

DC-DC CONVERTERS

2:1 AND 4:1 INPUT RANGE, UP TO 30 WATTS

MEDICAL APPLICATIONS

CWA30, CWB30 SERIES



FEATURES

- 2x MOPP
- 5,000 Vac Reinforced Insulation
- 4:1 Wide Input Range
- 2:1 Input Range
- Internal EN 55032 Class A Filter
- Low Leakage Current
- Low Standby Power
- No Minimum Load Required
- Operating Altitude 5,000 Meters
- Remote ON/OFF
- Over Current Protection
- Over Temperature Protection
- Over Voltage Protection
- Short Circuit Protection
- Under Voltage Protection RoHS Compliant
- REACH Compliant
- CE Mark

SELECTION GUIDE

All specifications are typical at 230Vac input, full load and 25°C, unless otherwise noted.

Input Range Vdc	Output Voltage Vdc	Output Current at Full Load A	Input Current at No Load mA	Efficiency %	Maximum Capacitor Load µF	Model Number*
9 - 18	5	6	9	88.5	7200	CWA30-12S5
9 - 18	12	2.5	10	88.5	1200	CWA30-12S12
9 - 18	15	2	12	89.5	1000	CWA30-12S15
9 - 18	24	1.25	11	89	375	CWA30-12S24
18 - 36	5	6	8	88.5	7200	CWA30-24S5
18 - 36	12	2.5	10	89	1200	CWA30-24S12
18 - 36	15	2	9	90.5	1000	CWA30-24S15
18 - 36	24	1.25	9	89.5	375	CWA30-24S24
36 - 75	5	6	8	89	7200	CWA30-48S5
36 - 75	12	2.5	9	89	1200	CWA30-48S12
36 - 75	15	2	8	90	1000	CWA30-48S15
36 - 75	24	1.25	9	89	375	CWA30-48S24

CWA30, CWB30 SERIES

SELECTION GUIDE (CONTINUED)

Input Range Vdc	Output Voltage Vdc	Output Current at Full Load A	Input Current at No Load mA	Efficiency %	Maximum Capacitor Load μ F	Model Number*
9 - 18	\pm 5	\pm 3	13	86	\pm 3600	CWA30-12-5
9 - 18	\pm 12	\pm 1.25	11	88.5	\pm 750	CWA30-12-12
9 - 18	\pm 15	\pm 1	13	89	\pm 500	CWA30-12-15
18 - 36	\pm 5	\pm 3	10	86	\pm 3600	CWA30-24-5
18 - 36	\pm 12	\pm 1.25	9	90	\pm 750	CWA30-24-12
18 - 36	\pm 15	\pm 1	10	90	\pm 500	CWA30-24-15
36 - 75	\pm 5	\pm 3	9	86.5	\pm 3600	CWA30-48-5
36 - 75	\pm 12	\pm 1.25	9	90	\pm 750	CWA30-48-12
36 - 75	\pm 15	\pm 1	8	89.5	\pm 500	CWA30-48-15
9 - 36	5	6	9	88.5	7200	CWB30-24S5
9 - 36	12	2.5	10	89	1200	CWB30-24S12
9 - 36	15	2	10	90.5	1000	CWB30-24S15
9 - 36	24	1.25	10	89.5	375	CWB30-24S24
18 - 75	5	6	8	89	7200	CWB30-48S5
18 - 75	12	2.5	9	89	1200	CWB30-48S12
18 - 75	15	2	8	90	1000	CWB30-48S15
18 - 75	24	1.25	9	89	375	CWB30-48SS24
9 - 36	\pm 5	\pm 3	10	86	\pm 3600	CWB30-24-5
9 - 36	\pm 12	\pm 1.25	10	89.5	\pm 750	CWB30-24-12
9 - 36	\pm 15	\pm 1	9	90	\pm 500	CWB30-24-15
18 - 75	\pm 5	\pm 3	9	86.5	\pm 3600	CWB30-48-5
18 - 75	\pm 12	\pm 1.25	9	90	\pm 750	CWB30-48-12
18 - 75	\pm 15	\pm 1	8	89.5	\pm 500	CWB30-48-15

CWA30, CWB30 SERIES

Input Specifications			Output Specifications			
Voltage range, Vdc	9 Min., 12 Typ., 18 Max.	12 Vin (nom), 2:1	Voltage accuracy, %	-1 Min., 1 Max.		
	18 Min., 24 Typ., 36 Max.	24 Vin (nom), 2:1	Line regulation, %	-0.2 Min., 0.2 Max.	Low line to high line at full load, Single	
	36 Min., 48 Typ., 75 Max.	48 Vin (nom), 2:1		-0.5 Min., 0.5 Max.	Dual	
	9 Min., 24 Typ., 36 Max.	24 Vin (nom), 4:1	Load regulation, %	-0.2 Min., 0.2 Max.	No load to full load, Single	
	18 Min., 48 Typ., 75 Max.	48 Vin (nom), 4:1		-1 Min., 1 Max.	Dual	
Start up voltage, Vdc	9 Max.	12 Vin (nom), 2:1	Cross regulation, %	-5 Min., 5 Max.		
	18 Max.	24 Vin (nom), 2:1		Asymmetrical load 25%/100% FL, Dual		
	36 Max.	48 Vin (nom), 2:1	Voltage adjustability, %	-10 Min., 10 Max.		
	9 Max.	24 Vin (nom), 4:1		-10 Min., 20 Max.		
	18 Max.	48 Vin (nom), 4:1		Single output, 5Vout, 12Vout 15Vout, 24Vout		
Shutdown voltage, Vdc	7.8 Min., 8 Typ., 8.6 Max.	12 Vin (nom), 2:1	Measured by 20MHz bandwidth			
	15.8 Min., 16 Typ., 17.4 Max.	24 Vin (nom), 2:1	50 Typ.	Single, 5Vout, With a 10µF/25V X7R MLCC		
	32 Min., 33 Typ., 34 Max.	48 Vin (nom), 2:1	75 Typ.	Single, 12Vout, With a 10µF/25V X7R MLCC		
	7.8 Min., 8 Typ., 8.6 Max.	24 Vin (nom), 4:1	100 Typ.	Single, 15Vout, With a 10µF/25V X7R MLCC		
	15.8 Min., 16 Typ., 17.4 Max.	48 Vin (nom), 4:1	100 Typ.	Single, 24Vout, With a 4.7µF/50V X7R MLCC		
Start up time, ms	30 Typ., 60 Max.	Power up, Constant resistive load	Ripple and noise, mVp-p	50 Typ.	Dual, ±5Vout, With a 10µF/25V X7R MLCC	
	30 Typ., 60 Max.	Remote ON/OFF		75 Typ.	Dual, ±12Vout, With a 10µF/25V X7R MLCC	
Input surge voltage, Vdc		3 seconds, Max.		75 Typ.	Dual, ±15Vout, With a 10µF/25V X7R MLCC	
	25 Max.	12 Vin (nom), 2:1		100 Typ.	Temperature coefficient, %/°C	
	50 Max.	24 Vin (nom), 2:1		-0.02 Min., 0.02 Max.		
	100 Max.	48 Vin (nom), 2:1		Transient response recovery time, µs		
	50 Max.	24 Vin (nom), 4:1		250 Typ. 25% load step change		
100 Max.	48 Vin (nom), 4:1	Over voltage protection, Vdc				
Input filter	Pi type			6.2 Typ. 5Vout, Zener diode clamp		
	Referred to - Vin pin			15 Typ. 12Vout		
Remote ON/OFF, mA	Open or 3.5 - 12 Vdc	DC-DC ON, Positive logic	20 Typ. 15Vout			
	Short or 0 - 1.2 Vdc	DC-DC OFF, Positive logic	30 Typ. 24Vout			
	Short or 0 - 1.2 Vdc	DC-DC ON, Negative logic	Over load protection, %			
	Open or 3.5 - 12 Vdc	DC-DC OFF, Positive logic	150 Typ., 185 Max. % of Iout rated; Hiccup mode			
	-0.5 Min., 1 Max.	Input current of Ctrl pin	Short circuit protection			
	2.5 Typ.	Remote off input current	Continuous, automatic recovery			

CWA30, CWB30 SERIES

General Specifications

Isolation voltage, Vac	1 minute, input to output, reinforced insulation for 250 Vac working voltage	5000 Min.		
Isolation capacitance, pF			20 Typ.	
Leakage current, μ A	240 Vac, 60 Hz		2 Typ.	2.5 Max.
Switching frequency, kHz		225 Min.	250 Typ.	285 Max.
Clearance/creepage, mm		8 Min.		

Environmental Specifications

Operating ambient temperature, $^{\circ}$ C	With derating	-40 Min.		+105 Max.
Maximum case temperature, $^{\circ}$ C				+105 Max.
Over temperature protection $^{\circ}$ C			115 Typ.	
Storage temperature range, $^{\circ}$ C		-55 Min.		125 Max.
Thermal impedance			12.85 Typ.	
Operating altitude, m				5000 Max.
Thermal shock		MIL-STD-810-F		
Vibration		MIL-STD-810-F		
Relative humidity		5% to 95% RH		

Physical Specifications

Design meet safety standard	IEC/EN/ANSI/AAMI ES 60601-1, UL:E360199 IEC/EN/UL 60950-1, 62368-1, UL:E193009, CB:UL(Demko)
Case material	Non-conductive black plastic
Base material	Non-conductive black plastic
Potting material	Silicone, (UL94 V-0)
Dimensions	2.0" \times 1.0" \times 0.4" (50.8 \times 25.4 \times 10.2 mm)
Weight	32g (1.13oz)
MTBF	1.137 \times 10 ⁶ hrs , MIL-HDBK-217F, Full load

EMC Specifications

Specifications	Conditions	Level	
EMI	EN55011, EN55032 and FCC Part 18	Without external components	Class A
		With external components	Class B
ESD	EN61000-4-2	Air \pm 15KV and Contact \pm 8KV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10V/m	Perf. Criteria A
Fast transient ⁽¹⁾	EN61000-4-4	\pm 2KV	Perf. Criteria A

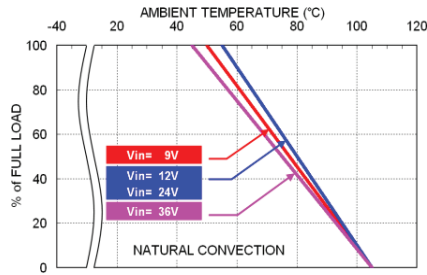
Note:

- The CWA30-12XXX/ CWB30-12XXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220 μ F/100V) and a TVS (SMDJ36A, 36V, 3000Watt peak pulse power) to connect in parallel.
The CWA30-12XXX/ CWB30-12XXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220 μ F/100V) and a TVS (SMDJ58A, 58V, 3000Watt peak pulse power) to connect in parallel.
The CWA30-12XXX/ CWB30-12XXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220 μ F/100V) and a TVS (SMDJ120A, 120V, 3000Watt peak pulse power) to connect in parallel.
- For further information, please contact Polytron Devices.

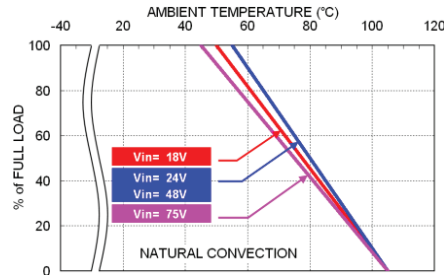
CAUTION: This power module is not internally fused. An input line fuse must always be used.

CWA30, CWB30 SERIES

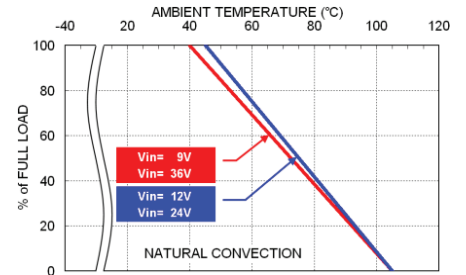
Characteristic Curve



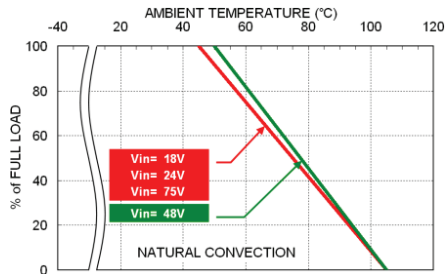
CWB30-24SXX Derating Curve



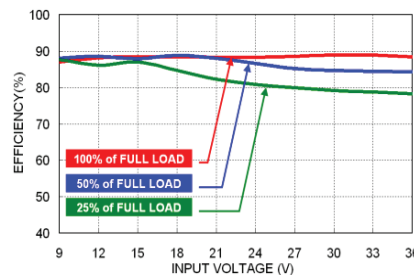
CWB30-48SXX Derating Curve



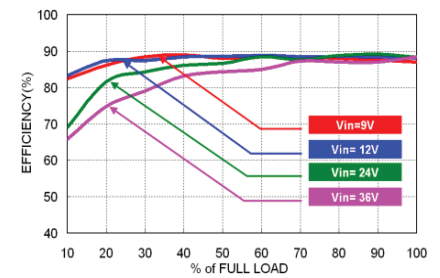
CWB30-24-5 Derating Curve



CWB30-48S5 Derating Curve



CWB30-24S5 Efficiency vs. Input Voltage



CWB30-24S5 Efficiency vs. Output Load

Fuse Consideration

Modules	Fuse Rating (A)	Fuse Type
CPA30-12XX, CPB30-24SXX	6.3	Slow-Blow
CPA30-24XX, CPB30-48SXX	3.15	Slow-Blow
CPA30-48XX	1.6	Slow-Blow

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

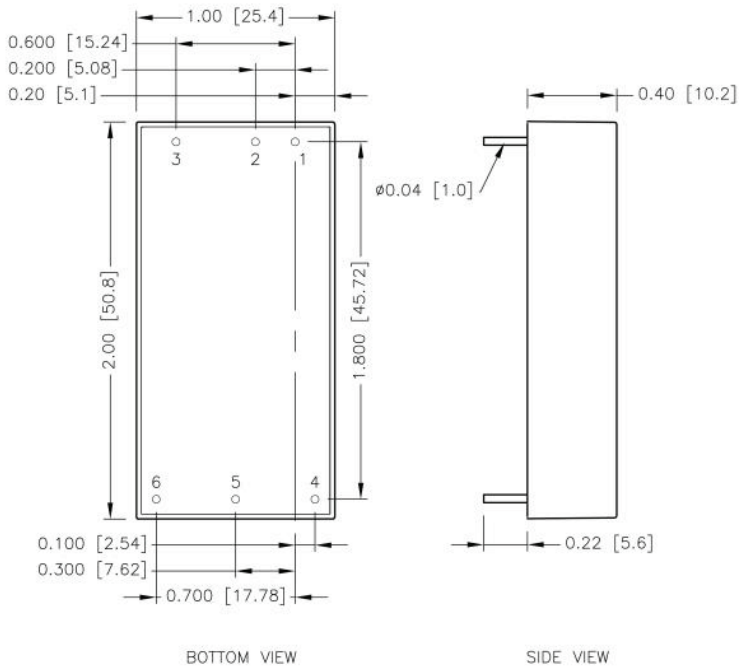
To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system production, always use an input line fuse.

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

CWA30, CWB30 SERIES

Mechanical Drawing

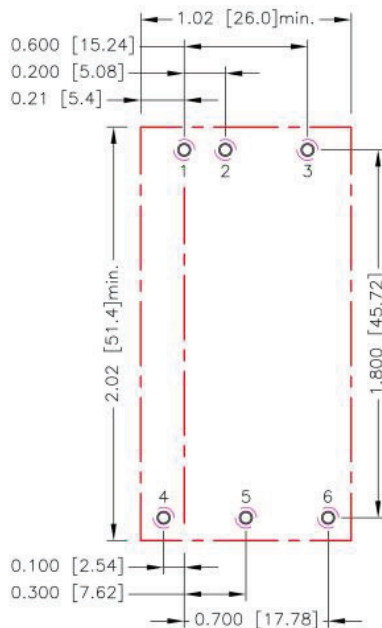


PIN CONNECTION

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl (Option)	Ctrl (Option)
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

1. All dimensions in inches (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
3. Pin dimension tolerance ±0.004(0.10)

Recommended Pad Layout



1. All dimensions in inches (mm)
2. Pad Size (lead free recommended)
3. Through hole 1.2.3.4.5.6: $\varnothing 0.051$ (1.30)
4. Top view pad 1.2.3.4.5.6: $\varnothing 0.064$ (1.63)
5. Bottom view pad 1.2.3.4.5.6: $\varnothing 0.102$ (2.60)
6. There should be at least 8mm between primary and secondary circuit

CWA30, CWB30 SERIES

Thermal Considerations

The power module operates in a variety of thermal environments.

However, sufficient cooling should be provided to help ensure reliable operation of the unit.

Heat is removed by conduction, convection and radiation to the surrounding Environment.

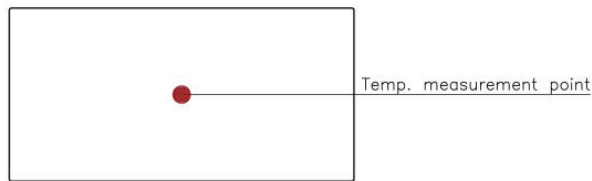
Proper cooling can be verified by measuring the point as the figure below.

The temperature at this location should not exceed "Maximum case temperature".

When Operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature".

You can limit this Temperature to a lower value for extremely high reliability.

Thermal test condition with vertical direction by natural convection (20LFM)



Output Voltage Adjustment

It allows the user to increase or decrease the output voltage of the module.

This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or -Vout pins.

With an external resistor between the Trim and -Output pin, the output voltage increases.

With an external resistor between the Trim and +Output pin, the output voltage decreases.

The external Trim resistor needs to be at least 1/16 W of rated power.

TRIM UP EQUATION:

$$R_U = \left[\frac{G \times L}{(V_{O,up} - L - K)} - H \right] \Omega$$

TRIM DOWN EQUATION:

$$R_D = \left[\frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H \right] \Omega$$

TRIM CONSTANTS:

MODULE	G	H	K	L
CWA30-XXS5, CWB30-XXS5	5110	2050	2.5	2.5
CWA30-XXS12, CWB30-XXS12	10000	5110	9.5	2.5
CWA30-XXS15, CWB30-XXS15	10000	5110	12.5	2.5
CWA30-XXS24, CWB30-XXS24	56000	13000	21.5	2.5

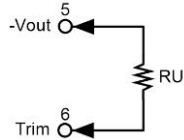
CWA30, CWB30 SERIES

Output Voltage Adjustment (continued)

EXTERNAL OUTPUT TRIMMING:

Output can be externally trimmed by using the method shown below.

TRIM-UP:



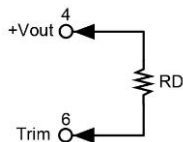
CWA30-XXS5		CWB30-XXS5								
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.05	5.1	5.15	5.2	5.25	5.3	5.35	5.4	5.45	5.5
RU (k Ω)	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500

CWA30-XXS12		CWB30-XXS12								
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.2
RU (k Ω)	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723

CWA30-XXS15		CWB30-XXS15								
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.15	15.3	15.45	15.6	15.75	15.9	16.05	16.2	16.35	16.5
RU (k Ω)	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557
ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	16.65	16.8	16.95	17.1	17.25	17.4	17.55	17.7	17.85	18
RU (k Ω)	10.042	8.779	7.711	6.795	6.001	5.307	4.694	4.149	3.662	3.223

CWA30-XXS24		CWB30-XXS24								
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.24	24.48	24.72	24.96	25.2	25.44	25.68	25.92	26.16	26.4
RU (k Ω)	570.333	278.667	181.444	132.833	103.667	84.222	70.333	59.917	51.815	45.333
ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	26.64	26.88	27.12	27.36	27.6	27.84	28.08	28.32	28.56	28.8
RU (k Ω)	40.030	35.611	31.872	28.667	25.889	23.458	21.314	19.407	17.702	16.167

TRIM-DOWN:



CWA30-XXS5		CWB30-XXS5								
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	4.95	4.9	4.85	4.8	4.75	4.7	4.65	4.6	4.55	4.5
RD (k Ω)	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390

CWA30-XXS12		CWB30-XXS12								
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	11.88	11.76	11.64	11.52	11.4	11.28	11.16	11.04	10.92	10.8
RD (k Ω)	776.557	380.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057

CWA30-XXS15		CWB30-XXS15								
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	14.85	14.7	14.55	14.4	14.25	14.1	13.95	13.8	13.65	13.5
RD (k Ω)	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223

CWA30-XXS24		CWB30-XXS24								
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	23.76	23.52	23.28	23.04	22.8	22.56	22.32	22.08	21.84	21.6
RD (k Ω)	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	488.407	432.667