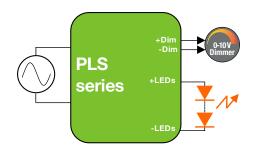
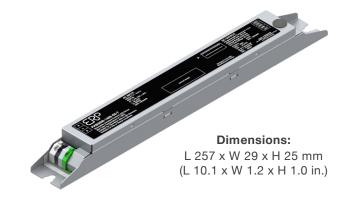


PLS20 PLS30 PLS50 PLS65

### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

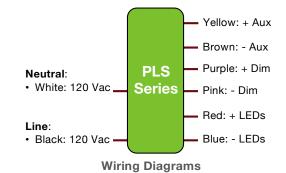
Input Voltage	Max. Output Power	Efficiency	Max. Case Temperature	THD	Power Factor	Dimming Method	Dimming Range	Startup Time
120 - 277 Vac	65 W	up to 87% typical	90°C (measured at the hot spot)	< 20%	> 0.9	Programmable 0 - 10 V	1 - 100%	300 ms typical





#### FEATURES

- · UL Class P
- · Class 2 output
- Active Ripple Rejection
- · Synchronized start-up: 20 ms
- Lifetime: 5 years @ Tc ≤ 75°C
- 90°C maximum case hot spot temperature
- Surge protection:
  - IEC61000-4-5: 6 kV line to line/6 kV line to earth
  - 2.5 kV ring wave: ANSI/IEEE c62.41.1-2002 & c62.41.2-2002
- Complies with ENERGY STAR®, DLC (DesignLight Consortium®), and CA Title 24 technical requirements
- Meets IEEE 1789-2015 "no impact" recommended practices for flicker



#### PROGRAMMING

- · Audio jack and cradle programming
- · Current: see page 2 for current range
- Fully programmable and selectable 0-10V dimming profiles: Non-linear with dim-to-off, Logarithmic, Non-Linear without dim-to-off.
- Data log read: SKU, S/N, lot code, hours of operation, FW rev., power cycles

#### APPLICATIONS

- · Commercial & residential lighting
- · Architectural lighting
- · Indoor Lighting



















PLS20 20 W PLS30 30 W PLS50 50 W PLS65 65 W

### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### 1 - ORDERING INFORMATION

Part Number	Input Voltage (Vac)	Max Output Power (W)	lout (mA)	Default Programmed Current (mA)	Vout Min. (Vdc)	Vout Nom. (Vdc)	Vout Max. (Vdc)*	Open Loop (No Load) Voltage (Vdc)	Notes
						Up	to 20W	'	
PLS-A20W-07-55-TZ	120 - 277	20	100 to 700	350	10	49.5	55	60	Terminal Blocks     No isolation between the DC output and the 0-10 V dimming circuit
PLS-A20W-07-55-TPZ	120 - 277	20	100 to 700	350	10	49.5	55	60	Terminal Blocks     Isolation between the DC output and 0-10 V dimming circuit
PLS-A20W-07-55-TXZ	120 - 277	20	100 to 700	350	10	49.5	55	60	Terminal Blocks  No isolation between the DC output and 0-10 V dimming circuit Auxiliary output
						21 :	to 30W		
PLS-A30W-10-55-TZ	120 - 277	30	275 to 1050	700	10	49.5	55	60	Terminal Blocks     No isolation between the DC output and the 0-10 V dimming circuit
PLS-A30W-10-55-TPZ	120 - 277	30	275 to 1050	700	10	49.5	55	60	Terminal Blocks     Isolation between the DC output and 0-10 V dimming circuit
PLS-A30W-10-55-TXZ	120 - 277	30	275 to 1050	700	10	49.5	55	60	Terminal Blocks  No isolation between the DC output and 0-10 V dimming circuit  Auxiliary output
						31 1	to 50W		
PLS-A50W-14-55-TZ	120 - 277	50	500 to 1400	1050	10	49.5	55	60	Terminal Blocks     No isolation between the DC output and the 0-10 V dimming circuit
PLS-A50W-14-55-TPZ	120 - 277	50	500 to 1400	1050	10	49.5	55	60	Terminal Blocks     Isolation between the DC output and 0-10 V dimming circuit
PLS-A50W-14-55-TXZ	120 - 277	50	500 to 1400	1050	10	49.5	55	60	Terminal Blocks  No isolation between the DC output and 0-10 V dimming circuit  Auxiliary output
						51 t	to 65W		
PLS-A65W-18-55-TZ	120 - 277	65	600 to 1800	1200	10	49.5	55	60	Terminal Blocks     No isolation between the DC output and the 0-10 V dimming circuit
PLS-A65W-18-55-TPZ	120 - 277	65	600 to 1800	1200	10	49.5	55	60	Terminal Blocks     Isolation between the DC output and 0-10 V dimming circuit
PLS-A65W-18-55-TXZ	120 - 277	65	600 to 1800	1200	10	49.5	55	60	Terminal Blocks  No isolation between the DC output and 0-10 V dimming circuit Auxiliary output

<sup>\*</sup> The forward voltage (Vf) of the LED load should not exceed Vout Max. of the driver under worst case field operating conditions which are the Vf max. of the LED load under lowest temperature and highest forward current conditions. As a general design guideline, the nominal LED load Vf measured at the operating current and at room temperature should be ≤ Vout Nom. of the driver.

Programming Cable

Part number: PROG-JACK-USB

### Programming Cradle Part number: PROG-CRADLE

#### Notes:

- Please order the programming cable using part number PROG-JACK-USB.
- Optional programming cradle can be ordered using part number PROG-CRADLE



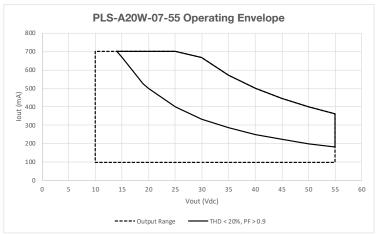


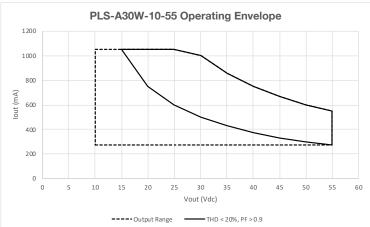


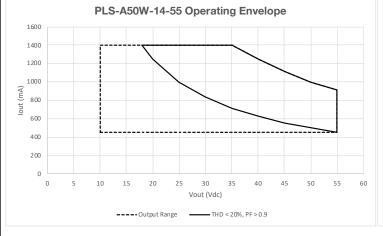
PLS20 20 W PLS30 30 W PLS50 50 W PLS65 65 W

# 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### 2 - OPERATING ENVELOPES











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## 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### 3 - INPUT SPECIFICATION (@25°C ambient temperature)

	Units	Minimum	Typical	Maximum	Notes	
Input Voltage Range (Vin)	Vac	108	120, 277	305	•The rated output current for each model is achieved at Vin≥108 Vac, & at Vin≥249 Vac. •At nominal load	
Input Frequency Range	Hz	47	50/60	63		
Input Current (lin)	Α			0.8 A @ 120 Vac 0.3 A @ 277 Vac		
Power Factor (PF)		0.9	> 0.9		•At nominal input voltage (120 & 277 Vac) and no dimmer •From 100% to 50% of output power	
Inrush Current	Α		Meets NEMA-410 requir	ements	•At any point on the sine wave and 25°C	
Leakage Current	mA			0.4 mA @ 120 Vac 0.75 mA @ 277 Vac	Measured per IEC60950-1	
Input Harmonics		Complies	with IEC61000-3-2 for Class	C equipment		
Total Harmonics Distortion (THD)				20%	At nominal input voltage (120 & 277 Vac) From 100% to 50% of output power Complies with DLC (Design Light Consortium) technical requirements	
Efficiency	%	-	up to 87%	-	Measured with nominal input voltage, a full sinusoidal wave form and without dimmer attached.	
Isolation	Dilation The AC input to the main DC output is isolated.					



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### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

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

	Units	Minimum	Typical	Maximum	Notes
Output Voltage (Vout)	Vdc				See ordering information for details
Output Current (lout)	mA				<ul> <li>See ordering information for details</li> <li>Output voltage and current combination cannot exceed max power output. See page 3 for operating window</li> <li>The rated output current for each model is achieved at Vin≥108 Vac &amp; Vin≥249 Vac.</li> </ul>
Output Current Regulation	%	-3	±2	3	At nominal AC line voltage (120 & 277 Vac) Includes load and current set point variations
Output Current Overshoot	%	-	-	20	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			urrent for	<ul> <li>Measured at nominal LED voltage and nominal input voltage without dimming</li> <li>Calculated in accordance with the IES Lighting Handbook, 9th edition</li> <li>Meets IEEE 1789-2015 "no impact" recommended practices for flicker</li> </ul>
Dimming Range	%	1		100	•The dimming range is dependent on each specific dimmer. It may not be able to achieve 1% dimming with some dimmers.  •When testing, if light is measured, dimming range is based on light output. If no light is measured, dimming range is based on percentage of output current.  •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	Without any dimmer attached, and at nominal input voltages and nominal load Synchronized start-up of 20 ms when multiple drivers on same circuit Measured from application of AC line voltage to continuous light output Complies 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. "-TPZ" Models feature additional isolation between the DC output and 0-10 V dimming circuit.				

### 5 - AUXILLIARY OUTPUT SPECIFICATION (@25°C ambient temperature)

l		Units	Minimum	Typical	Maximum	Notes		
	Auxilliary Output Voltage	Vdc	10.2	12, 24	26.4	Only on "-TXZ" models Output regulation: 10% Configurable through programming		
l	Auxilliary Output Current	mA				Only on "-TXZ" models  Max output power		



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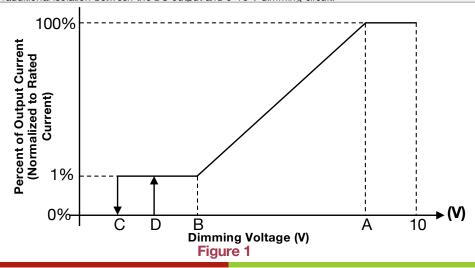
### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### 6 - 0-10 V DIMMING CONTROL (@25°C ambient temperature)

In the PLS series, several 0-10V dimming profiles can be selected, such as a logarithmic profile, a non-linear profile with 1% minimum dimming, a non-linear profile with 10% minimum dimming, and optional dim-to-off function. Furthermore, every point in the non-linear dimming profile can be programmed using the programming software.

By default, the non-linear profile with 1% minimum dimming and NO dim-to-off is pre-loaded in the PLS series.

					Notes				
		Minimum							
+Dim Signal, -Dim Signal	done	The PLS 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)	Linear	00% of output current between 10 V and 8 V, inear between 8 V and 1 V, % of output current below 1 V.							
Dimming Range	%	1		100	When testing, if light is measured, dimming range is based on light output. If no light is measured, dimming range is based on percentage of output current.				
High Level Voltage - A	V		8.0	8.5					
Low Level Voltage - B	V	0.5	1.0						
Dim to Off - C	V	0.6	0.7	0.8					
Dim to Off Hysteresis - D	V			+0.3					
Current Supplied by the +Dim Signal Pin	mA			1					
Dimming Voltage Sensing Tolerance	mV			100	The tolerance of the difference between the 0-10 V signal supplied by the dimmer and sensed by the driver.				
Output Current Tolerance While Being Dimmed	%		±8		In the linear region of the dimming curve (Between points A and B in Figure 1).				
Output Current Tolerance at Minimum Dimming	%		±8		The tolerance of the output current at minimum dimming is +/-8% of 1% of the maximum output current of each driver.				
Minimum Dimming Tolerance	%	0.8	1	2					
Isolation		ne 0-10 V circuit is isolated from the AC input and meets UL8750 supplement SF requirements. "-TPZ" Models feature							





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## 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### 7 - ENVIRONMENTAL CONDITIONS

	Units	Minimum	Typical	Maximum	Notes			
Operating Ambient Temperature (Ta)	°C	-20		50	50°C is the non-derated temperature (Refer to section 11 'Output power de-rating at elevated temperatures'.)			
Maximum Case Temperature (Tc)	°C			+90	Case temperature measured at the hot spot •tc (see label on page 16)			
Storage Temperature	°C	-40		+85				
Humidity	%	5	-	95	Non-condensing			
Cooling		Conve	ection cooled					
Acoustic Noise	dBA			24	Measured at a distance of 1 foot, without dimmer			
Mechanical Shock Protection	per EN6	60068-2-27						
Vibration Protection	per EN60068-2-6 & EN60068-2-64							
MTBF	> 200,0	> 200,000 hours when operated at nominal inpu			and output conditions, and at Tc ≤ 75°C			
Lifetime	50,000 hours at Tc ≤ 75°C maximum case hot spot temperature (see hot spot •tc on label on page 14)							
Warranty  5 years. Users must utilize proper thermal management techniques to ensure proper thermal condubletween the driver and heat sink. The use of double-sided tape to mount the driver voids the warrance.								

### 8 - EMC COMPLIANCE, SAFETY, AND ENVIRONMENTAL APPROVALS

	EMC Compliance							
Conducted and	Compliant with ECC CER Title	17 Dort 15 Class A s	st 100 % 977 Voc					
Radiated EMI	Compliant with FCC CFR Title 4	FI Part 15 Class A a	11 120 & 277 Vac					
<b>Harmonic Current E</b>	missions	IEC61000-3-2	For Class C equipment					
Voltage Fluctuations	& Flicker	IEC61000-3-3						
	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					
Immunity	<b>Electrical Fast Transient</b>	IEC61000-4-4	± 2 kV on AC power port for 1 minute, ±1 kV on signal/control lines					
Compliance	Surge	IEC61000-4-5	± 6 kV line to line (differential mode) /± 6 kV line to common mode ground					
	Surge	ANSI/IEEE c62.41.1-2002 & c62.41.2-2002 category A, 2.5 kV ring wave						
	Conducted RF	IEC61000-4-6	2V 0.15 90 MHz 900/ modulated					
	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 & Environmental Approvals								

Safety & Environmental Approvals						
UL UL8750 listed Class 2, supplement SF						
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	2200			•Tested at the RMS voltage equivalent of 1555 Vac		



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### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

#### 9 - DIMMING FEATURES

#### **Synchronized Start-up**

The PLS series incorporates a synchronized start-up feature. When wired into the same dimmer, multiple PLS series drivers will dim to the same level and turn on within 20 ms of each other.

#### **Fully Programmable Dimming Curve**

In the PLS series, several 0-10V 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. Furthermore, every point in the non-linear dimming profile can be programmed using the programming software.

#### 10 - PROTECTION FEATURES

#### **Input Over Current Protection**

The PLS 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 PLS 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 PLS 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 PLS series is typically limited to 1.3 times the maximum output voltage of each model.

### ■ 11 - OUTPUT POWER DE-RATING AT ELEVATED TEMPERATURES

The PLS 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 until internal over temperature protection activates.



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### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

#### 12 - 0-10 V DIMMING

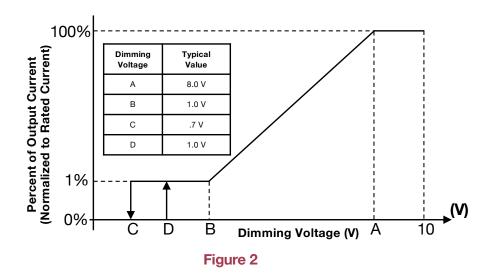
The PLS series operate only with 0-10 V dimmers that sink current. They are not designed to operate with 0-10 V control systems that source current, as used in theatrical/entertainment systems. Developed in the 1980's, the 0-10 V sinking current control method is adopted by the International Electrotechnical 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. If the +Dim input is > 10 V or open circuited, the output current is programmed to 100% of the rated current.

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

In the PLS 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 and NO dim-to-off is pre-loaded in the PLS series. In this non-linear 0-10 V dimming profile, 10 V to 8 V=100% of the output current, <1 V =1%.



### ■ 13 - COMPATIBLE 0-10 V DIMMERS

- Lutron, Nova series (part number NFTV)
- Leviton, IllumaTech series (part number IP710-DL)
- Lutron, Diva series (part number DVTV)



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### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

#### 14 - PROGRAMMING

The PLS series can be programmed by inserting the audio jack of the cable shown in figure 3 into the driver and by plugging the USB other end of the cable into a computer. **The driver should not be powered on during the programming process.** 

When ordering the PLS series, please make sure to order a programming cable. The part number for the programming cable is "PROG-JACK-USB". Additionally, there is an optional programming cradle intended for higher volume use that can be ordered using the part number "PROG-CRADLE".

Programming is done by using the ERP GUI (Graphical User Interface), which enables the user to adjust output current and dimming profile.

Please note that, for each model, the **default output current setting is listed on page 2 of this datasheet**.

Furthermore, when connecting the driver to 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 power cycles.

While programming drivers in a lot, the ERP GUI can interface with a label printer, which enables the user to add configuration labels to driver labels in order to highlight programmed output current. Listed below is the equipment needed to print labels.

Equipment	Part Number	Where to buy			
Printer	TSC TC210	barcodefactory.com/tsc/printers/tc210/99-059a001-54lf			
Ribbon	TSC Prem. Resin, 60mm x 110mm	barcodefactory.com/tsc/35-r060110-23cf			
Labels	BAR81x.28-1-TT	barcodefactory.com/barcodefactory/labels/bar81x_28-1-tt			

For more information, please refer to the GUI user's manual at: <a href="mailto:erp-power.com/our-products/programming-software/">erp-power.com/our-products/programming-software/</a>

### Programming Cable

Part number: PROG-JACK-USB



# Programming Cradle Part number: PROG-CRADLE



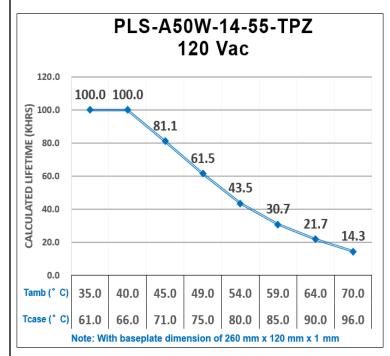
PLS20 20 W PLS30 30 W PLS50 50 W PLS65 65 W

### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### ■ 15 - PREDICTED LIFETIME VERSUS CASE AND AMBIENT TEMPERATURE

Lifetime is defined by the measurement of the temperatures of all the electrolytic capacitors whose failure would affect light output under the nominal LED load and worst case AC line voltage. The graphs in figures 4 and 5 are determined by the electrolytic capacitor with the shortest lifetime, among all electrolytic capacitors. It represents a worst case scenario in which the LED driver is powered 24 hours/day, 7 days/week. The lifetime of an electrolytic capacitor is measured when any of the following changes in performance are observed:

- 1) Capacitance changes more than 20% of initial value
- 3) Equivalent Series Resistance (ESR): 150% or less of initial specified value
- 2) Dissipation Factor (tan δ): 150% or less of initial specified value
- 4) Leakage current: less of initial specified value



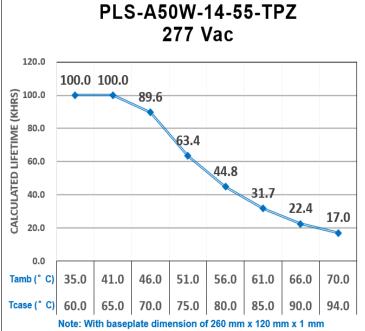


Figure 5

Figure 4

#### Notes:

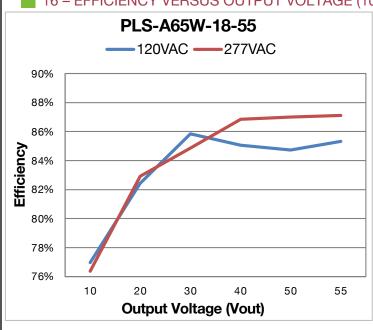
- The ambient temperature  $T_{ambient}$  and the differential between  $T_{ambient}$  and  $T_{case}$  mentioned in the above graphs are relevant only as long as both the driver and the light fixture are exposed to the same ambient room temperature. If the LED driver is housed in an enclosure or covered by insulation material, then the ambient room temperature is no longer valid. In this situation, please refer only to the case temperature  $T_{case}$ .
- It should be noted the graph "Lifetime vs. Ambient Temperature" may have an error induced in the final application if the mounting has restricted convection flow around the case. For applications where this is evident, the actual case temperature measured at the Tc point in the application should be used for reliability calculations.
- Users must utilize proper thermal management techniques to ensure proper thermal conductivity between the driver and heat sink. The use of double-sided tape to mount the driver voids the warranty.



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## 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### 16 – EFFICIENCY VERSUS OUTPUT VOLTAGE (100% OF IOUT)



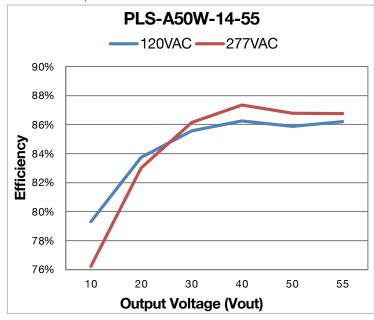
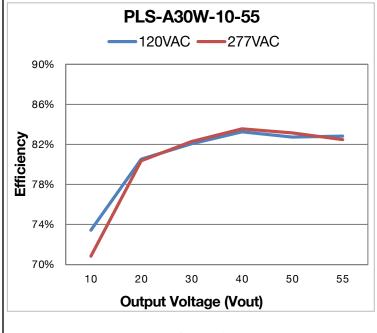


Figure 6





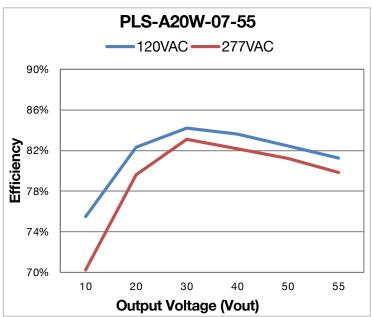


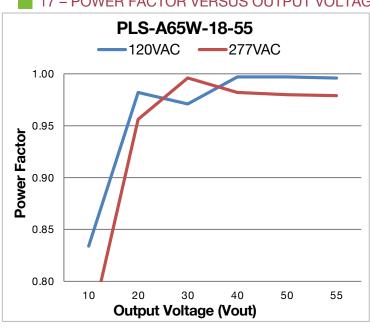
Figure 8 Figure 9



PLS20 20 W PLS30 30 W PLS50 50 W PLS65 65 W

## 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### ■ 17 – POWER FACTOR VERSUS OUTPUT VOLTAGE (100% OF IOUT)



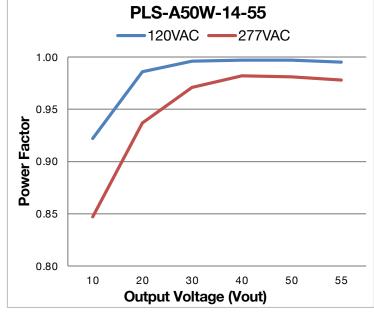
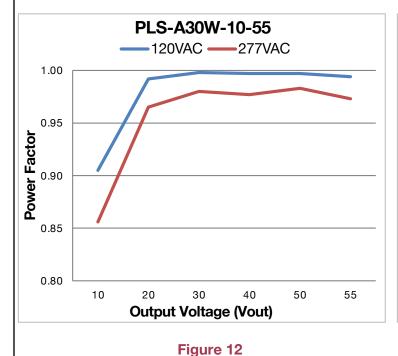


Figure 10

Figure 11



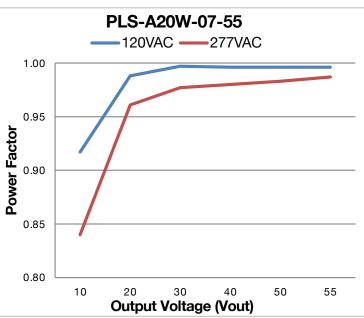


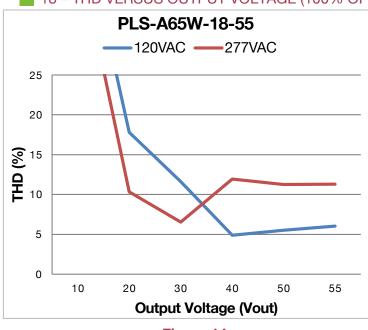
Figure 13



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### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

### ■ 18 – THD VERSUS OUTPUT VOLTAGE (100% OF IOUT)

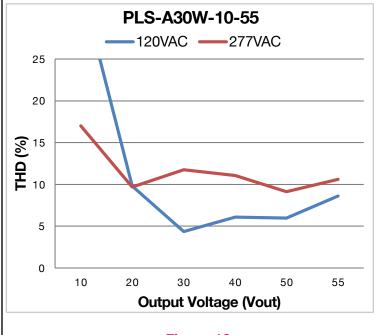


PLS-A50W-14-55
—120VAC —277VAC

25
20
15
0
10
20
30
40
50
55
Output Voltage (Vout)

Figure 14

Figure 15



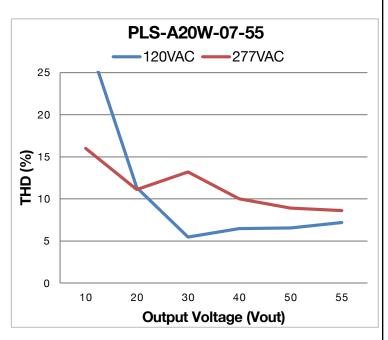


Figure 16 Figure 17



PLS20 20 W PLS30 30 W PLS50 50 W PLS65 65 W

### 20 to 65 W Programmable Constant Current Class 2 LED Driver with 0-10 V Dimming

#### 19 - MECHANICAL DETAILS

• Packaging: Aluminum case

I/O Connections:

• Models with "T" suffix: Terminal Blocks
• Ingress Protection: IP20 rated

• Mounting Instructions: The PLS driver case must be secured on a flat surface through the two mounting

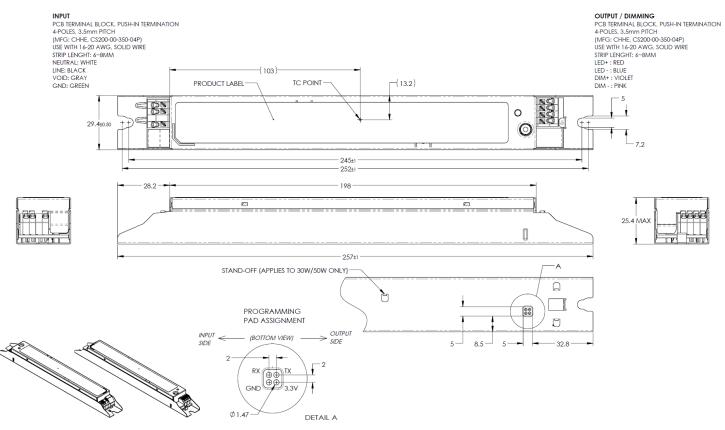
tabs, shown here below in the case outline drawings. The use of double-sided tape voids

the warranty.

### 20 - OUTLINE DRAWINGS (PLS20, PLS30, PLS50, PLS65)

**Dimensions:** L 257 x W 29 x H 25 mm (L 10.1 x W 1.2 x H 1.0 in.)

**Volume:** 190 cm<sup>3</sup> (11.6 in<sup>3</sup>) **Weight:** 240 g (8.5 oz)



All dimensions are in mm

Figure 18



PLS20 20 W PLS30 30 W PLS50 50 W PLS65 65 W

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#### 20 - LABELING

The PLS-A65W-18-55-TZ is used in figure 19 as an example to illustrate a typical label.

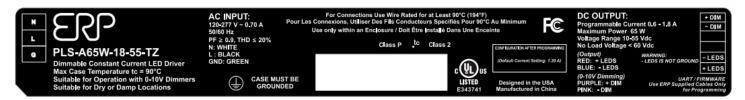


Figure 19

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PLS20 20 W PLS30 30 W PLS50 50 W PLS65 65 W

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