	2.0V	3.8V
1	1	0	1.8V	3.5V
1	1	1	1.5V	3.3V

0: Short to GND  
1: OPEN

### CE-1005

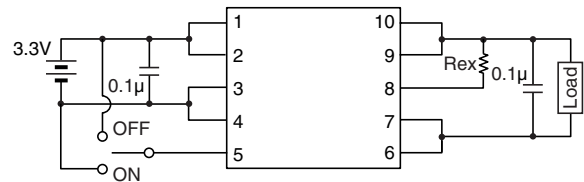
The output current voltage may differ depending upon the output voltage setting.

Output voltage	Rated output current	
	3.3V input	5V input
1.0V	1.75A	1.5A
1.2V	1.85A	1.65A
1.5V	2.00A	1.85A
1.8V	2.15A	2.0A
2.0V	2.25A	2.2A
2.5V	2.50A	2.5A
3.3V	—	2.5A

- When the setting is under 2.5V: Set the output voltage by connecting resistance between the pins 8 and 9.

$$V_{out} = \frac{5.78 + 2.5 \times R_{ex}}{5.78 + R_{ex}} \quad \text{Unit: V, k}\Omega$$

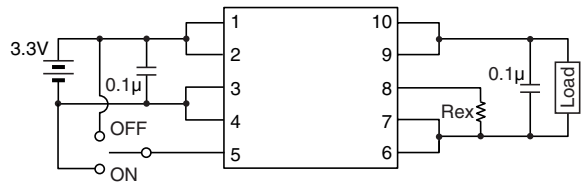
$$R_{ex} = \frac{5.78 \times (V_{out} - 1)}{2.5 - V_{out}} \quad \text{Unit: V, k}\Omega$$



- When the setting is over 2.5V: Set the output voltage by connecting resistance between the pins 7 and 8.

$$V_{out} = \frac{5.78 + 2.5 \times R_{ex}}{0.68 + R_{ex}} \quad \text{Unit: V, k}\Omega$$

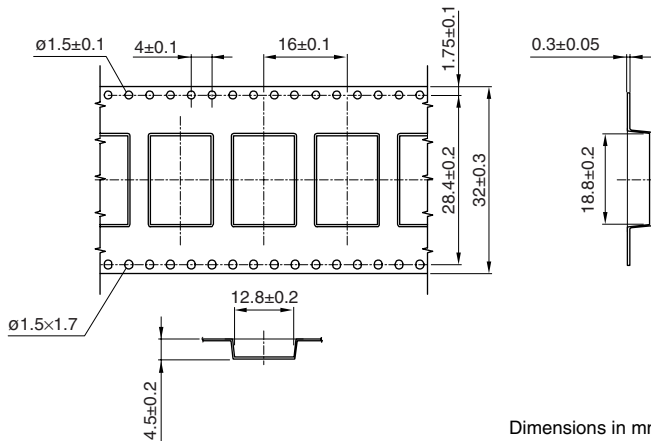
$$R_{ex} = \frac{5.78 - 0.68 \times V_{out}}{V_{out} - 2.5} \quad \text{Unit: V, k}\Omega$$



## PACKAGING STYLES AND QUANTITIES

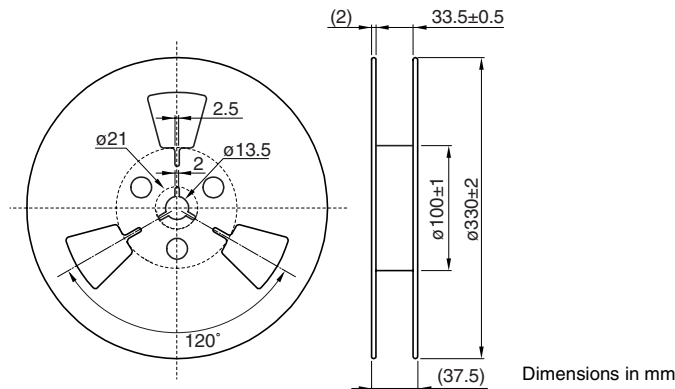
### TAPING SPECIFICATIONS

Carrier tape dimensions



Dimensions in mm

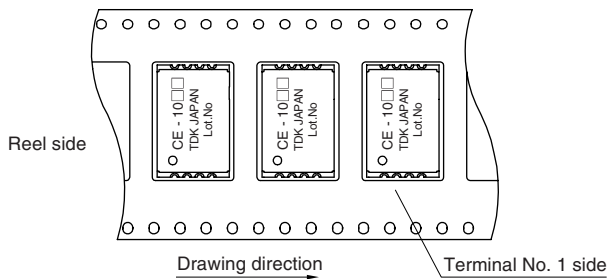
Reel dimensions



Dimensions in mm

### TAPING DIRECTION

View from cover tape



### PACKAGE QUANTITY

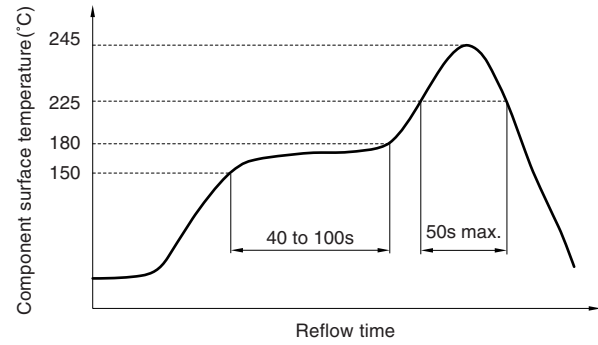
500 pieces per reel

Maximum 3 reels are packed in a reel box.

The following items are indicated on the packing box:

1. Part No.
2. Quantity
3. Lot No. or manufacturing date
4. Name of manufacturing company

### RECOMMENDED REFLOW SOLDERING CONDITIONS



Peak temperature: 245°C max.

Reflow temperature: over 225°C, 50s min.

Preheating temperature: 150 to 180°C, 100s min.

### PRECAUTIONS

- Cleaning of this product is inhibited.

Store this product indoors, in a room where temperature variation is slight, and away from direct sunlight. Caution should be taken not to store this product in an environment of high temperature and high humidity, or where temperature variation is large, which may cause the formation of condensation on the product, deterioration of properties, and deterioration of solderability.

- Less-residue or non-cleaning type flux should be used so as to omit the cleaning.

This product cannot be cleaned. Use low-residue or non-cleaning type flux and refrain from cleaning.

- The rise time of the input voltage must be 40ms max.