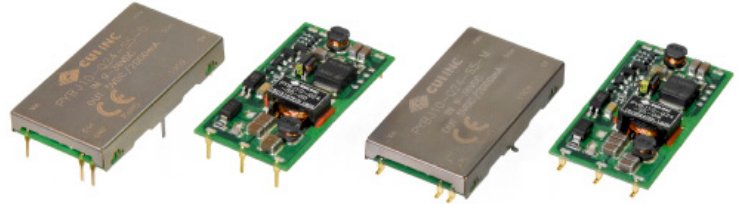


SERIES: PYBJ10 | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

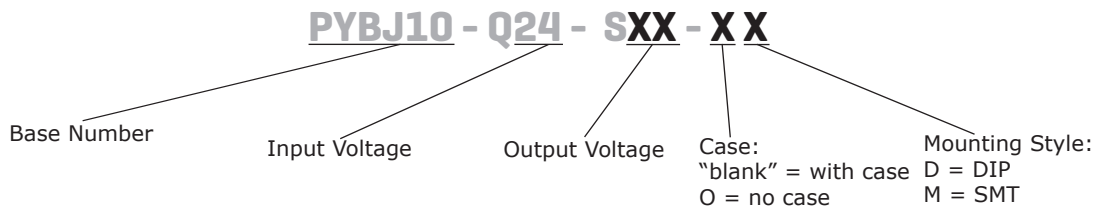
- up to 10 W isolated output
- 4:1 input range (9~36 Vdc)
- single regulated output
- output over-voltage protection, over-current protection, short-circuit protection
- efficiency up to 88%
- DIP and SMT mounting styles
- available with or without case
- UL 62368-1, IEC 62368-1, EN 62368-1 approved



MODEL	input voltage		output voltage	output current		output power	ripple & noise ¹	efficiency ²
	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) ⁴	turn on (CTRL pin pulled low to GND (0~1.2 Vdc)) turn off (CTRL pin open or pulled high (2.4~12 Vdc)) 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 ⁵	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 ⁶	from 5% to full load		±0.5	±1	%
adjustability	see application notes		±5		%
switching frequency ⁷	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 ⁸ for 1 minute at 5 mA	500			Vac
	output to case ⁸ for 1 minute at 5 mA	500			Vac
	input to output for 1 minute at 1 mA	1,500			Vdc
	input to case ⁸ for 1 minute at 1 mA	1,500			Vdc
	output to case ⁸ for 1 minute at 1 mA	1,500			Vdc
isolation resistance	input to output at 500 Vdc	100			MΩ
	input to case ⁸ at 500 Vdc	100			MΩ
	output to case ⁸ 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				

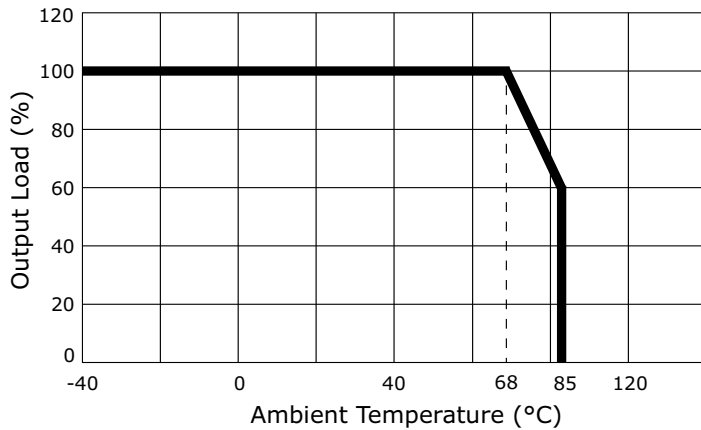
Note: 8. Only applies to versions with case.

ENVIRONMENTAL

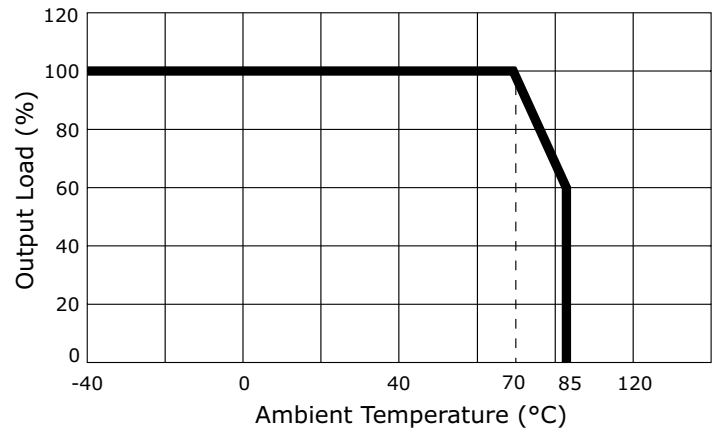
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		85	°C
storage temperature		-55		125	°C
storage humidity	non-condensing	5		95	%
vibration	10~150 Hz, for 90 minutes on each axis		5		G

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)

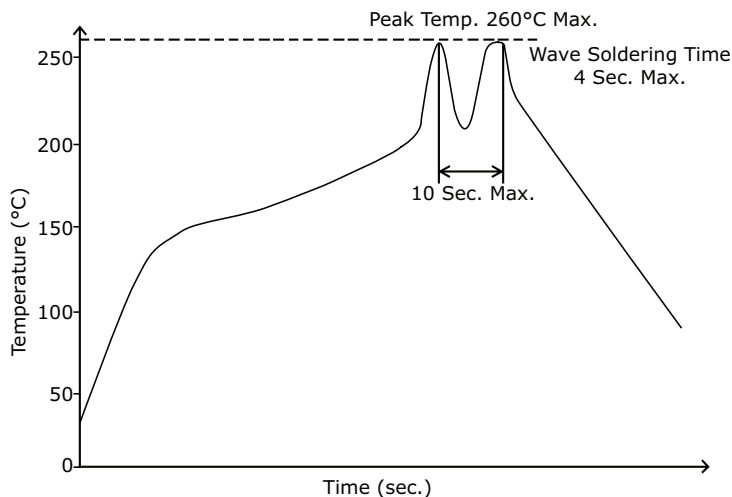


SOLDERABILITY

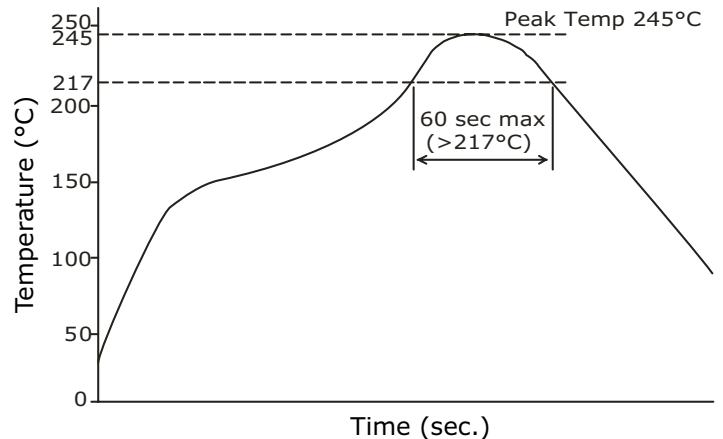
parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
wave soldering ⁹	see wave soldering profile			260	°C
reflow soldering ¹⁰	see reflow soldering profile Maximum duration >217°C is 60 seconds. For actual application, refer to IPC/JEDEC J-STD-020D.1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

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

Wave Soldering Profile
(DIP models)



Reflow Soldering Profile
(SMT models)



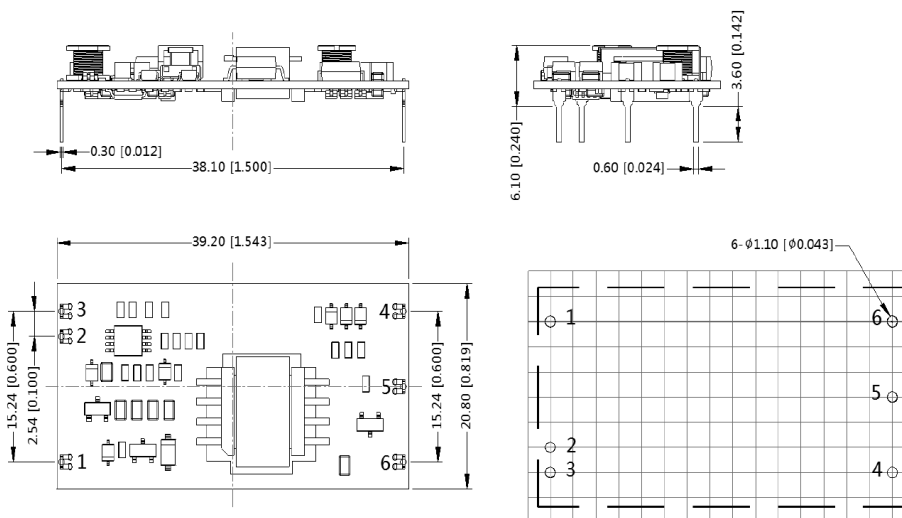
MECHANICAL

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

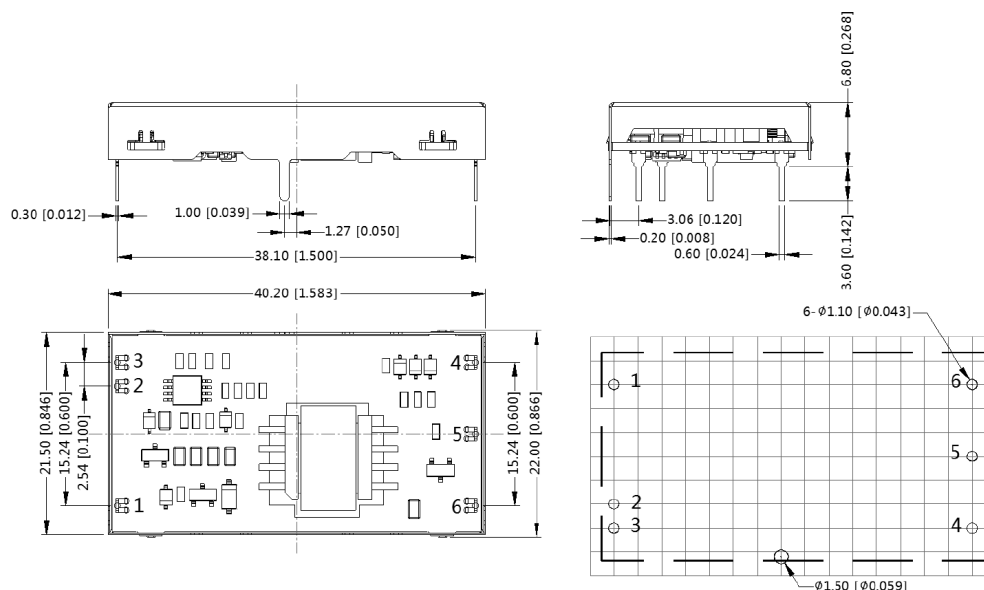


Note: Grid 2.54*2.54mm
 Recommended PCB Layout
 Top View

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

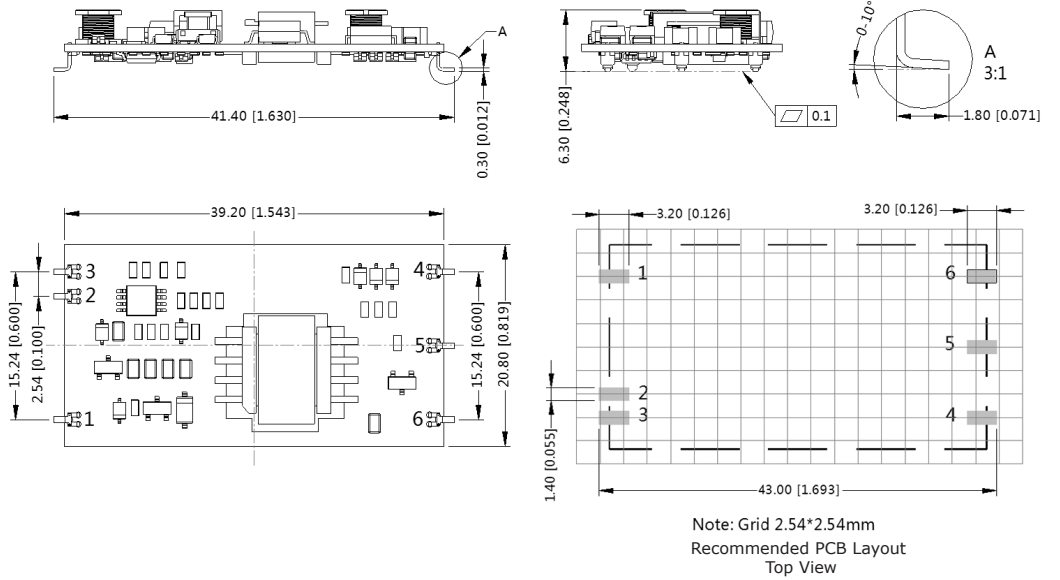


Note: Grid 2.54*2.54mm
 Recommended PCB Layout
 Top View

MECHANICAL DRAWING (SMT WITHOUT CASE)

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

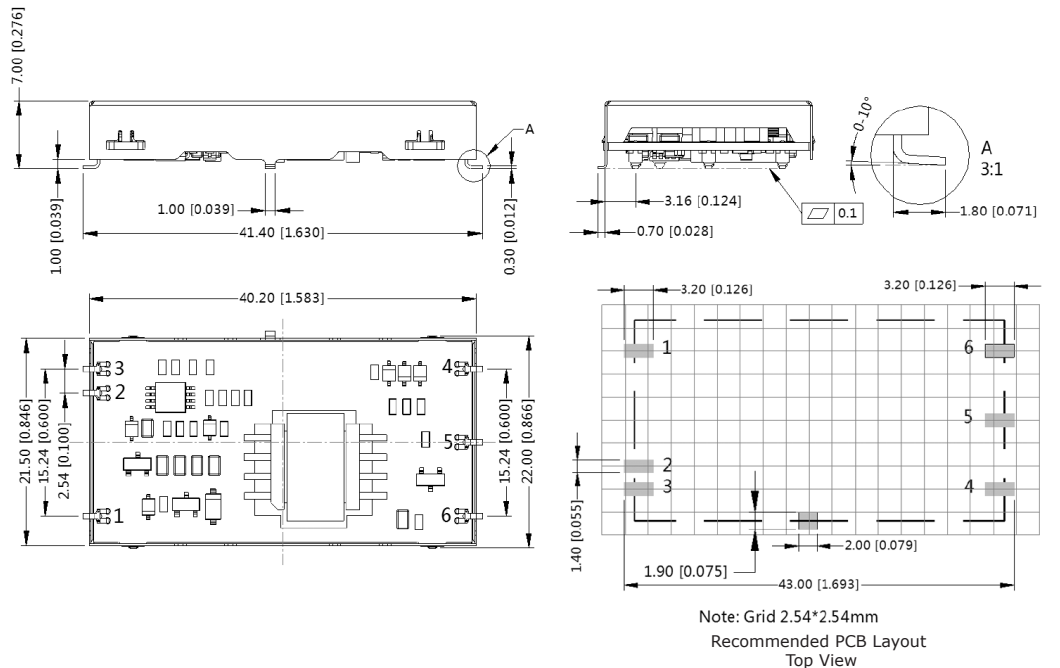
PIN CONNECTIONS	
PIN	Function
1	Vin
2	CTRL
3	GND
4	0V
5	trim
6	+Vo



MECHANICAL DRAWING (SMT WITH CASE)

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

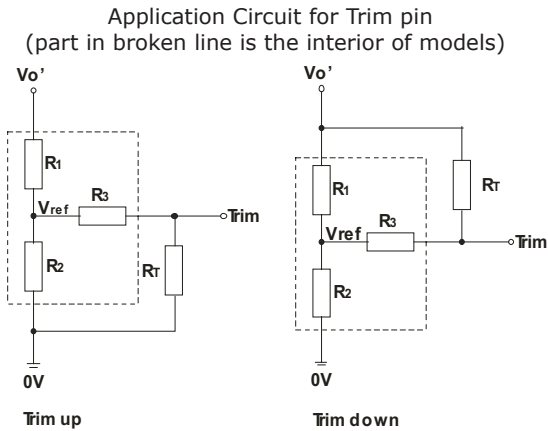
PIN CONNECTIONS	
PIN	Function
1	Vin
2	CTRL
3	GND
4	0V
5	trim
6	+Vo



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_T: 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

REVISION HISTORY

rev.	description	date
1.0	initial release	03/27/2019
1.01	packaging removed	12/16/2020

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



CUI INC

a bel group

Headquarters
20050 SW 112th Ave.
Tualatin, OR 97062
800.275.4899

Fax 503.612.2383
cui.com
techsupport@cui.com

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