



## DC-DC CONVERTERS

REGULATED, 4:1 WIDE INPUT RANGE UP TO 30 WATTS

LOW PROFILE, SINGLE & DUAL OUTPUT

LPB30 SERIES

### FEATURES

- 4:1 Ultra Wide Input Voltage Range
- No Minimum Load Required
- High Efficiency Up to 92%
- Extra Small Low Profile Package: 1.0" × 1.0" × 0.39"
- Six Sided Continuous Shield
- Safety Meets UL60950-1, EN60950-1 and IEC60950-1
- CE Mark
- Compliant to RoHS & Reach

### SELECTION GUIDE

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

Input Voltage Range Vdc	Output Voltage Vdc	Output Current at Full Load mA	Input Current at No Load mA	Efficiency %	Model Number	Maximum Capacitor Load <sup>(1)</sup> µF
9 - 36	3.3	7000	10	88	LPB30-24S33	10000
9 - 36	5	6000	10	89	LPB30-24S5	7200
9 - 36	12	2500	10	89	LPB30-24S12	1200
9 - 36	15	2000	10	89	LPB30-24S15	1000
9 - 36	24	1250	10	90	LPB30-24S24	375
18 - 75	3.3	7000	10	88	LPB30-48S33	10000
18 - 75	5	6000	10	90	LPB30-48S5	7200
18 - 75	12	2500	8	90	LPB30-48S12	1200
18 - 75	15	2000	8	91	LPB30-48S15	1000
18 - 75	24	1250	8	92	LPB30-48S24	375
9 - 36	±12	±1250	10	89	LPB30-24-12	±750
9 - 36	±15	±1000	10	91	LPB30-24-15	±500
9 - 36	±24	±625	12	91	LPB30-24-24	±180
18 - 75	±12	±1250	8	91	LPB30-48-12	±750
18 - 75	±15	±1000	8	92	LPB30-48-15	±500
18 - 75	±24	±625	10	92	LPB30-48-24	±180

#### \*Use Suffix after Model Number:

Standard	Negative logic remote ON/OFF
Suffix "A"	Positive logic remote ON/OFF
Suffix "B"	Without Ctrl pin
Suffix "C"	Negative Logic Remote ON/OFF without trim pin
Suffix "D"	Without Control and Trim Pin
Suffix "E"	Positive logic remote ON/OFF without Trim pin
Suffix "HS"	Heat Sink
Suffix "HC"	Heat Sink with clamp

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Input Specifications			Output Specifications		
Operating input voltage range, Vdc	9 Min., 24 Typ., 36 Max.	24Vin(nom)	Voltage accuracy, %	-1.0 Min., +1.0 Max	
	18 Min., 48 Typ., 75 Max.	48Vin(nom)	Line regulation, %	Low Line to High Line at Full Load	
Input reflected ripple current, mAp-p	30 Typ.	Nominal input and Full load		-0.2 Min., +0.2 Max.	Single
Start up voltage, Vdc	9 Max.	24Vin(nom)	-0.5 Min., +0.5 Max.	Dual	
	18 Max.	48Vin(nom)	Load regulation, %	No Load to Full Load, Single	
Shutdown voltage, Vdc	8 Typ.	24Vin(nom)		-1.0 Min., +1.0 Max.	No Load to Full Load, Dual
	16 Typ.	48Vin(nom)	-0.1 Min., +0.1 Max.	10% Load to 90% Load, Single	
Start up time, ms		Constant resistive load	-0.8 Min., +0.8 Max.	10% Load to 90% Load, Dual	
	30 Max.	Power up	Cross regulation, %	Asymmetrical load 25%/100%FL, Dual	
30 Max.	Remote ON/OFF	Voltage and adjustability <sup>(2)</sup> , %		Single Output, 15Vout, 24Vout	
Input surge voltage, Vdc			1 second, max.	-10 Min., +20 Max.	Others
	50 Max.	24Vin(nom)	-10 Min., +10 Max.	Measured by 20MHz bandwidth, 3.3Vout, 5Vout	
Input filter	Pi type		Ripple and noise, mVp-p	75 Typ.	With a 22µF/25V X7R MLCC, Single, 3.3Vout, 5Vout
	100 Max.	48Vin(nom)		75 Typ.	With 2 pcs of 22µF/25V X7R MLCC, Single, 12Vout, 15Vout
Remote ON/OFF		Referred to -Vin pin	75 Typ.	With 2 pcs of 6.8µF/50V X7R MLCC, Single, 24Vout	
	Open or 3 - 15 Vdc	Positive logic, DC-DC ON	60 Typ.	With a 10µF/25V X7R MLCC for each output, Dual, 12Vout, ±15Vout	
	Short or 0 - 1.2 Vdc	(Option), DC-DC OFF	75 Typ.	With a 4.7µF/50V X7R MLCC for each output, Dual, 24Vout	
	Short or 0 - 1.2 Vdc	Negative logic, DC-DC ON	Temperature coefficient, %/°C	-0.02 Min., +0.02 Max.	
	Open or 3 - 15 Vdc	(Standard), DC-DC OFF		Transient response recovery time, µs	250 Typ.
	-0.5 Min., 1.0 Max., mA	Input current of Ctrl pin	Over voltage protection, Vdc		3.7 Min., 5.4 Max.
2.0 mA Typ.	Remote off input current	5.6 Min., 7.0 Max.		5Vout	
			13.5 Min., 19.6 Max.	12Vout	
			18.3 Min., 22.0 Max.	15Vout	
			29.1 Min., 32.5 Max.	24Vout	
			Over load protection, %	170 Typ.	% of lout rated; Hiccup mode
			Short circuit protection	Continuous, automatics recovery	

General Specifications				
Isolation voltage, Vdc	1 minute	Input to Output	1600 Min.	
	1 minute	Input (Output) to Case	1000 Min.	
Isolation resistance, GΩ	500Vdc		1 Min.	
Isolation capacitance, pF				1500 Max.
Switching frequency, kHz	3.3Vout, 5Vout		248 Min.	275 Typ. 303 Max.
	Others		297 Min.	330 Typ. 363 Max.

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Environmental Specifications			
Operating ambient temperature, °C	Without derating	-40 Min.	+50 Max.
	With derating	+50 Min.	+100 Max.
Maximum case temperature, °C			+105 Max.
Over temperature protection, °C			+115 Typ.
Storage temperature range, °C		-55 Min.	+125 Max.
Thermal impedance, °C/W	Vertical direction by natural convection (20LFM)		
	Without heat-sink		+15 Typ.
	With heat-sink		+13.8 Typ.
Thermal shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
Relative humidity		5% to 95% RH	

Physical Specifications	
Design meet safety standard	UL60950-1, EN60950-1, IEC60950-1
Case material	Copper
Base material	FR4 PCB
Potting material	Silicone (UL94 V-0)
Weight	16.5g (0.58oz)
MTBF	1.259×10 <sup>6</sup> hrs, MIL-HDBK-217F, Full load

EMC Specifications			
Specifications	Conditions		Level
EMI <sup>(3)</sup>	EN55022		Class A
			Class B
ESD	EN61000-4-2	Air ±8kV and Contact ±6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10V/m	Perf. Criteria A
Fast transient <sup>(4)</sup>	EN61000-4-4	±2kV	Perf. Criteria A
Surge <sup>(4)</sup>	EN61000-4-5	±2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10Vr.m.s	Perf. Criteria A

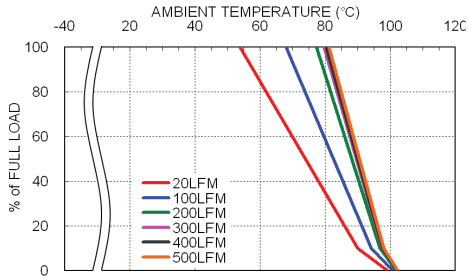
**Note:**

1. Test by minimum input and constant resistive load.
2. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either the +Vout pin or the -Vout pin.
3. The standard modules meet EN55022 Class A and Class B with external components. For further information, please contact Polytron Devices.
4. The external input components are required if the module has to meet EN6100-4-4. EN61000-4-5. The LPB30-24XXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 300Watt peak pulse power) to connect in parallel. The LPB30-48XXX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220µF/100V).

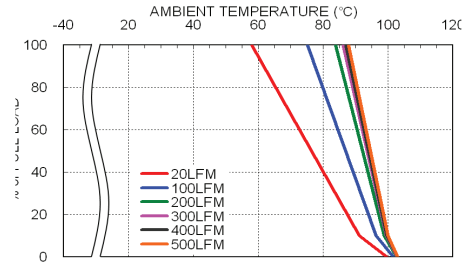
**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

# LPB30 SERIES

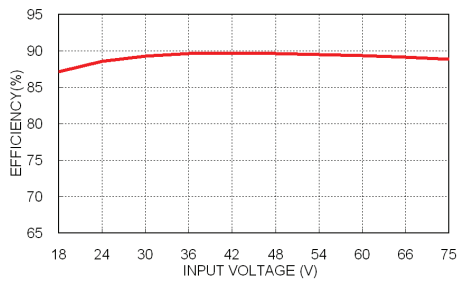
## Characteristic Curve



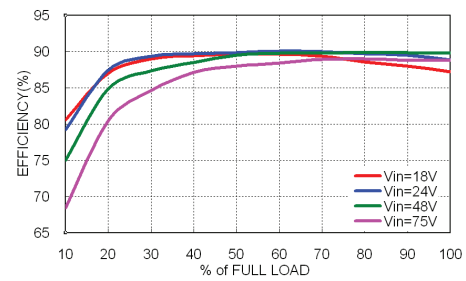
LPB30-48S5 Derating Curve



LPB30-48S5 Derating Curve With Heat-sink

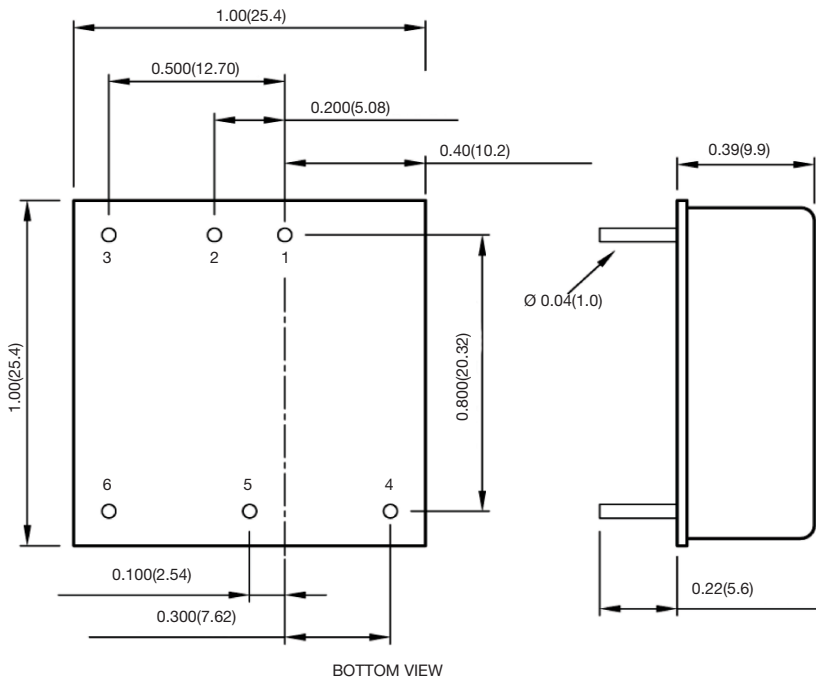


LPB30-48S5 Efficiency vs. Input Voltage



LPB30-48S5 Efficiency vs. Output Load

## Mechanical Drawing

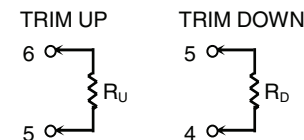


### PIN CONNECTION

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

### EXTERNAL OUTPUT TRIMMING

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



1. All dimensions in inch (mm)
2. Tolerance:  $x.xx \pm 0.02$  ( $x.x \pm 0.5$ )  $x.xxx \pm 0.01$  ( $x.xx \pm 0.25$ )
3. Pin pitch tolerance  $\pm 0.01$  (0.25)
4. Pin dimension tolerance  $\pm 0.004$  (0.1)