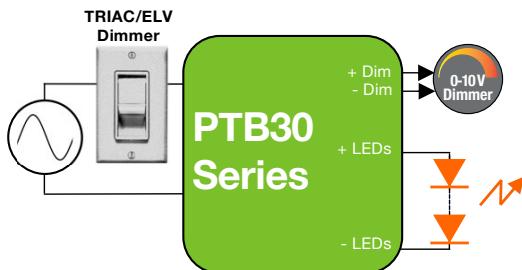


30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

Nominal Input Voltage	Max. Output Power	Efficiency	Max. Case Temperature	THD	Power Factor	Dimming Method	Dimming Range	Startup Time
120 & 277 Vac	30 W	up to 90% typical	90°C (measured at the hot spot)	< 20%	> 0.9	Programmable Forward-Phase, Reverse-Phase & 0 - 10 V	1 - 100% (% of Iout)	300 ms typical

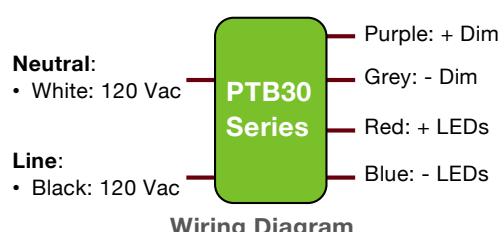


FEATURES

- Class 2 power supply
- Lifetime: 5 years @ $T_c = xx^\circ C$
- 90°C maximum case hot spot temperature
- IP20-rated case
- Surge protection:
 - IEC61000-4-5: 2 kV line to line/2 kV line to earth
 - 2.5 kV ring wave: ANSI/IEEE c62.41.1-2002 & c62.41.2-2002 category A
- Complies with ENERGY STAR®, DLC (DesignLight Consortium®) and CA Title 24 technical requirements
- Optional mounting clips for multiple mounting methods

PROGRAMMING

- Audio jack programming
- Current: 100% to 60% in each voltage range
- 0-10 V dimming profiles: Linear, Non-linear, Logarithmic
- Programmable conduction angles with turn-on & turn-off for TRIAC & ELV
- Data log read: SKU, S/N, lot code, hours of operation, FW rev., power cycles



Wiring Diagram

APPLICATIONS

- Commercial & residential lighting
- Architectural lighting
- Indoor Lighting



30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

1 - ORDERING INFORMATION

Part Number	Nominal Input Voltage (Vac)	Max Output Power (W)	Iout (mA)	Default Programmed Current (mA)	Vout Min. (Vdc)	Vout Nom. (Vdc)	Vout Max. (Vdc)	Open Loop (No Load) Voltage (Vdc)
120 & 277 VAC NOMINAL INPUT VOLTAGE								
PTB15W-0350-42	120 & 277	14.7	210 to 350	250	28	37.8	42	50
PTB30W-0500-42	120 & 277	21.0	300 to 500	350	28	37.8	42	50
PTB30W-0700-42	120 & 277	29.4	420 to 700	500	28	37.8	42	50

Notes:

- By default, each PTB series driver is shipped with 2 metal mounting clips. Additional mounting clips can be ordered separately using the part number PTB-CLIPS-100 or PTB-CLIPS-1K
- For additional options of output current and output voltage, contact your sales representative or send an email to: SaveEnergy@erp-power.com
- Please order the programming cable using the part number PROG-JACK-USB.

Programming Cable

Part number: PROG-JACK-USB





PTB30/15 Series

PTB30 30 W
PTB15 15 W

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

2 - INPUT SPECIFICATION (@25° C ambient temperature)

	Units	Minimum	Typical	Maximum	Notes
Input Voltage Range (Vin)	Vac	90	120, 277	305	<ul style="list-style-type: none">The rated output current for each model is achieved at $V_{in} \geq 108$ Vac & at $V_{in} \geq 249$ Vac.At nominal load
Input Frequency Range	Hz	47	50/60	63	
Input Current (Iin)	A			0.25 A @ 120 Vac 0.11 A @ 277 Vac	
Power Factor (PF)		0.9	> 0.9		<ul style="list-style-type: none">At nominal input voltage and with nominal LED voltageFrom 100% to 60% of rated power
Inrush Current	A	Meets NEMA-410 requirements			<ul style="list-style-type: none">At any point on the sine wave and 25°CActive limiting inrush current is available as an option. Please contact your ERP representative or send an email to SaveEnergy@erp-power.com.
Leakage Current	mA			0.3 mA @ 120 Vac 0.7 mA @ 277 Vac	Measured per IEC60950-1
Input Harmonics	Complies with IEC61000-3-2 for Class C equipment				
Total Harmonics Distortion (THD)				20%	<ul style="list-style-type: none">At nominal input voltage and nominal LED voltageFrom 100% to 60% of rated powerComplies with DLC (Design Light Consortium) technical requirements
Efficiency	%	-	up to 90%	-	Measured with nominal input voltage, a full sinusoidal wave form and without dimmer attached.
Isolation	The AC input to the main DC output and 0-10 V circuit is isolated. UL8750 supplement SF compliant.				

3 - MAIN OUTPUT SPECIFICATION (@25° C ambient temperature)

	Units	Minimum	Typical	Maximum	Notes
Output Voltage (Vout)	Vdc				See ordering information for details
Output Current (Iout)	mA				<ul style="list-style-type: none">See ordering information for detailsThe rated output current for each model is achieved at $V_{in} \geq 108$ Vac, $V_{in} \geq 209$ Vac, & at $V_{in} \geq 249$ Vac.
Output Current Regulation	%	-5	±2.5	5	<ul style="list-style-type: none">At nominal AC line voltageIncludes load and current set point variations
Output Current Overshoot	%	-	-	10	The driver does not operate outside of the regulation requirements for more than 500 ms during power on with nominal LED load and without dimmer.
Ripple Current	≤ 20% of rated output current for each model				<ul style="list-style-type: none">Measured at nominal LED voltage and nominal input voltage without dimmingCalculated in accordance with the IES Lighting Handbook, 9th edition
Dimming Range (% of Iout)	%	1		100	<ul style="list-style-type: none">The dimming range is dependent on each specific dimmer. It may not be able to achieve 1% dimming with some dimmers.Dimming performance is optimal when the driver is operated at its nominal output voltage matching the LED nominal Vf (forward voltage). Dimming performance may vary when the driver is operated near its minimum output voltage.
Start-up Time	ms		300	500	<ul style="list-style-type: none">Without any dimmer attached, and at nominal input voltages and nominal loadMeasured from application of AC line voltage to 100% light outputComplies with ENERGY STAR® luminaire specification and CA Title 24
Isolation	The main DC output is certified and tested per UL8750 Class 2 or LED Class 2. UL8750 supplement SF compliant.				

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

4 - 0-10 V DIMMING CONTROL (@25° C ambient temperature)

In the PTB30 series, several 0-10 V dimming profiles can be selected, such as a logarithmic profile, a non-linear profile with 1% minimum dimming, and a non-linear profile with 10% minimum dimming.

By default, the non-linear profile with 1% minimum dimming (shown in figure 1) is pre-loaded in the PTB30 series.

	Units	Minimum	Typical	Maximum	Notes
+Dim Signal, -Dim Signal					The PTB30 series operate only with 0-10 V dimmers that sink current. The method to dim the output current of the driver is done via the +Dim/-Dim Signal pins. The +Dim/-Dim signal pins can be used to adjust the output setting via a standard commercial wall dimmer, an external control voltage source (0 to 10 Vdc), or a variable resistor when using the recommended number of LEDs. The dimming input permits 1% to 100% dimming.
Dimming Profile (see figure 1)					100% of output current between 10 V and 8.5 V, Linear between 8.5 V and 1.5 V, 1% of output current below 1.5 V.
Dimming Range	%	1		100	As a percent of the output current
High Level Voltage - A	V		8.5		
Low Level Voltage - B	V		1.5		
Current Supplied by the +Dim Signal Pin	mA			1	
Output Current Tolerance While Being Dimmed	%			±8	The tolerance of the output current while being dimmed is $\leq \pm 8\%$ until down to 1.5V.
Isolation					The 0-10 V circuit is isolated from both the AC input and the main DC output and meets Class II reinforced/double insulation power supply.

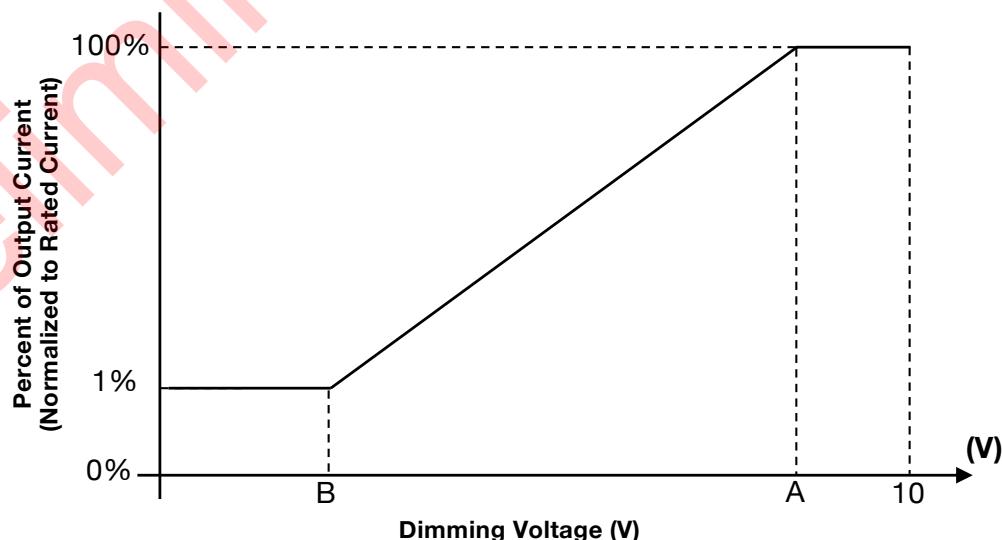


Figure 1

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

5 - ENVIRONMENTAL CONDITIONS

	Units	Minimum	Typical	Maximum	Notes
Operating Ambient Temperature (Ta)	°C	-10		50	When mounted to 240 * 120 * 2 mm aluminum baseplate
Maximum Case Temperature (Tc)	°C			+90	Case temperature measured at the hot spot •tc (see label in page 11)
Storage Temperature	°C	-40		+85	
Humidity	%	5	-	95	Non-condensing
Cooling		Convection cooled			
Acoustic Noise	dBA			24	Measured at a distance of 1 meter, without dimmer
Mechanical Shock Protection	per EN60068-2-27				
Vibration Protection	per EN60068-2-6 & EN60068-2-64				
MTBF	> 200,000 hours when operated at nominal input and output conditions, and at Tc ≤ XX°C				
Lifetime	5 years at Tc ≤ XX°C maximum case hot spot temperature (see hot spot •tc on label in page 11)				

6 - EMC COMPLIANCE AND SAFETY APPROVALS

EMC Compliance					
Conducted and Radiated EMI		FCC CFR Title 47 Part 15 Class B at 120 Vac and Class A at 277 Vac			
Harmonic Current Emissions		IEC61000-3-2 For Class C equipment			
Voltage Fluctuations & Flicker		IEC61000-3-3			
Immunity Compliance	ESD (Electrostatic Discharge)	IEC61000-4-2	6 kV contact discharge, 8 kV air discharge, level 3		
	RF Electromagnetic Field Susceptibility	IEC61000-4-3	3 V/m, 80 - 1000 MHz, 80% modulated at a distance of 3 meters		
	Electrical Fast Transient	IEC61000-4-4	± 2 kV on AC power port for 1 minute, ±1 kV on signal/control lines		
	Surge	IEC61000-4-5	± 2 kV line to line (differential mode) /± 2 kV line to common mode ground (tested to secondary ground) on AC power port, ±0.5 kV for outdoor cables		
			ANSI/IEEE c62.41.1-2002 & c62.41.2-2002 category A, 2.5 kV ring wave		
	Conducted RF Disturbances	IEC61000-4-6	3V, 0.15-80 MHz, 80% modulated		
	Voltage Dips	IEC61000-4-11	>95% dip, 0.5 period; 30% dip, 25 periods; 95% reduction, 250 periods		

Safety Agency Approvals

UL	UL8750 Class 2
cUL	CAN/CSA C22.2 No. 250.13-14 LED equipment for lighting applications

Safety					
	Units	Minimum	Typical	Maximum	Notes
Hi Pot (High Potential) or Dielectric voltage-withstand	Vdc	4400			<ul style="list-style-type: none"> •Insulation between the input (AC line and Neutral) and the output •Tested at the RMS voltage equivalent of 3100 Vac •Double insulation



PTB30/15 Series

PTB30 30 W
PTB15 15 W

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

7 - PROTECTION FEATURES

Input Over Current Protection

The PTB30 series incorporates a primary AC line fuse for input over current protection to prevent damage to the LED driver and meet product safety requirements as outlined in Section 6.

Short Circuit and Over Current Protection

The PTB30 series is protected against short-circuit such that a short from any output to return shall not result in a fire hazard or shock hazard. The driver shall hiccup as a result of a short circuit or over current fault. Removal of the fault will return the driver to within normal operation. The driver shall recover, with no damage, from a short across the output for an indefinite period of time.

Internal Over temperature Protection

The PTB30 series is equipped with internal temperature sensor on the primary power train. Failure to stay within the convection power rating will result in the power supply reducing the available current (fold back) below the programmed amount. The main output current will be restored to the programmed value when the temperature of the built-in temperature sensor cools adequately.

Output Open Load Protection

When the LED load is removed, the output voltage of the PTB30 series is typically limited to 1.3 times the maximum output voltage of each model.

Protection on 0-10V Dimming Wires

The 0-10 V dimming circuit is protected from application of source power to the 0-10 V dimming wires for all nominal AC input voltages.

8 - OUTPUT POWER DE-RATING AT ELEVATED TEMPERATURES

The PTB30 series can be operated with cooling air temperatures above 50°C by linearly de-rating the total maximum output power (or current) by 2.5%/°C typical until internal over temperature protection activates.

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

9 - PHASE-CUT DIMMING

Dimming of the driver is possible with standard TRIAC-based incandescent dimmers that chop the AC voltage as shown in Figure 3, or with ELV dimmers. During the rapid rise time of the AC voltage when the dimmer turns on, the driver does not generate any voltage or current oscillations, and inrush current is controlled. During the on-time of the AC input, the driver regulates the output current based upon the conduction angle. The RMS value of the driver output current is proportional to the on-time of the AC input voltage. When operating with an incandescent dimmer, the RMS output current varies depending upon the conduction angle and RMS value of the applied AC input voltage. Figure 4 shows the typical output current versus conduction angle at nominal input voltage.

Forward-phase (TRIAC) and reverse-phase (ELV) dimming work only at 120 Vac.

The PTB30 series offers Tri-Mode Dimming™ compatibility with both phase-cut (reverse-phase and forward-phase) and 0-10V dimmers. Phase-cut dimming always has priority over 0-10 V dimming.

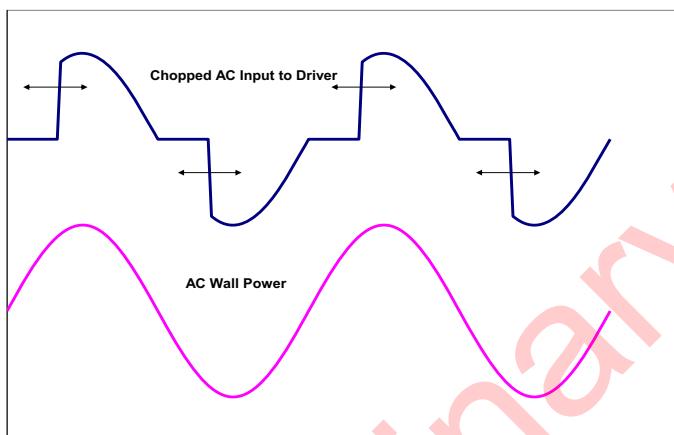


Figure 3

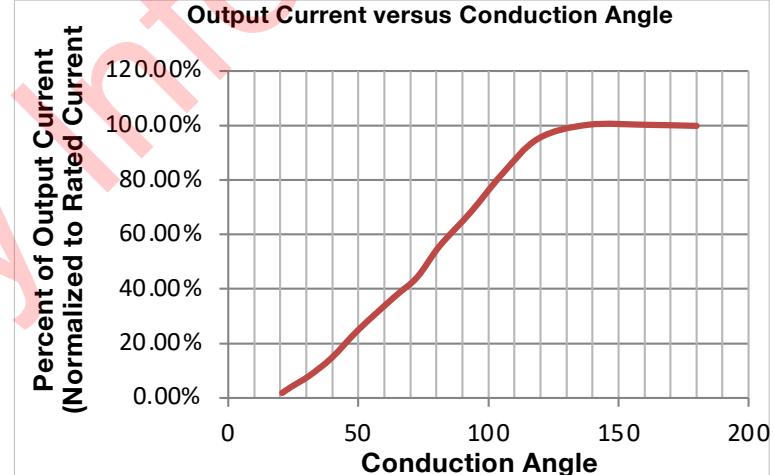


Figure 4

10 - COMPATIBLE PHASE-CUT DIMMERS & DIMMING RANGE

120Vac Dimmers					
Mfg.	Model	Mfg.	Model	Mfg.	Model
Lutron	S-603PG	Lutron	DVELV-303P	Lutron	CT-103P
Leviton	IPI06-1LZ	Lutron	SELV-300P	Cooper	SLC03P
Leviton	6631-2	Leviton	6683-IW	Leviton	IPE04
Lutron	DVCL-153P	Leviton	6161	Lutron	MAELV-600
Lutron	DV-600P	Leviton	6633-P	Lutron	FAELV-500
Lutron	TGCL-153P	Lutron	TG-600P	Lightolier	ZP260QEW
Lutron	S-600P	Cooper	DLC03P	Cooper	DAL06P
Leviton	VPE06	Lutron	LG-600P		

Dimming compatibility charts are available for each model in the PTB30 series. Please contact your sales representative or send an email to: SaveEnergy@erp-power.com.

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

11 - 0-10 V DIMMING

The PTB30 series operate only with 0-10 V dimmers that sink current. They are not designed to operate with 0-10 V control systems that source current, as used in theatrical/entertainment systems. Developed in the 1980's, the 0-10 V sinking current control method is adopted by the International Electrotechnical Commission (IEC) as part of its IEC Standard 60929 Annex E.

The method to dim the output current of the driver is done via the +Dim/-Dim Signal pins. The +Dim/-Dim Signal pins respond to a 0 to 10 V signal, delivering 1% to 100% of the output current based on rated current for each model. A pull-up resistor is included internal to the driver. When the +Dim wire (purple) is short circuited to the -Dim wire (grey) or to the -LED wire (blue), the output current turns off.

If the +Dim input is > 10 V or open circuited, the output current is programmed to 100% of the rated current. When not used, the -Dim wire (grey) and to the +Dim wire (purple) can be individually capped or cut off. In this configuration, no dimming is possible and the driver delivers 100% of its rated output current.

The maximum source current (flowing from the driver to the 0-10 V dimmer) supplied by the +Dim Signal pin is ≤ 1 mA. The tolerance of the output current while being dimmed shall be $\pm 8\%$ typical until down to 1.5 V.

In the PTB30 series, several 0-10 V dimming profiles can be selected, such as a logarithmic profile, a non-linear profile with 1% minimum dimming, and a non-linear profile with 10% minimum.

By default, the non-linear profile with 1% minimum dimming (show in figure 5) is pre-loaded in the PTB30 series. In this non-linear 0-10 V dimming profile, 10 V to 8.5 V=100% of the output current, linear between 8.5 V and 1.5 V, <1.5 V=1%.

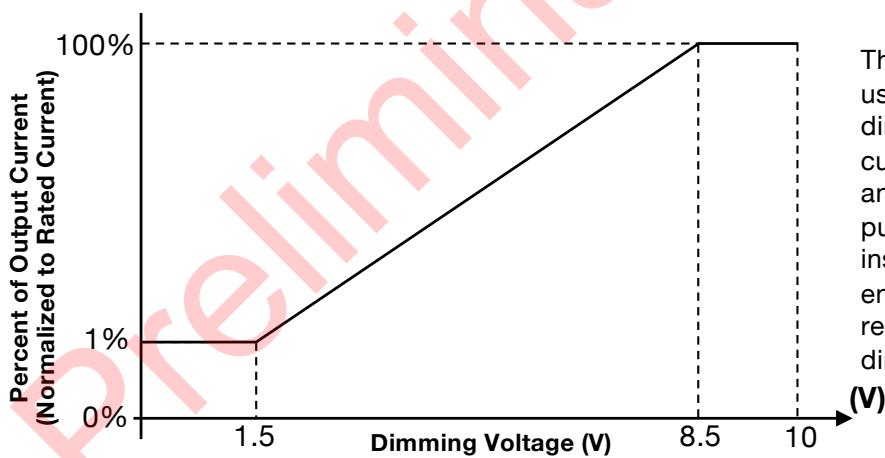


Figure 5

The non-linear curve is recommended when using standard in wall 0-10 V logarithmic dimmers to avoid having insufficient source current available to pull the dimmer up to 10 V and to account for the inability of the dimmer to pull below approximately 0.9 V. In these type of installations, the modified transfer function will ensure 100% light output and dimming to 1%, regardless of the number of drivers on the 0-10 V dimming line.

12 - COMPATIBLE 0-10 V DIMMERS

Mfg.	Model	Mfg.	Model	Mfg.	Model
Lutron	NFTV	Lutron	DVT	Lutron	DVSTV
Lutron	RMJS-8T	Lightolier	SR1200ZTUNV	Cooper	SF10P-W
Leviton	IP710-LFZ	Leviton	IP710-DL		

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

■ 13 - PROGRAMMING

The PTB30 series can be programmed by inserting the audio jack plug into the driver and by plugging the USB other end of the cable into a computer. ***The driver does not need to be powered on during the programming process.***

When ordering the PTB30 series, please make sure you order a programming cable. The part number for the programming cable is “PROG-JACK-USB”.

Programming is done by using the ERP GUI (Graphical User Interface), which enables the user to adjust output current from 100% to 60%.

Furthermore, when programming the driver with a computer using the programming cable, you can access the driver’s internal data log and read the following information: SKU, serial number, manufacturing lot code, hours of operation, firmware revision, and AC power cycles.

For more information, please refer to the GUI user’s manual at:
<https://www.erp-power.com/our-products/programming-software/>



Figure 6

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

■ 14 - MECHANICAL DETAILS

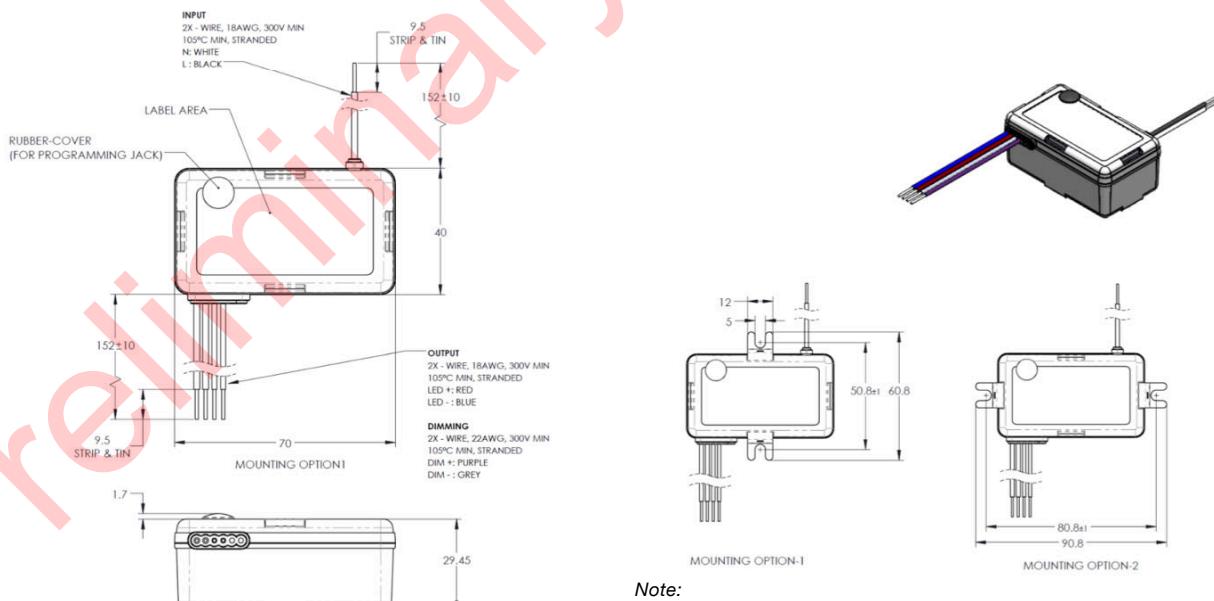
- **Packaging:** Plastic case
- **I/O Connections:**
 - **Models with flying leads:** 18 AWG on all leads, 22 AWG on 0-10V dimming wires, xxmm (x in) long, 105°C rated, stranded, stripped by approximately 9.5 mm, and tinned. All the wires, on both input and output, have a 300 V insulation rating.
- **Ingress Protection:** IP20 rated
- **Mounting Instructions:** The PTB30 driver case must be secured on a flat surface through the two mounting clips, shown here below in the case outline drawings.

■ 15 - OUTLINE DRAWINGS (MODELS WITH FLYING LEADS)

Dimensions: L 70 * W 40 * H 29.5 mm (L 2.76 * W 1.57 * H 1.16 in.)

Volume: XX cm³ (XX in³)

Weight:



Note:

- By default, each PTB series driver is shipped with 2 metal mounting clips. Additional mounting clips can be ordered separately using the part number PTB-CLIPS-100 or PTB-CLIPS-1K

All dimensions are in mm

Figure 7



PTB30/15 Series

PTB30 30 W
PTB15 15 W

30 W Programmable CC Class 2 LED Driver with Enhanced Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

■ 16 - LABELING

The XX is used in figure 8 as an example to illustrate a typical label.

Figure 8

USA Headquarters
Tel: +1-805-517-1300
Fax: +1-805-517-1411
893 Patriot Drive, Suite E,
Moorpark, CA 93021, USA

CHINA Operations
Tel: +86-756-6266298
Fax: +86-756-6266299
No. 8 Pingdong Road 2
Zhuhai, Guangdong, China 519060

ERP Power, LLC (ERP) reserves the right to make changes without further notice to any products herein. ERP makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ERP assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in ERP data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ERP does not convey any license under its patent rights nor the rights of others. ERP products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the ERP product could create a situation where personal injury or death may occur. Should Buyer purchase or use ERP products for any such unintended or unauthorized application, Buyer shall indemnify and hold ERP and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ERP was negligent regarding the design or manufacture of the part. ERP is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.