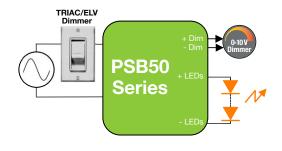


PSB50 50 W PSB40 PSB30

### 50, 40 & 30 W Programmable Constant Current LED Driver with 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 to 277 Vac	50 W	up to 90% typical	90°C (measured at the hot spot)	(from 100% to 50%	> 0.9 (from 100% to 50% of max rated power)	Forward-Phase, Reverse-Phase & 0 - 10V	1 - 100% (% of lout)	200 ms typical	



## **Aluminum Case** L 98.5 \* W 25.4 \* H 19.05 mm (L 3.88 \* W 1.00 \* H 0.75 in.)

PSB50

**Series** 

**Wiring Diagram** 

#### FEATURES

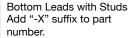
- Non-linear 0-10V dimming profile with dim-to-off (10V to 9.1V=100%, 1.5V to 0.6V=1%, <0.6V=dim-to-off)
- UL Class P
- Class 2 power supply
- Lifetime: 50.000 hours @ Tc = 75°C
- 90°C maximum case hot spot temperature
- IP20-rated (IP64 as option) case with silicone-based potting
- Surge protection:
  - 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

## OTHER MOUNTING OPTIONS

White: Neutral

Black: Line •







Purple: + Dim

Grey: - Dim

Red: + LEDs

Blue: - LEDs

European Terminal Blocks Add "-T" suffix to part number.

### PROGRAMMING

- Serial port programming
  - Current: 100% to 50% in each voltage range
  - Data log read: SKU, S/N, lot code, hours of operation, FW rev., fault events: power failure, transients (short or surge), thermal

#### OPTIONS

- Alternate 0-10V dimming profiles: Linear, Logarithmic, Ballast type Mark7 (IEC60929, ANSI C82.11)
- Energy metering (as part of future software upgrade)

#### APPLICATIONS

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













PSB50 50 W PSB40 40 W PSB30 30 W

50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

#### 1 - ORDERING INFORMATION

Part Number	Nominal Input Voltage (Vac)	Max Output Power	lout (mA)	Vout Min. (Vdc)	Vout Nom. (Vdc)	Vout Max. (Vdc)	Open Loop (No Load) Voltage (Vdc)
	( <b>v</b> ac)	(W)	PSB30W				(Vuc)
PSB30W-0700-42	120 to 277	29.4	350 to 700	27	<b>3</b> 7.8	42	50
PSB30W-1050-27	120 to 277	28.4	525 to 1050	17	24.3	27	35
PSB30W-0800-34	120 to 277	27.2	400 to 800	20	30.6	34	44.2
			PSB40W				
PSB40W-1400-27	120 to 277	37.8	700 to 1400	17	24.3	27	35
			PSB50W				
PSB50W-0550-85	120 to 277	46.8	275 to 550	54	76.5	85	100
PSB50W-0850-56	120 to 277	47.6	425 to 850	36	50.4	56	60
PSB50W-1200-42	120 to 277	50.4	600 to 1200	27	37.8	42	50
PSB50W-1400-34	120 to 277	47.6	700 to 1400	20	30.6	34	44.2

#### Notes:

- For each model, the default output current setting is the maximum current.
- To order the mounting option "Bottom Leads with Studs", add the suffix "-X". Example: PSB50W-1200-42-X
- To order the mounting option "Terminal Blocks", add the suffix "-T". Example: PSB50W-1200-42-T
- For additional options of output current and output voltage, contact your sales representative or send an email to: <a href="mailto:SaveEnergy@erp-power.com">SaveEnergy@erp-power.com</a>
- Please order the programming cable using the part number "PROG-JACK-USB".





PSB50 50 W PSB40 40 W PSB30 30 W

# 50, 40 & 30 W Programmable Constant Current LED Driver with 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, 230, 277	305	•The rated output current for each model is achieved at Vin≥108 Vac & at Vin≥198 Vac •At nominal load			
Input Frequency Range	Hz	47	50/60	63				
Input Current (lin)	Α			0.5 A @ 120 Vac 0.23 A @ 277 Vac				
Power Factor (PF)		0.9	> 0.9		At nominal input voltage and with nominal LED voltage     From 100% to 50% of rated power			
Inrush Current	А		Meets NEMA-410 require	ements	At any point on the sine wave and 25°C Active 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 0.6 mA @ 230 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%	At nominal input voltage and nominal LED voltage     From 100% to 50% of rated power     Complies 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 is isolated and meets Class II reinforced/double insulation power supply							

### 3 - 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	<b>\</b>			•See ordering information for details •The rated output current for each model is achieved at Vin≥108 Vac & at Vin≥198 Vac.
Output Current Regulation	%	-5	±2.5	5	At nominal AC line voltage Includes load and current set point variations
Output Current Overshoot	%		10	The driver does not operate outside of the regulation requirements for more than 5 ms during power on with nominal LED load and without dimmer.	
Ripple Current	≤ 10% of rated output contact each model			urrent for	Measured at nominal LED voltage and nominal input voltage without dimming     Calculated in accordance with the IES Lighting Handbook, 9th edition
Dimming Range (% of lout)	%	1		100	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		200	500	Without any dimmer attached, and at nominal input voltages and nominal load  Measured from application of AC line voltage to 100% 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					d tested per UL8750 Class 2 or LED Class 2

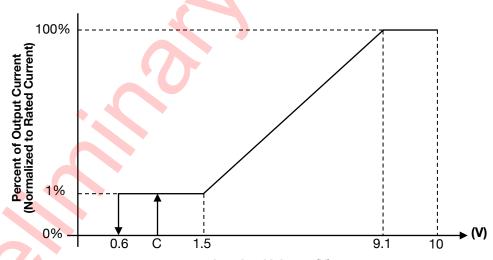


PSB50 50 W PSB40 40 W PSB30 30 W

# 50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

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

	Units	Minimum	Typical	Maximum	Notes				
+Dim Signal, -Dim Signal  The PSB50/40/30 series operate only with 0-10V dimmers that sink current. The method to dim the output curr driver is done via the +Dim/-Dim Signal pins. The +Dim/-Dim signal pins can be used to adjust the output set standard commercial wall dimmer, an external control voltage source (0 to 10 Vdc), or a variable resistor when recommended number of LEDs. The dimming input permits 1% to 100% dimming.									
Dimming Profile (see figure 1)	Linear 1% of	100% of output current between 10 V and 9.1 V, Linear between 9.1 V and 1.5 V, 1% of output current between 1.5 V and 0.6 V, No output current below 0.6 V.							
Dimming Range	%	1		100	As a percent of the output current				
High Level Voltage	V		9.1						
Low Level Voltage	V		1.5						
Dim to Off	V		0.6		No output current				
Current Supplied by the +Dim Signal Pin	mA 1								
Output Current Tolerance While Being Dimmed	+8   The folerance of the output current while being dimmed is < +/-8% until down to 1								
Isolation	The 0-	10 V circui	t is isolat	ted from th	e AC input and meets Class II reinforced/double insulation power supply.				



#### **Dimming Voltage (V)**

Dimming Voltage	Description	Value
С	hysteresis	> 700 mV, < 800 mV

Figure 1



PSB50 50 W PSB40 40 W PSB30 30 W

## 50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

#### 5 - ENVIRONMENTAL CONDITIONS

	Units	Minimum	Typical	Maximum	Notes			
Operating Ambient Temperature (Ta)	°C	-20		50	50°C is the non-derated temperature (Refer to section 8 "Output power de-rating at higher temperatures".			
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		Conve	ection cooled					
Acoustic Noise	dBA			24	Measured at a distance of 1 meter, without dimmer			
Mechanical Shock Protection	per EN	60068-2-27						
Vibration Protection	per EN	60068-2-6 & E	N60068-2-64					
MTBF	> 200,000 hours when operated			nominal input	and output conditions, and at Tc ≤ 75°C			
Lifetime	50,000	hours at Tc ≤	75°C maximun	n case hot spo	ot temperature (see hot spot •tc on label in page 11)			

#### 6 - EMC COMPLIANCE AND SAFETY APPROVALS

		EM(	C Compliance				
Conducted and Radiated EMI	•Models with "-T" suffix: Con	mpliant with FCC C	ompliant with FCC CFR Title 47 Part 15 Class B at 120 Vac & Class A at 277 Vac CFR Title 47 Part 15 Class B at 120 Vac and Class A at 277 Vac and with at 220, 230, and 240 Vac				
<b>Harmonic Current Er</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				
	Electrical Fast Transient	IEC61000-4-4	± 2 kV on AC power port for 1 minute, ±1 kV on signal/control lines				
Immunity Compliance	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 •Higher surge is available. Please contact your ERP representative or send an email to SaveEnergy@erp-power.com.				
		ANSI/IEEE c62.4	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						

	Safety Agency Approvals					
cUL	UL8750 listed Class 2 (except PSB50W-0550-85)					
cUL	CAN/CSA C22.2 No. 250.13-14 LED equipment for lighting applications					
CE	IEC61347-2-13 electronic control gear for LED Modules & EN55015 (EMC compliance)					
СВ						
ENEC						

Safety							
	Units	Minimum	Typical	Maximum	Notes		
Hi Pot (High Potential) or					• Insulation between the input (AC line and Neutral)		
Dielectric voltage-withstand	Vdc	2500			and the output		
Dielectric voltage-withstalid					• Tested at the RMS voltage equivalent of 1767 Vac		



PSB50 50 W PSB40 40 W PSB30 30 W

## 50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

#### 7 - PROTECTION FEATURES

#### **Short Circuit and Over Current Protection**

The PSB50/40/30 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 PSB50/40/30 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 PSB50/40/30 series is typically limited to 1.3 times the maximum output voltage of each model.

#### 8 - OUTPUT POWER DE-RATING AT ELEVATED TEMPERATURES

The PSB50/40/30 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 from 50°C to 70°C (see figure 2).

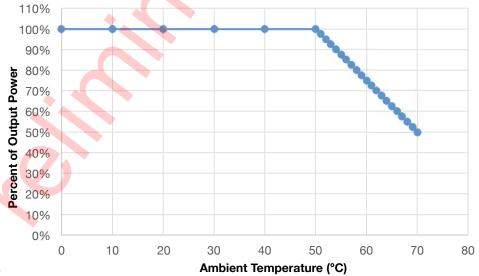


Figure 2



PSB50 50 W PSB40 40 W PSB30 30 W

## 50, 40 & 30 W Programmable Constant Current LED Driver with 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 ontime 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 PSB50/40/30 series offers Tri-Mode Dimming<sup>™</sup> 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.

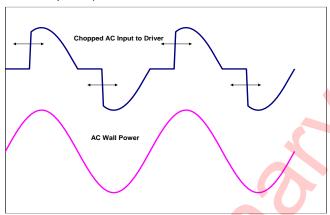


Figure 3

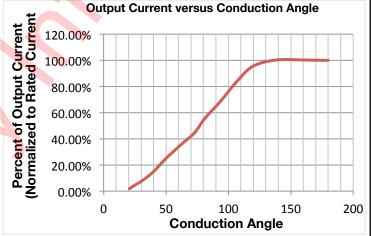


Figure 4

#### 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 PSB50/40/30 series. Please contact your sales representative or send an email to: <a href="mailto:saveEnergy@erp-power.com">SaveEnergy@erp-power.com</a>.



PSB50 50 W PSB40 40 W PSB30 30 W

## 50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

#### 11 - 0-10 V DIMMING

The PSB50/40/30 series operate only with 0-10V dimmers that sink current. They are not designed to operate with 0-10V control systems that source current, as used in theatrical/entertainment systems. Developed in the 1980's, the 0-10V sinking current control method is adopted by the International Electrotechnical Commission (IEC) as part of its IEC Standard 60929 Annex E.

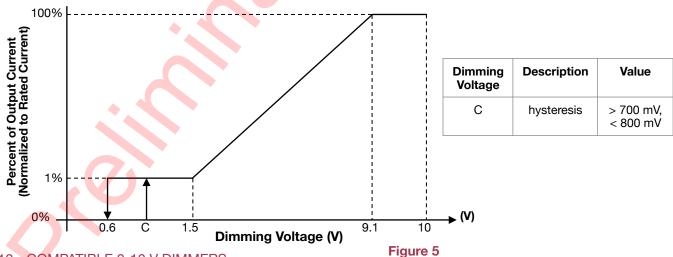
The method to dim the output current of the driver is done via the +Dim/-Dim Signal pins. The +Dim/-Dim Signal pins respond to a 0 to 10 V signal, delivering 1% to 100% of the output current based on rated current for each model. A pull-up resistor is included internal to the driver. When the +Dim wire (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 0-10V 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 1.5 V.

The non-linear 0-10V dimming profile is the default profile across all models of the PSB50/40/30 series. In the non-linear 0-10V dimming profile, shown in figure 5, 10V to 9.1V=100% of the output current, 1.5V to 0.6V=1%, <0.6V=dim-to-off (no output current). 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 10V and to account for the inability of the dimmer to pull below approximately 0.9V. 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 0-10V dimming line. Please contact your sales representative or send an email to: <a href="mailto:SaveEnergy@erp-power.com">SaveEnergy@erp-power.com</a> for additional information.



#### 12 - COMPATIBLE 0-10 V DIMMERS

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



PSB50 50 W PSB40 40 W PSB30 30 W

## 50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

#### 13 - PROGRAMMING

The PSB50/40/30 series can be programmed by inserting the audio jack of the cable shown in figure 6 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 PSB50/40/30 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 to trim or adjust output current from 100% to 50%.

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 fault events: power failure, transients (short or surge), thermal events (i.e. number of times the case temperature has exceed the maximum case temperature of 90°C). For more information, please refer to the GUI user's manual.



Figure 6



PSB50 50 W PSB40 40 W PSB30 30 W

## 50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

#### 14 - MECHANICAL DETAILS

Packaging Options: Aluminum case

I/O Connections: Flying leads, 18 AWG on power leads, 22 AWG on 0-10V dimming wires and on auxiliary

output, 203mm (8 in) long, 105°C rated, stranded, stripped by approximately 9.5mm, and

tinned. All the wires, on both input and output, have a 600 V insulation rating.

Ingress Protection: IP20 rated

Mounting Instructions: The PSB50/40/30 driver case must be secured on a flat surface through the two mounting

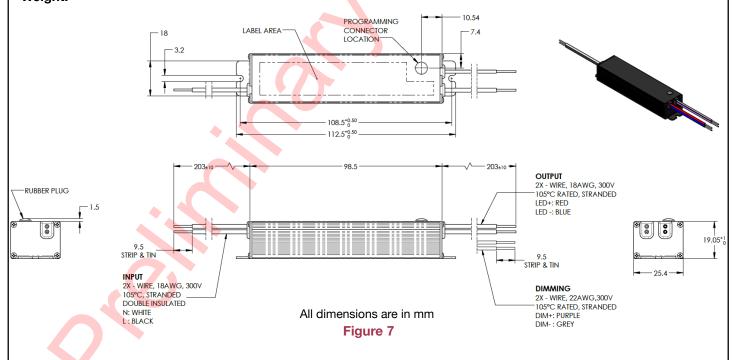
tabs, shown here below in the case outline drawings.

#### 15 - OUTLINE DRAWINGS

**Dimensions:** L 98.5 \* W 25.4 \* H 19.05 mm (L 3.88 \* W 1.00 \* H 0.75 in.)

**Volume:** 46.9 cm<sup>3</sup> (2.87 in<sup>3</sup>)

Weight:





PSB50 PSB40 PSB30

50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

#### 16 - LABELING

The PSB50-1200-42 is used in figure 8 as an example to illustrate a typical label.

⊃ PSB50W-1200-42 CONFIGURATION AFTER PROGRAMMING Dimmable Constant Current LED Driver DC OUTPUT: Max Case Temperature tc = 90°C Programmable Current 0.60-1.20 A === Maximum Power 50.4 W Suitable for Operation with a 0-10V Dimmer Suitable for Dry or Damp Locations Voltage Range 32-42 Vdc No Load Voltage 50 Vdc UART/FIRMWARE • tc AC INPUT: Use ERP Supplied Cables Only LED +: RED 120-277 V ~ 0.50A for Programming LED -: BLUE 50/60 Hz (serial label) PF ≥ 0.9, THD ≤ 20% For 0-10V Dimmina L: BLACK DIM +: PURPLE Designed in the USA DIM - : GREY N: WHITE Manufactured in China

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

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PSB50 50 W PSB40 40 W PSB30 30 W

50, 40 & 30 W Programmable Constant Current LED Driver with Tri-Mode Dimming™ (TRIAC, ELV & 0-10 V)

### **Revision History**

Revision	Date	Originator	Comments						
Prelim.	15OCT2017	LJ	Created data sheet						
Prelim.	02NOV2017	З	<ul> <li>Updated feature table on front page.</li> <li>Updated Lifetime: 50,000 hours @ Tc = 75°C</li> <li>Updated part numbers in section 1 and added nominal values</li> <li>Updated package dimensions and mechanical outline dimensions in section 15</li> <li>Added a comment about the programming cable in section 1</li> <li>Updated the 0-10V dimming profile in section 4 &amp; 11</li> <li>Updated Safety agency approvals in section 6</li> </ul>						
Prelim.	05NOV2017	LJ	Updated list of applications						
Prelim.	06NOV2017	LJ	Updated acoustic noise specification						
Prelim.	14NOV2017	LJ	Extended Vout range on all models						
Prelim.	25NOV2017	LJ	Combined the 2 Surge specs in section 6						
Prelim.	04DEC2017	LJ	Corrected the part number of the programming cable to "PROG-JACK-USB"						

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PDA080B-1A0G ESS010W-0500-12 PDA150B-S1A5G SLM140W-1.05-130-ZA ESS015W-0700-18 EUD-150S350DVA LWA320-C420-ARK-B HVG-240-48AB HVG-320-36AB HVG-320-54AB ELG-240-C1400AB EUK-150S105DV BXCS-12Z-N2P-B1-A BXPR-WN-01-A LN1224CV BXCS-12D-N2P-01-A BXCS-12W-N2P-01-A HBG-160-24AB 980100001200394 980060001200376 LC 14W 250-350MA

FLEXC R ADV2 LC 24W 500-600MA FLEXC R ADV2 LC 36W 850-900MA FLEXC R ADV2 LC 50W 200-350ML 170V FLEXC LP SNC4 LC 25W 200-350ML 70V FLEXC LP SNC4 LC 35W 200-350ML 121V FLEXC LP SNC4 LCBI 10W 350MA PHASE-CUT/1-10V LP LC 13W 300MA FIXC SC ADV2 LC 44W 1050MA FIXC SC ADV2 LC 38W 900MA FIXC SR ADV2 LC 38W 900MA FIXC SR ADV2 LC 34W 800MA FIXC SC ADV2 LC 44W 1050MA FIXC SC ADV2 LC 38W 900MA 42V FIXC SRL ADV2