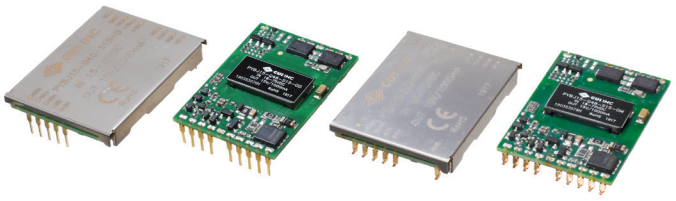
CUI INC
a bel group

SERIES: PYBJ15 | DESCRIPTION: DC-DC CONVERTER

FEATURES

- up to 15 W isolated output
- ultra wide 4:1 input voltage range
- single regulated output
- output short circuit, over current, over voltage protection
- efficiency up to 89%
- DIP and SMT mounting styles
- available with or without case
- 1500 Vdc isolation
- EN 62368-1



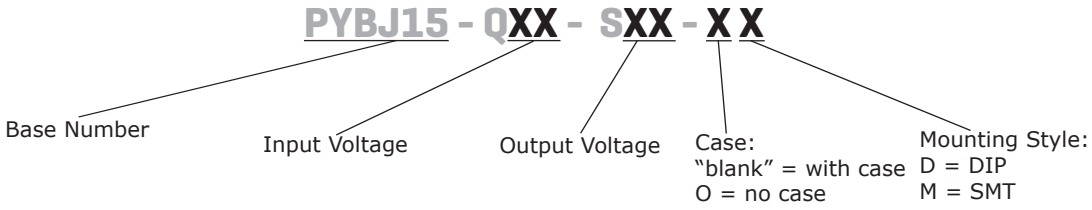
RoHS CE

MODEL

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 (%)
PYBJ15-Q24-S3	24	9~36	3.3	0	4500	14.85	100	88
PYBJ15-Q24-S5	24	9~36	5	0	3000	15	100	88
PYBJ15-Q24-S12	24	9~36	12	0	1250	15	100	89
PYBJ15-Q24-S15	24	9~36	15	0	1000	15	100	89
PYBJ15-Q48-S3	48	18~75	3.3	0	4500	14.85	100	88
PYBJ15-Q48-S5	48	18~75	5	0	3000	15	100	88
PYBJ15-Q48-S12	48	18~75	12	0	1250	15	100	89
PYBJ15-Q48-S15	48	18~75	15	0	1000	15	100	89

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	24 Vdc input models 48 Vdc input models		9 18	24 48	36 75	Vdc Vdc
start-up voltage	24 Vdc input models 48 Vdc input models				9 18	Vdc Vdc
surge voltage	24 Vdc input models for 1 second max 48 Vdc input models for 1 second max		-0.7 -0.7		50 100	Vdc Vdc
under voltage shutdown	24 Vdc input models 48 Vdc input models		5.5 12	6.5 15.5		Vdc Vdc
current	24 Vdc input models	3, 5 Vdc output models 12, 15 Vdc output models			727 718	mA mA
	48 Vdc input models	3.3 Vdc output models 5 Vdc output models			363 360	mA mA
start-up current	24 Vdc input models 48 Vdc input models				3,000 1,500	mA 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 (3.5~12 Vdc)) input current when switched off			6	15	mA
alarm indication (ALM)	Valm (relative to GND), when under voltage protection is going to happen, and during the over voltage protection working status.			0.2	1.2	Vdc
	Valm (relative to GND), other working status		3.5	9		Vdc
filter	Pi filter					
no load power consumption				0.36		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]	3.3, 5 Vdc output models 12 Vdc output models 15 Vdc output models			4,700 1,000 820	µF µF µF
voltage accuracy	from 0% to full load		±1	±2	%
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	%
switching frequency[7]	PWM mode		300		kHz
transient recovery time	25% load step change, nominal input voltage		300	500	µs
transient response deviation	25% load step change, nominal input voltage 3.3, 5 Vdc output models all other output models		 ±3 ±3	 ±8 ±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 ±3%.
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	output shut down	110		160	%
over current protection	hiccup, auto recovery	110	180	230	%
short circuit protection	hiccup, continuous, auto recovery				

SAFETY AND COMPLIANCE

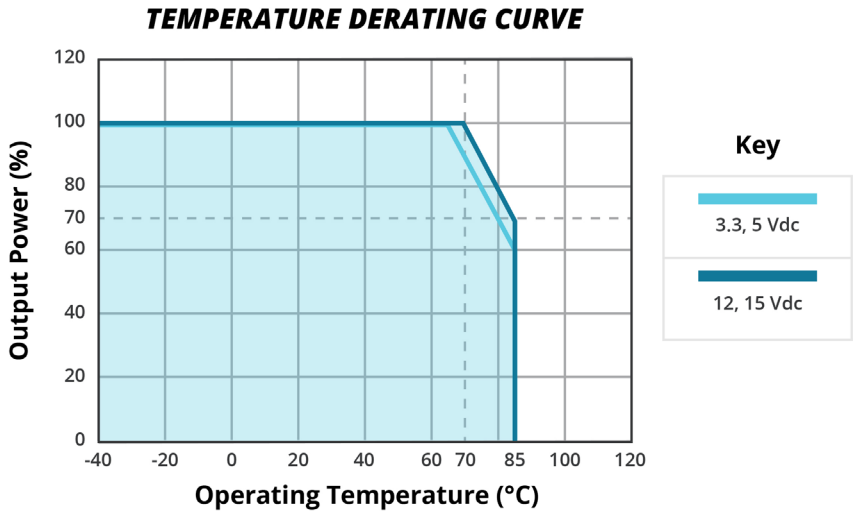
parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA input to case[8] for 1 minute at 1 mA output to case[8] for 1 minute at 1 mA	1,500 500 500			Vdc Vdc Vdc
isolation resistance	input to output at 500 Vdc input to case[8] at 500 Vdc output to case[8] at 500 Vdc	100 100 100			MΩ MΩ MΩ
isolation capacitance	input to output, 100 kHz / 0.1 V		1,000		pF
safety approvals	certified to 62368-1: IEC, EN				
conducted emissions	CISPR32/EN55032, 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 60 minutes on each axis		5		G

DERATING CURVES

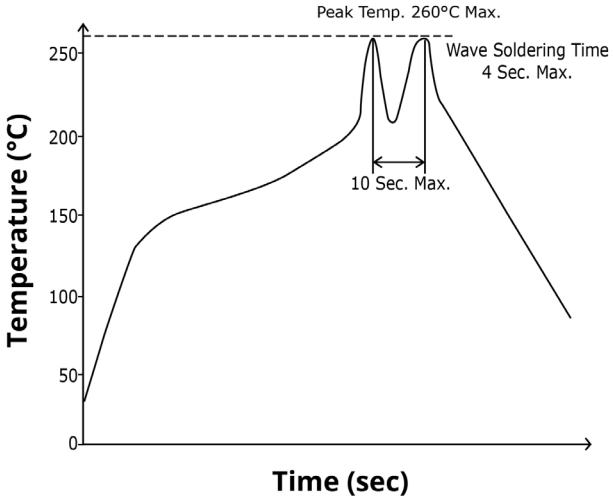


SOLDERABILITY

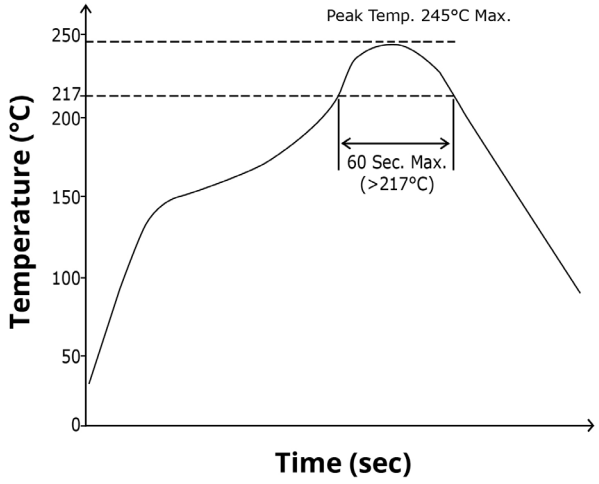
parameter	conditions/description	min	typ	max	units
hand soldering	1.5 mm from case for 10 seconds			300	°C
wave soldering[9]	see wave soldering profile			260	°C
reflow soldering[10]	see reflow soldering profile Maximum duration >217°C is 60 seconds. For actual application, refer to IPC/JEDEC J-STD-020D.1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

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

WAVE SOLDERING PROFILE (DIP models)



REFLOW SOLDERING PROFILE (SMT models)



MECHANICAL

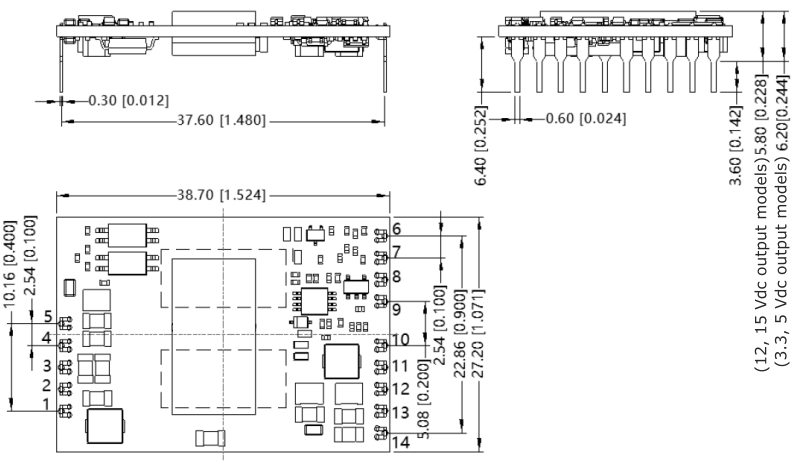
parameter	conditions/description	min	typ	max	units
dimensions	DIP without case: 3.3, 5 Vdc output models: 38.70 x 27.20 x 6.20 [1.524 x 1.071 x 0.244 inch] 12, 15 Vdc output models: 38.70 x 27.20 x 5.80 [1.524 x 1.071 x 0.228 inch]				 mm mm
	DIP with case: 3.3, 5 Vdc output models: 39.10 x 29.50 x 6.80 [1.539 x 1.161 x 0.268 inch] 12, 15 Vdc output models: 39.10 x 29.50 x 6.40 [1.539 x 1.161 x 0.252 inch]				 mm mm
	SMT without case: 3.3, 5 Vdc output models: 38.70 x 27.20 x 6.20 [1.524 x 1.071 x 0.244 inch] 12, 15 Vdc output models: 38.70 x 27.20 x 5.80 [1.524 x 1.071 x 0.228 inch]				 mm mm
	SMT with case: 3.3, 5 Vdc output models: 39.10 x 29.50 x 6.80 [1.539 x 1.161 x 0.268 inch] 12, 15 Vdc output models: 39.10 x 29.50 x 6.40 [1.539 x 1.161 x 0.252 inch]				 mm mm
case material	aluminum alloy				
weight	without case 3.3, 5 Vdc output models without case 12, 15 Vdc output models with case 3.3, 5 Vdc output models with case 12, 15 Vdc output models		11.0 8.8 13.8 11.5		g g g g

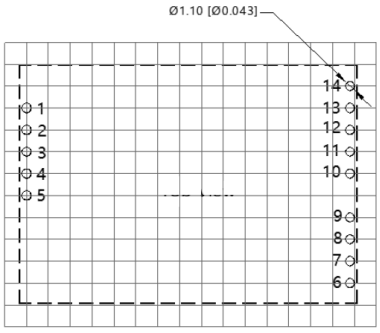
MECHANICAL DRAWING (DIP WITHOUT CASE)

units: mm [inch]
tolerance: ±0.50[±0.020]
pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS	
PIN	Function
1	+Vo
2	+Vo
3	+Vo
4	0V
5	0V
6	NC
7	ALM
8	CTRL
9	NC
10	+Vin
11	+Vin
12	GND
13	GND
14	NC

Note: NC = no connect





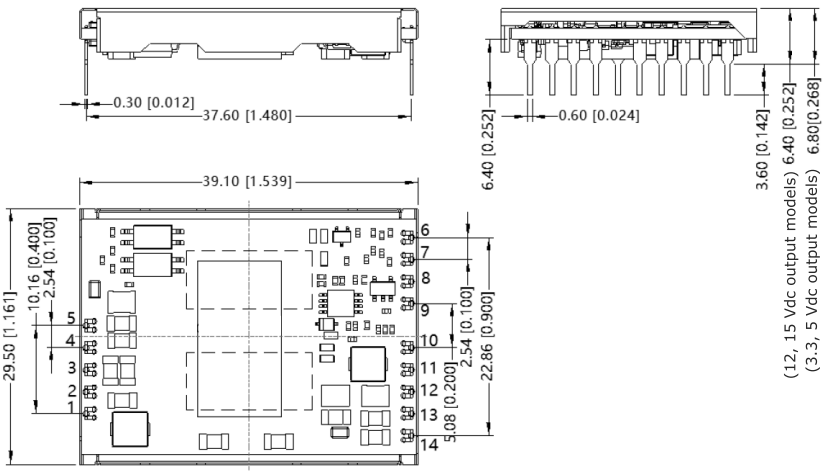
Note: Grid 2.54*2.54mm
Recommended PCB Layout
Top View

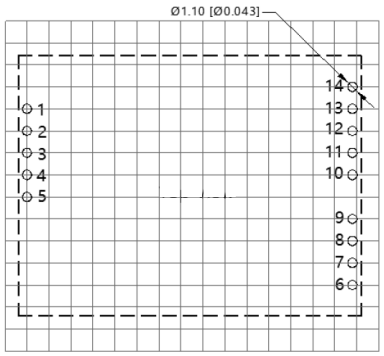
MECHANICAL DRAWING (DIP WITH CASE)

units: mm [inch]
tolerance: ±0.50[±0.020]
pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS	
PIN	Function
1	+Vo
2	+Vo
3	+Vo
4	0V
5	0V
6	NC
7	ALM
8	CTRL
9	NC
10	+Vin
11	+Vin
12	GND
13	GND
14	NC

Note: NC = no connect





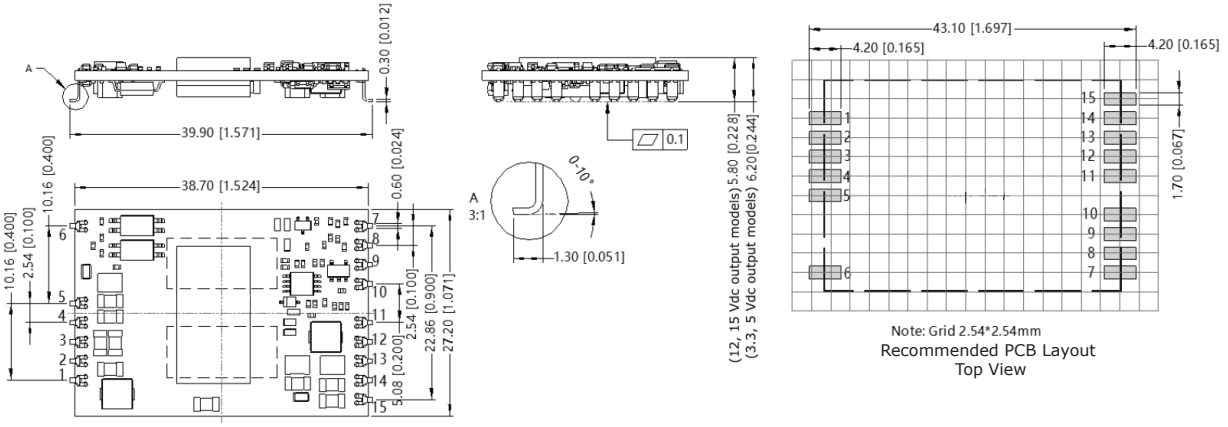
Note: Grid 2.54*2.54mm
Recommended PCB Layout
Top View

MECHANICAL DRAWING (SMT WITHOUT CASE)

units: mm [inch]
tolerance: ±0.50[±0.020]
pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS	
PIN	Function
1	+Vo
2	+Vo
3	+Vo
4	0V
5	0V
6	NC
7	NC
8	ALM
9	CTRL
10	NC
11	+Vin
12	+Vin
13	GND
14	GND
15	NC

Note: NC = no connect

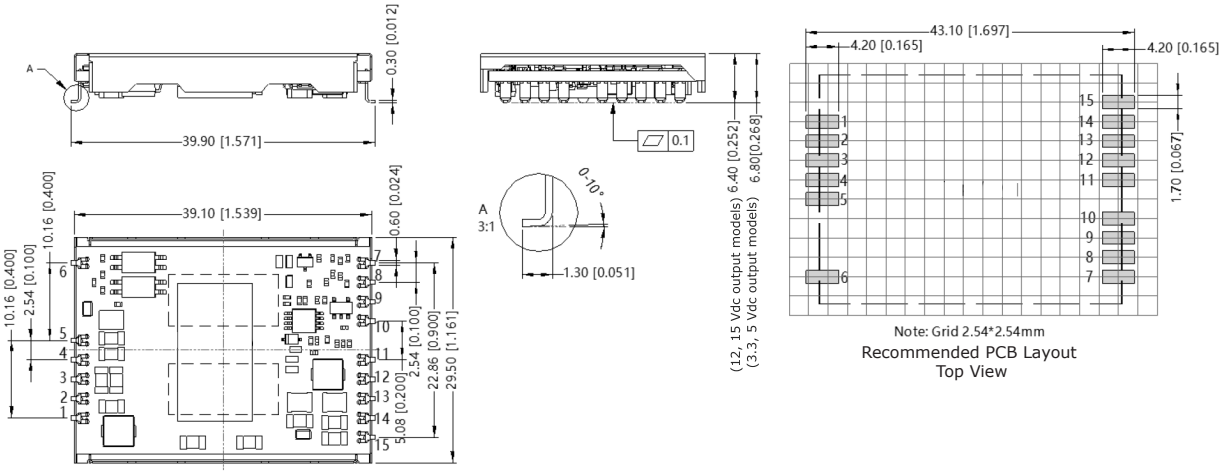


MECHANICAL DRAWING (SMT WITH CASE)

units: mm [inch]
tolerance: ±0.50[±0.020]
pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS	
PIN	Function
1	+Vo
2	+Vo
3	+Vo
4	0V
5	0V
6	NC
7	NC
8	ALM
9	CTRL
10	NC
11	+Vin
12	+Vin
13	GND
14	GND
15	NC

Note: NC = no connect



APPLICATION CIRCUIT

This series has been tested according to the following recommended circuit (Figure 1) before leaving the factory. If you want to further reduce the input and output ripple, you can increase the input and output capacitors or select capacitors of low equivalent impedance provided that the capacitance is less than the maximum capacitive load of the model.

Figure 1

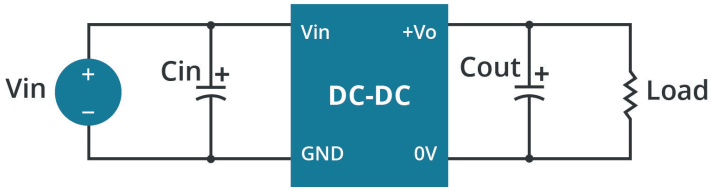


Table 1

Vout (Vdc)	Cin (μF)	Cout (μF)
3.3/5/12/15	100	10

EMC RECOMMENDED CIRCUIT

Figure 2

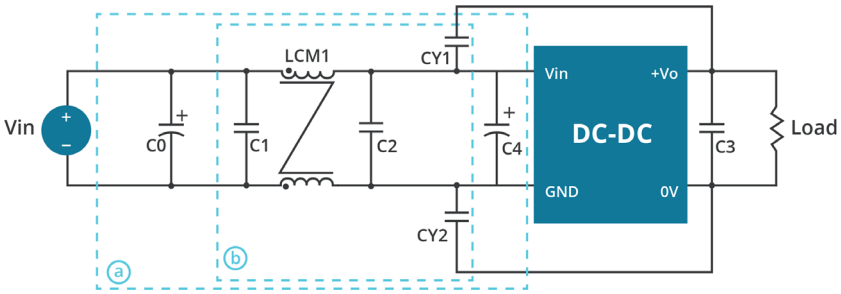


Table 2

Recommended External Circuit Components		
Vin (Vdc)	24	48
FUSE	choose according to actual input current	
C0	470 μF / 50 V	680 μF / 100 V
C1, C2	4.7 μF / 50 V	4.7 μF / 100 V
C3	refer to the Cout in Table 1	
C4	330 μF / 50 V	330 μF / 100 V
LCM1	4.7 μH	
CY1, CY2	2000 pF /2 kV	

REVISION HISTORY

rev.	description	date
1.0	initial release	06/24/2019
1.01	packaging removed, safeties updated in features and safety line	01/14/2021
1.02	derating curve and circuit figures updated	07/28/2021

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

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