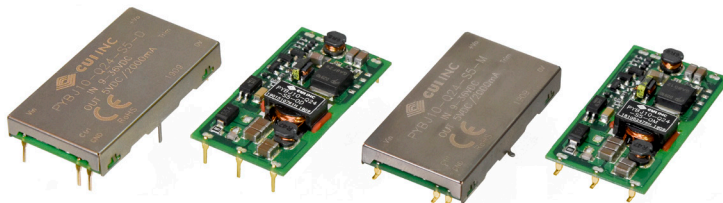




**SERIES:** PYBJ10 | **DESCRIPTION:** DC-DC CONVERTER

**FEATURES**

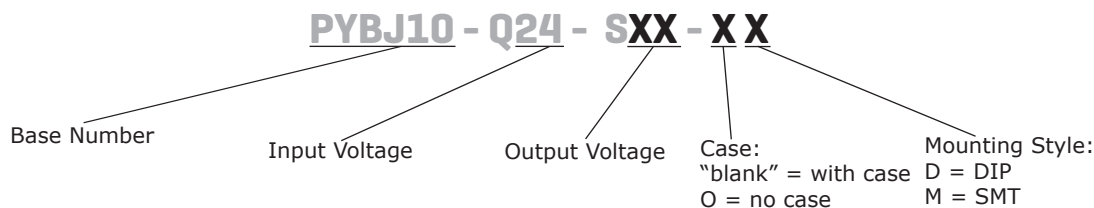
- up to 10 W isolated output
- 4:1 input range (9~36 Vdc)
- single regulated output
- output over-voltage protection, over-current protection, short-circuit protection
- efficiency up to 88%
- DIP and SMT mounting styles
- available with or without case
- UL 62368-1, IEC 62368-1, EN 62368-1 approved



| MODEL          | input voltage |             | output voltage | output current |          | output power | ripple & noise <sup>1</sup> | efficiency <sup>2</sup> |
|----------------|---------------|-------------|----------------|----------------|----------|--------------|-----------------------------|-------------------------|
|                | typ (Vdc)     | range (Vdc) | (Vdc)          | min (mA)       | max (mA) | max (W)      | max (mVp-p)                 | typ (%)                 |
| PYBJ10-Q24-S5  | 24            | 9~36        | 5              | 0              | 2000     | 10           | 100                         | 84                      |
| PYBJ10-Q24-S12 | 24            | 9~36        | 12             | 0              | 833      | 10           | 100                         | 87                      |
| PYBJ10-Q24-S15 | 24            | 9~36        | 15             | 0              | 667      | 10           | 100                         | 88                      |

Notes: 1. From 5~100% load, nominal input, 20 MHz bandwidth oscilloscope, with 10 µF tantalum and 1 µF ceramic capacitors on the output. From 0~5% load, ripple and noise is <5% Vo.  
 2. Measured at nominal input voltage, full load.  
 3. All specifications are measured at Ta=25°C, humidity < 75%, nominal input voltage, and rated output load unless otherwise specified.

**PART NUMBER KEY**



## INPUT

| parameter                         | conditions/description                                                                                                                      | min  | typ | max | units |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|------|-----|-----|-------|
| operating input voltage           |                                                                                                                                             | 9    | 24  | 36  | Vdc   |
| start-up voltage                  |                                                                                                                                             |      |     | 9   | Vdc   |
| surge voltage                     | for 1 second max                                                                                                                            | -0.7 |     | 50  | Vdc   |
| under voltage shutdown            |                                                                                                                                             | 5.5  | 6.5 |     | Vdc   |
| current                           | 5 Vdc output models                                                                                                                         |      |     | 508 | mA    |
|                                   | 12 Vdc output models                                                                                                                        |      |     | 490 | mA    |
|                                   | 15 Vdc output models                                                                                                                        |      |     | 485 | MA    |
| remote on/off (CTRL) <sup>4</sup> | turn on (CTRL pin pulled low to GND (0~1.2 Vdc))<br>turn off (CTRL pin open or pulled high (2.4~12 Vdc))<br>input current when switched off |      | 6   |     | mA    |
| filter                            | Pi filter                                                                                                                                   |      |     |     |       |
| no load power consumption         |                                                                                                                                             |      | 0.1 |     | W     |

Notes: 4. The voltage of the CTRL pin is referenced to input GND pin.

## OUTPUT

| parameter                            | conditions/description                      | min | typ  | max   | units |
|--------------------------------------|---------------------------------------------|-----|------|-------|-------|
| maximum capacitive load <sup>5</sup> | 5 Vdc output models                         |     |      | 2,200 | μF    |
|                                      | 12 Vdc output models                        |     |      | 680   | μF    |
|                                      | 15 Vdc output models                        |     |      | 470   | μF    |
| voltage accuracy                     | from 0% to full load                        |     | ±1   | ±3    | %     |
| line regulation                      | from low line to high line, full load       |     | ±0.2 | ±0.5  | %     |
| load regulation <sup>6</sup>         | from 5% to full load                        |     | ±0.5 | ±1    | %     |
| adjustability                        | see application notes                       |     | ±5   |       | %     |
| switching frequency <sup>7</sup>     | PWM mode                                    |     | 350  |       | kHz   |
| transient recovery time              | 25% load step change, nominal input voltage |     | 300  | 500   | μs    |
| transient response deviation         | 25% load step change, nominal input voltage |     | ±3   | ±5    | %     |
| temperature coefficient              | at full load                                |     |      | ±0.03 | %/°C  |

Note: 5. Tested at input voltage range and full load.

6. At 0~100% load, the max load regulation is ±5%.

7. Value is based on full load. At loads <50%, the switching frequency decreases with decreasing load for efficiency improvement.

## PROTECTIONS

| parameter                | conditions/description            | min | typ | max | units |
|--------------------------|-----------------------------------|-----|-----|-----|-------|
| over voltage protection  |                                   | 110 |     | 160 | %     |
| over current protection  |                                   | 110 | 140 | 200 | %     |
| short circuit protection | hiccup, continuous, auto recovery |     |     |     |       |

## SAFETY AND COMPLIANCE

| parameter             | conditions/description                                                                              | min       | typ   | max | units |
|-----------------------|-----------------------------------------------------------------------------------------------------|-----------|-------|-----|-------|
| isolation voltage     | input to output for 1 minute at 5 mA                                                                | 500       |       |     | Vac   |
|                       | input to case <sup>8</sup> for 1 minute at 5 mA                                                     | 500       |       |     | Vac   |
|                       | output to case <sup>8</sup> for 1 minute at 5 mA                                                    | 500       |       |     | Vac   |
|                       | input to output for 1 minute at 1 mA                                                                | 1,500     |       |     | Vdc   |
|                       | input to case <sup>8</sup> for 1 minute at 1 mA                                                     | 1,500     |       |     | Vdc   |
|                       | output to case <sup>8</sup> for 1 minute at 1 mA                                                    | 1,500     |       |     | Vdc   |
| isolation resistance  | input to output at 500 Vdc                                                                          | 100       |       |     | MΩ    |
|                       | input to case <sup>8</sup> at 500 Vdc                                                               | 100       |       |     | MΩ    |
|                       | output to case <sup>8</sup> at 500 Vdc                                                              | 100       |       |     | MΩ    |
| isolation capacitance | input to output, 100 kHz / 0.1 V                                                                    |           | 1,000 |     | pF    |
| safety approvals      | UL 62368-1, IEC 62368-1, EN 62368-1                                                                 |           |       |     |       |
| conducted emissions   | CISPR32/EN55032, class A (no external circuit); class B (external circuit required, see Figure 2-a) |           |       |     |       |
| radiated emissions    | CISPR32/EN55032, class B (external circuit required, see Figure 2-a)                                |           |       |     |       |
| ESD                   | IEC/EN61000-4-2, contact ±6 kV, class B                                                             |           |       |     |       |
| radiated immunity     | IEC/EN61000-4-3, 10 V/m, class A                                                                    |           |       |     |       |
| EFT/burst             | IEC/EN61000-4-4, ±2 kV, class B (external circuit required, see Figure 2-b)                         |           |       |     |       |
| surge                 | IEC/EN61000-4-5, line-line ±2 kV, class B (external circuit required, see Figure Figure 2-b)        |           |       |     |       |
| conducted immunity    | IEC/EN61000-4-6, 3 Vr.m.s, class A                                                                  |           |       |     |       |
| MTBF                  | as per MIL-HDBK-217F, 25°C                                                                          | 1,000,000 |       |     | hours |
| RoHS                  | yes                                                                                                 |           |       |     |       |

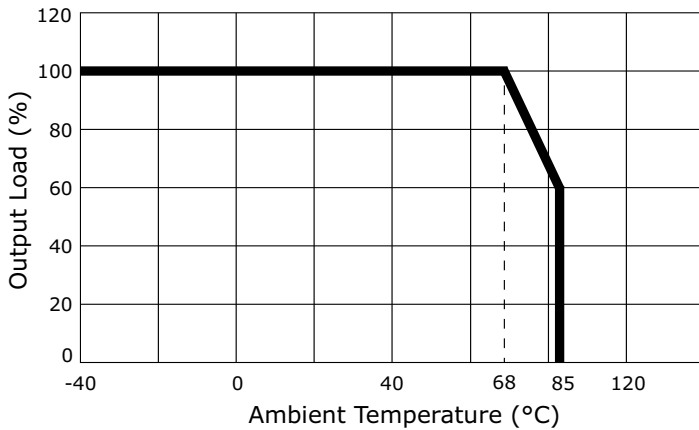
Note: 8. Only applies to versions with case.

## ENVIRONMENTAL

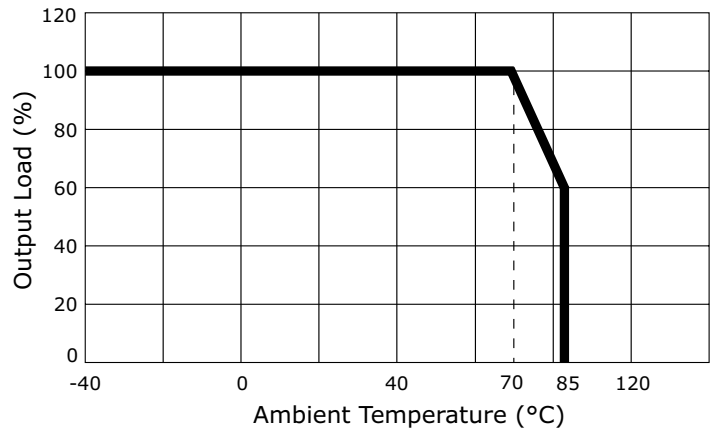
| parameter             | conditions/description                 | min | typ | max | units |
|-----------------------|----------------------------------------|-----|-----|-----|-------|
| operating temperature | see derating curves                    | -40 |     | 85  | °C    |
| storage temperature   |                                        | -55 |     | 125 | °C    |
| storage humidity      | non-condensing                         | 5   |     | 95  | %     |
| vibration             | 10~150 Hz, for 90 minutes on each axis |     | 5   |     | G     |

## DERATING CURVES

Temperature Derating Curve  
(Output Load vs. Ambient Temperature  
20 LFM, 5 Vdc output models)



Temperature Derating Curve  
(Output Load vs. Ambient Temperature  
20 LFM, all other models)

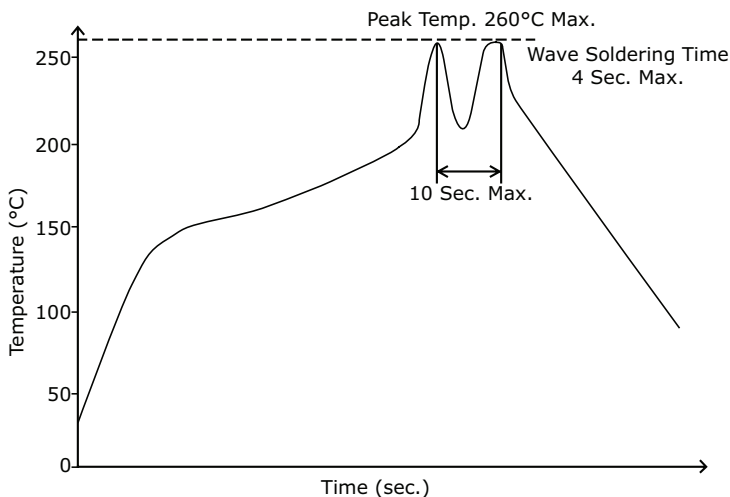


## SOLDERABILITY

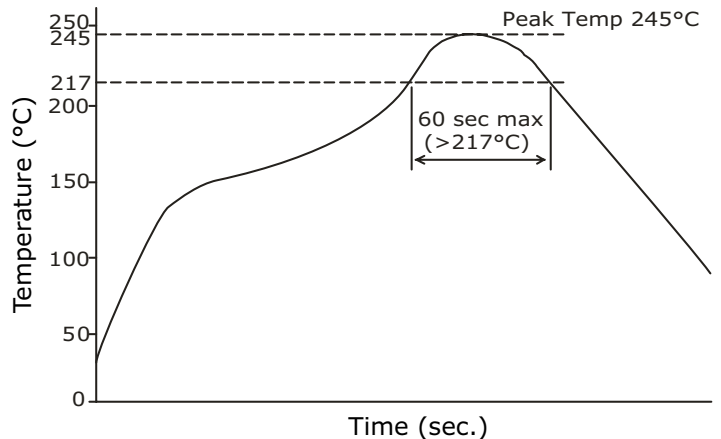
| parameter                      | conditions/description                                                                                                            | min | typ | max | units |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-------|
| hand soldering                 | 1.5 mm from case for 10 seconds                                                                                                   |     |     | 300 | °C    |
| wave soldering <sup>9</sup>    | see wave soldering profile                                                                                                        |     |     | 260 | °C    |
| reflow soldering <sup>10</sup> | see reflow soldering profile<br>Maximum duration >217°C is 60 seconds.<br>For actual application, refer to IPC/JEDEC J-STD-020D.1 |     |     | 245 | °C    |

Note: 9. For DIP models only.  
10. For SMT models only.

Wave Soldering Profile  
(DIP models)



Reflow Soldering Profile  
(SMT models)



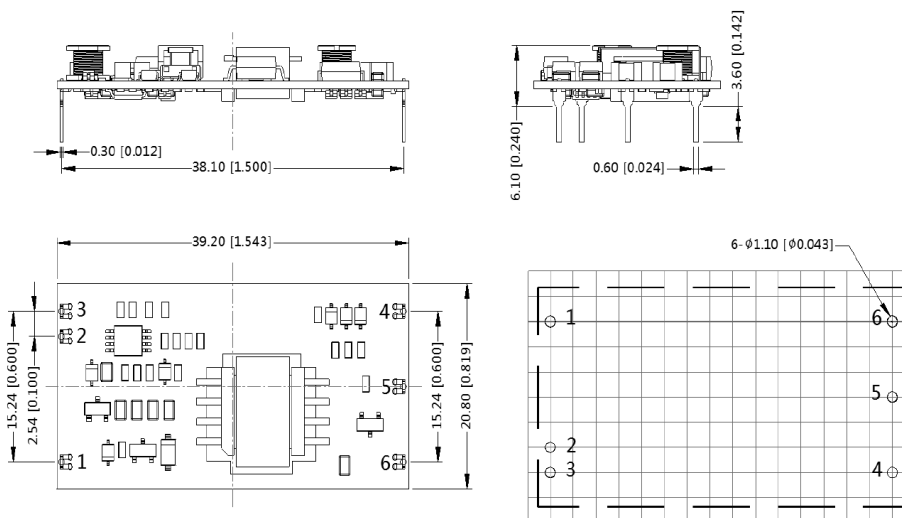
## MECHANICAL

| parameter     | conditions/description                                              | min | typ | max | units |
|---------------|---------------------------------------------------------------------|-----|-----|-----|-------|
| dimensions    | DIP without case: 39.20 x 20.80 x 6.10 [1.543 x 0.819 x 0.240 inch] |     |     |     | mm    |
|               | DIP with case: 40.20 x 22.00 x 6.80 [1.583 x 0.866 x 0.268 inch]    |     |     |     | mm    |
|               | SMT without case: 39.20 x 20.80 x 6.30 [1.543 x 0.819 x 0.248 inch] |     |     |     | mm    |
|               | SMT with case: 40.20 x 22.00 x 7.00 [1.583 x 0.866 x 0.276 inch]    |     |     |     | mm    |
| case material | aluminum alloy                                                      |     |     |     |       |
| weight        | models without case                                                 |     | 5.7 |     | g     |
|               | models with case                                                    |     | 6.7 |     | g     |

## MECHANICAL DRAWING (DIP WITHOUT CASE)

units: mm [inch]  
 tolerance:  $\pm 0.50[\pm 0.020]$   
 pin section tolerance:  $\pm 0.10[\pm 0.004]$

| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | Function |
| 1               | Vin      |
| 2               | CTRL     |
| 3               | GND      |
| 4               | 0V       |
| 5               | trim     |
| 6               | +Vo      |

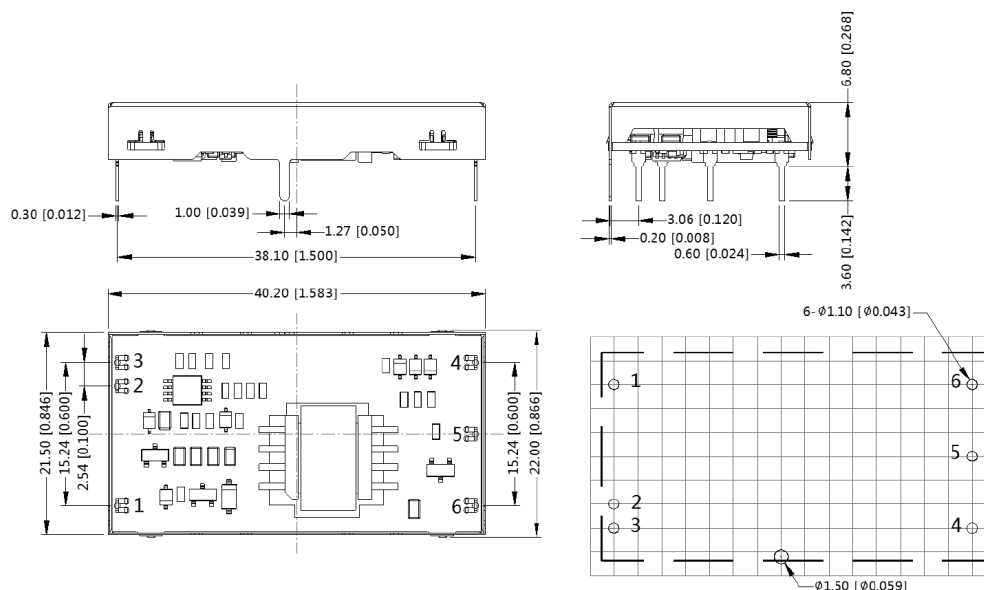


Note: Grid 2.54\*2.54mm  
 Recommended PCB Layout  
 Top View

## MECHANICAL DRAWING (DIP WITH CASE)

units: mm [inch]  
 tolerance:  $\pm 0.50[\pm 0.020]$   
 pin section tolerance:  $\pm 0.10[\pm 0.004]$

| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | Function |
| 1               | Vin      |
| 2               | CTRL     |
| 3               | GND      |
| 4               | 0V       |
| 5               | trim     |
| 6               | +Vo      |

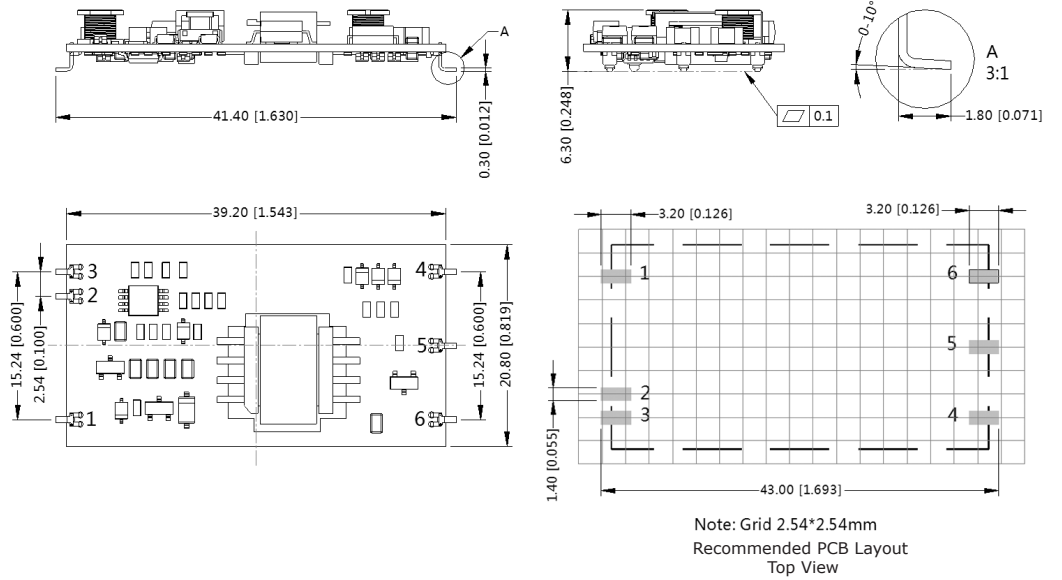


Note: Grid 2.54\*2.54mm  
 Recommended PCB Layout  
 Top View

## MECHANICAL DRAWING (SMT WITHOUT CASE)

units: mm [inch]  
 tolerance:  $\pm 0.50[\pm 0.020]$   
 pin section tolerance:  $\pm 0.10[\pm 0.004]$

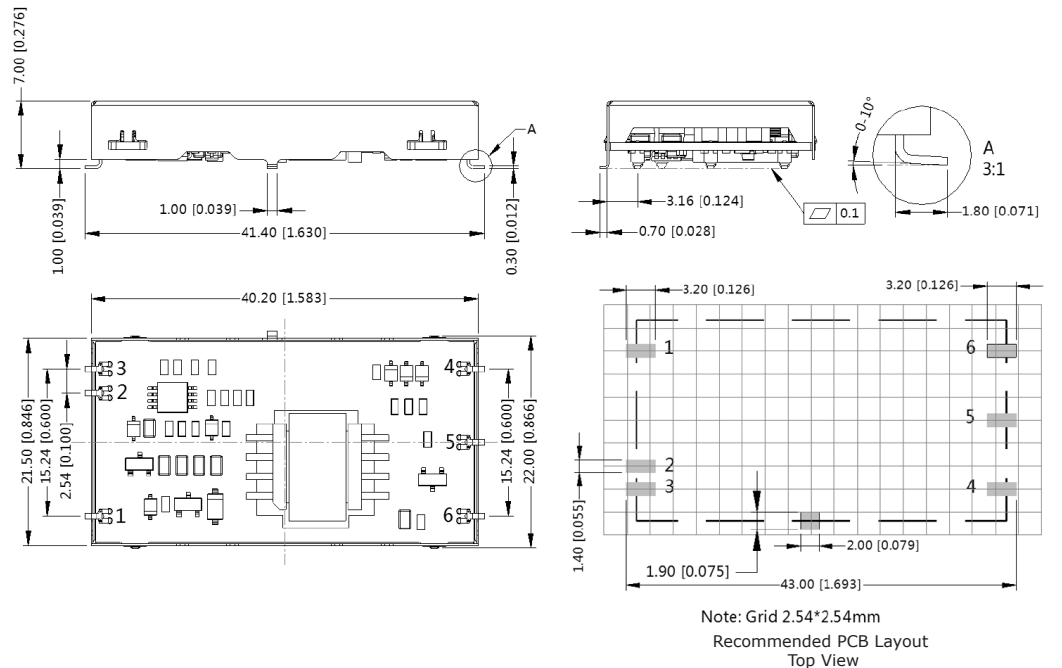
| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | Function |
| 1               | Vin      |
| 2               | CTRL     |
| 3               | GND      |
| 4               | 0V       |
| 5               | trim     |
| 6               | +Vo      |



## MECHANICAL DRAWING (SMT WITH CASE)

units: mm [inch]  
 tolerance:  $\pm 0.50[\pm 0.020]$   
 pin section tolerance:  $\pm 0.10[\pm 0.004]$

| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | Function |
| 1               | Vin      |
| 2               | CTRL     |
| 3               | GND      |
| 4               | 0V       |
| 5               | trim     |
| 6               | +Vo      |

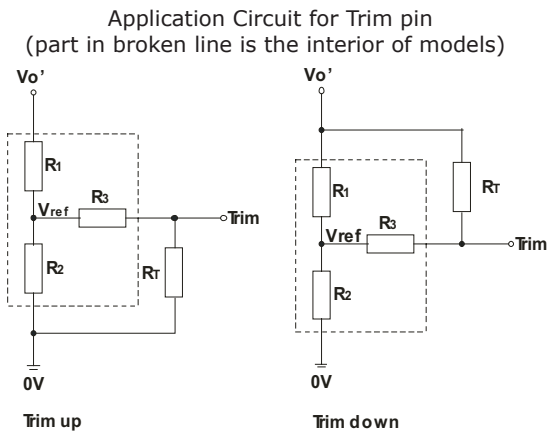




## APPLICATION NOTES

Output voltage trimming  
 Leave open if not used.

**Figure 3**



Formula for Trim Resistor

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2$$

Note: Value for R1, R2, R3, and Vref refer to Table 3  
 R<sub>T</sub>: Trim Resistor  
 a: User-defined parameter, no actual meanings  
 Vo': The trim up/down voltage

**Table 3**

| Vout (Vdc) | R1 (kΩ) | R2 (kΩ) | R3 (kΩ) | Vref (V) |
|------------|---------|---------|---------|----------|
| 5          | 2.94    | 2.87    | 15      | 2.5      |
| 12         | 11.00   | 2.87    | 17.4    | 2.5      |
| 15         | 14.50   | 2.87    | 15      | 2.5      |

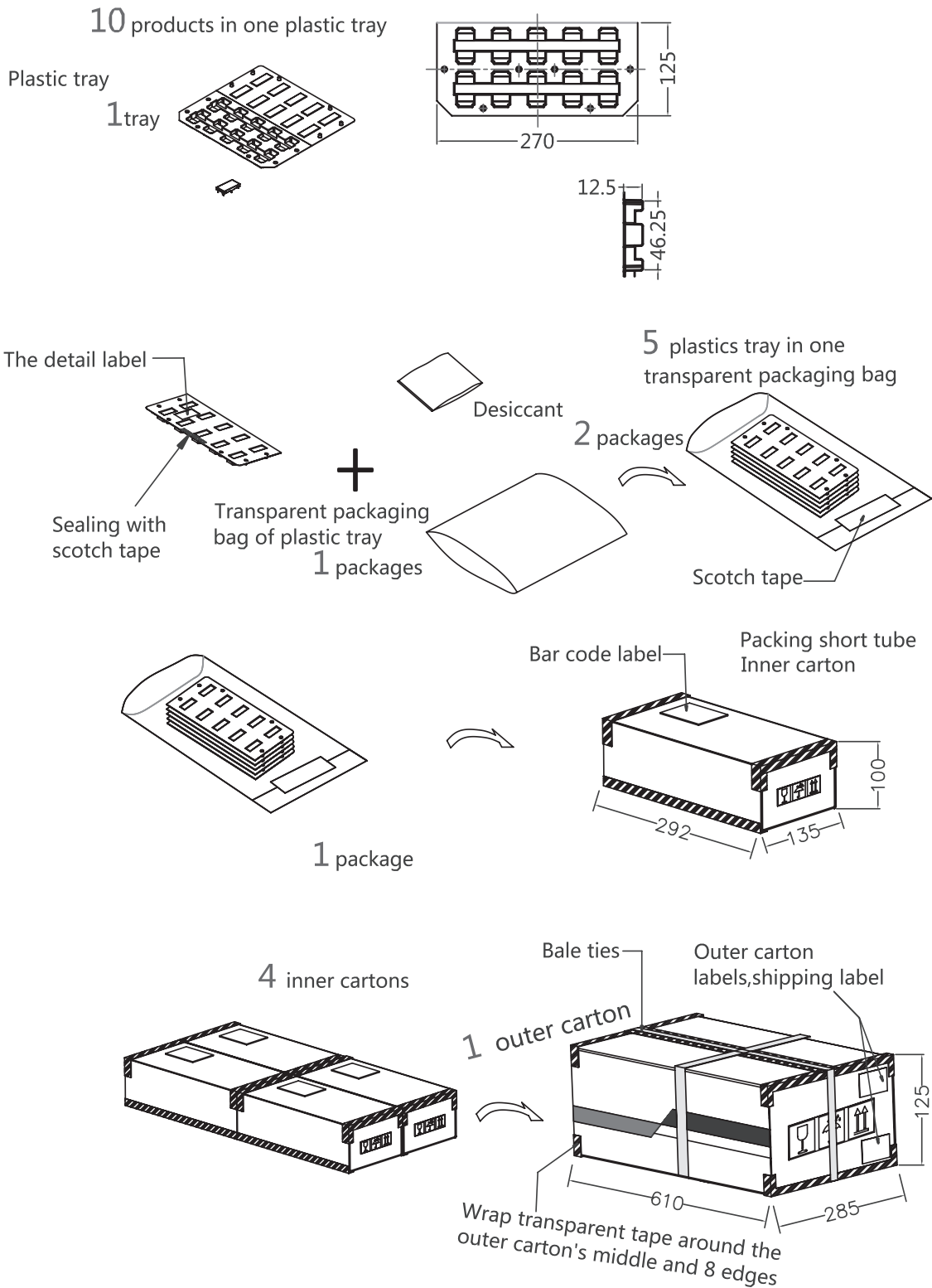
## PACKAGING

units: mm

Inner Carton Size: 292 x 135 x 100 mm

Outer Carton Size: 610 x 285 x 125 mm

Outer Carton QTY: 200 pcs



## REVISION HISTORY

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| rev. | description     | date       |
|------|-----------------|------------|
| 1.0  | initial release | 03/27/2019 |

The revision history provided is for informational purposes only and is believed to be accurate.



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CUI offers a two (2) year limited warranty. Complete warranty information is listed on our website.

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