

## DC-DC CONVERTERS

### REGULATED, 2:1 WIDE INPUT RANGE, 20 WATTS

#### LOW PROFILE, SINGLE & DUAL OUTPUT

#### LPA20 SERIES



#### FEATURES

- 2:1 Wide Input Voltage Range
- No Minimum Load Required
- High Efficiency Up to 91%
- 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 - 18	3.3	4500	10	89	LPA20-12S33	7000
9 - 18	5	4000	10	89	LPA20-12S5	5000
9 - 18	12	1670	10	89	LPA20-12S12	850
9 - 18	15	1330	10	89	LPA20-12S15	700
9 - 18	24	833	12	89	LPA20-12S24	220
18 - 36	3.3	4500	10	90	LPA20-24S33	7000
18 - 36	5	4000	10	91	LPA20-24S5	5000
18 - 36	12	1670	6	90	LPA20-24S12	850
18 - 36	15	1330	6	91	LPA20-24S15	700
18 - 36	24	833	10	91	LPA20-24S24	220
36 - 75	3.3	4500	10	90	LPA20-48S33	7000
36 - 75	5	4000	10	90	LPA20-48S5	5000
36 - 75	12	1670	4	90	LPA20-48S12	850
36 - 75	15	1330	4	90	LPA20-48S15	700
36 - 75	24	833	8	91	LPA20-48S24	220
9 - 18	±12	±833	10	89	LPA20-12-12	±500
9 - 18	±15	±667	10	90	LPA20-12-15	±350
9 - 18	±24	±417	14	90	LPA20-12-24	±100
18 - 36	±12	±833	6	90	LPA20-24-12	±500
18 - 36	±15	±667	6	90	LPA20-24-15	±350
18 - 36	±24	±417	12	91	LPA20-24-24	±100
36 - 75	±12	±833	4	89	LPA20-48-12	±500
36 - 75	±15	±667	4	90	LPA20-48-15	±350
36 - 75	±24	±417	10	91	LPA20-48-24	±100

#### \*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

**LPA20 SERIES**

Input Specifications			Output Specifications		
Operating input voltage range, Vdc	9 Min., 12 Typ., 18 Max.	12Vin(nom)	Voltage accuracy, %	-1.0 Min., 1.0 Max	
	18 Min., 24 Typ., 36 Max.	24Vin(nom)	Line regulation, %	Low Line to High Line at Full Load	
	36 Min., 48 Typ., 75 Max.	48Vin(nom)		-0.2 Min., 0.2 Max.	Single
Start up voltage, Vdc	9 Max.	12Vin(nom)	-0.5 Min., 0.5 Max.	Dual	
	18 Max.	24Vin(nom)	Load regulation, %	-0.2 Min., 0.2 Max.	
	36 Max.	48Vin(nom)		No Load to Full Load, Single	
Shutdown voltage, Vdc	8 Typ.	12Vin(nom)	-1.0 Min., 1.0 Max.	No Load to Full Load, Dual	
	16 Typ.	24Vin(nom)	-0.1 Min, 0.1 Max.	10% Load to 90% Load, Single	
	33 Typ.	48Vin(nom)	-0.8 Min., 0.8 Max.	10% Load to 90% Load, Dual	
Start up time, ms		Constant resistive load	Cross regulation, %	-5.0 Min., 5.0 Max.	
	30 Max.	Power up	Voltage and adjustability <sup>(2)</sup> , %	-10 Min., 20 Max.	
	30 Max.	Remote ON/OFF		-10 Min., 10 Max.	
Input surge voltage, Vdc		1 second, max.	Ripple and noise, mVp-p	Single Output, 24Vout	
	25 Max.	12Vin(nom)		Others	
	50 Max.	24Vin(nom)		Measured by 20MHz bandwidth	
	100 Max.	48Vin(nom)		75 Typ.	With a 1µF M/C X7R and a 10µF T/C, 3.3Vout, 5Vout, 12Vout, 15Vout, Single
Input filter	Pi type		75 Typ.	With 2 pcs. of 6.8µF/50V X7R MLCC, 24Vout, Single	
	25 Max.	12Vin(nom)	100 Typ.	With a 1µF M/C X7R and a 10µF T/C per output, 12Vout, 15Vout, Dual	
Input reflected ripple current, mAp-p	30 Typ.	Nominal input and Full load	100 Typ.	With a 4.7µF/50V X7R MLCC per output, 24Vout, Dual	
		Referred to -Vin pin	Temperature coefficient, %/°C	-0.02 Min., -0.02 Max.	
Remote ON/OFF	Open or 3 - 15 Vdc	Positive logic, DC-DC ON	Transient response recovery time, µs	250 Typ.	
	Short or 0 - 1.2 Vdc	(Option), DC-DC OFF		25% load step change	
	Short or 0 - 1.2 Vdc	Negative logic, DC-DC ON	Over voltage protection, Vdc	3.7 Min., 5.4 Max.	
	Open or 3 - 15 Vdc	(Standard), DC-DC OFF		5.6 Min., 7 Max.	
	-0.5 Min., 1 Max., mA	Input current of Ctrl pin		13.5 Min., 19.6 Max.	
	2.5 mA Typ.	Remote off input current		16.8 Min., 20.5 Max.	
			29.1 Min., 32.5 Max.		
		Over load protection, %	150 Typ.		
		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.
Design meet safety standard	UL60950-1, EN60950-1, IEC60950-1			

## LPA20 SERIES

### Environmental Specifications

Operating ambient temperature, °C	Without derating	-40 Min.	60 Max.
	With derating	60 Min.	101 Max.
Maximum case temperature, °C			105 Max.
Storage temperature range, °C		-55 Min.	125 Max.
Thermal impedance, °C/W	Natural convection (20LFM)		
	Without heat-sink		17.6 Typ.
	With heat-sink		14.8 Typ.
Thermal shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
Relative humidity		5% to 95% RH	

### Physical Specifications

Case material	Nickel-coated copper
Base material	FR4 PCB
Potting material	Silicone (UL94 V-0)
Weight	15g (0.53oz)
MTBF	1.477×10 <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

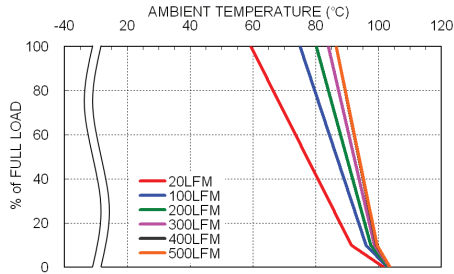
#### Note:

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 without external components and meet Class B with external components. For further information, please contact Polytron Devices.
4. An external input filter capacitor is required if the module has to meet EN6100-4-4, EN61000-4-5. Recommended 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220µF/100V) to connect in parallel.

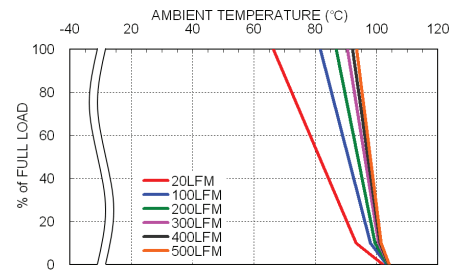
**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

## LPA20 SERIES

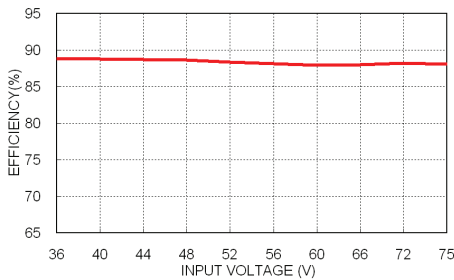
### Characteristic Curve



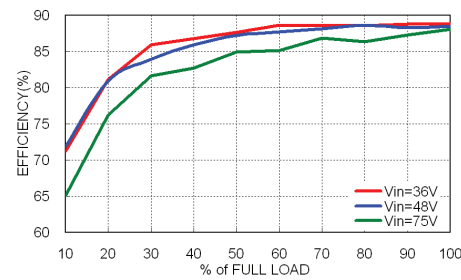
LPA20-48S5 Derating Curve



LPA20-48S5 Derating Curve With Heat-sink

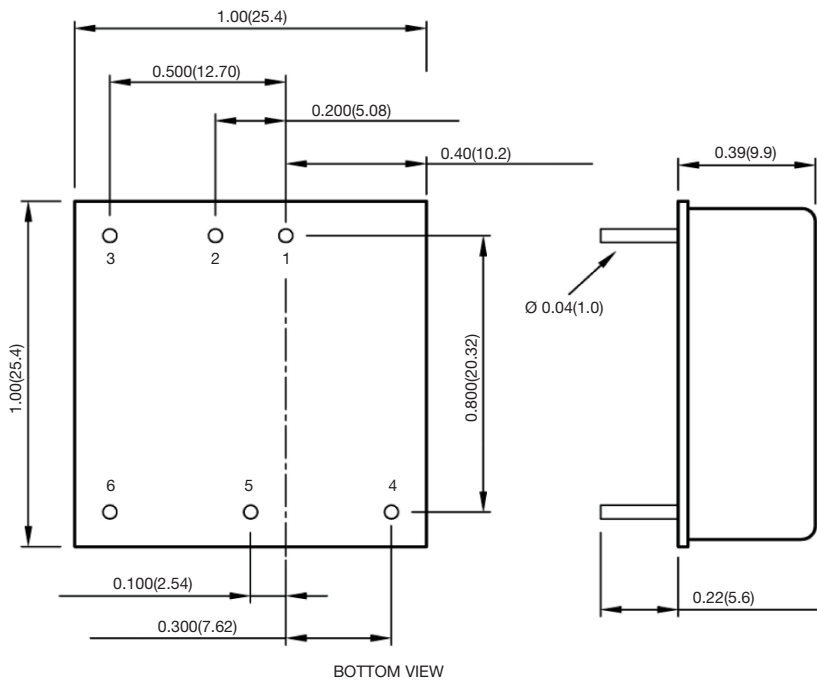


LPA20-48S5 Efficiency vs. Input Voltage



LPA20-48S5 Efficiency vs. Output Load

### Mechanical Drawing

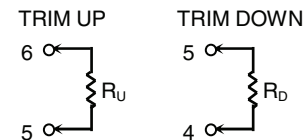


#### PIN CONNECTION

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)