VLM100 Series

96 W

96 W, Efficient, Compact Non-Dimmable CV Class 2 / Class II LED Drivers

Nominal Input Voltage	Max. Output Power	Nominal Output Voltage	Max. Output Current	Efficiency	Max. Case Temperature	THD	Power Factor
120 & 277 Vac, 220 to 240 Vac	96 W	12, 24, 48 Vdc	8, 4, 2 A	up to 92% typical	90°C (measured at the hot spot)	< 20%	> 0.9

Typical Application Diagram

Models with "-T" Suffix (Terminal Blocks), Aluminum Case:
L 193.2 x W 26.25 x H 19.85 mm
(L 7.60 x W 1.03 x H 0.78 in)

( ): Wire Color for models with "-T" suffix (220-240 Vac)

Wiring Diagram

FEATURES

- Very high power density of 24 W/in^3
- Class 2 power supply
- Class II power supply per IEC 61347
- IP20-rated case with silicone-based potting
- 90°C maximum case hot spot temperature
- Complies with ENERGY STAR®, DLC (DesignLight Consortium®) and CA Title 24 technical requirements
- Lifetime: 50,000 hours min at 70°C case temperature
- UL Class P
- Worldwide safety approvals
- Additional safety approvals when using the optional strain reliefs for models with "-T" suffix

CA Title 24

SELV Class 2 RoHS

TYPICAL APPLICATIONS

- Strip lights
- Pendants
- Linears
- Cove Lights

5 Year Warranty - 5 Year Warranty

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1 - ORDERING INFORMATION

ERP Part Number	Nominal Input Voltage (Vac)	Pout Max (W)	Vout Nom (Vdc)	Iout Min (A)	Iout Max (A)	Open Loop Voltage (No Load Vout Max) (Vdc)	Comments
120/277 VAC NOMINAL VOLTAGE							
VLM100W-12[(1)]	120 & 277	96	12	0.2	8	12.84	Aluminum case with flying leads
VLM100W-24	120 & 277	96	24	0.2	4	25.68	Aluminum case with flying leads
VLM100W-48	120 & 277	96	48	0.1	2	51.36	Aluminum case with flying leads
VLM100W-12-S[(1)]	120 & 277	96	12	0.2	8	12.84	Aluminum case with bottom leads and studs
VLM100W-24-S	120 & 277	96	24	0.2	4	25.68	Aluminum case with bottom leads and studs
VLM100W-48-S	120 & 277	96	48	0.1	2	51.36	Aluminum case with bottom leads and studs
220 TO 240 VAC NOMINAL VOLTAGE							
VLM100E-12-T	220 to 240	96	12	0.2	8	12.84	Aluminum case with terminal blocks
VLM100E-24-T	220 to 240	96	24	0.2	4	25.68	Aluminum case with terminal blocks
VLM100E-48-T	220 to 240	96	48	0.1	2	51.36	Aluminum case with terminal blocks

(1): VLM100W-12 is not Class 2 because the over-current protection of this model exceeds the 8A UL Class 2 limit.

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

	Units	Minimum	Typical	Maximum	Notes
Input Voltage Range (Vin) - Models with flying leads and with "-S" suffix	Vac	90	120 & 277	305	•The rated output voltage for each model is achieved at Vin≥105 Vac & at Vin≥249 Vac for models with flying leads and with the "-S" suffix, and at Vin≥209 Vac for models with "-T" suffix.
- Models with "-T" suffix		198	230	264	•At maximum load, as specified in section 1.
Input Frequency Range - Models with flying leads and with "-S" suffix	Hz	47	60	63	
- Models with "-T" suffix		47	50	53	
Input Current (Iin)	A			1.05 A @ 120 Vac 0.58 A @ 230 vac 0.48 A @ 277 Vac	
Power Factor (PF)		0.9	> 0.9		•At nominal input voltage •From 100% to 60% of rated power
Inrush Current	A	Meets NEMA-410 requirements			•At any point on the sine wave and 25°C
Leakage Current	µA			400 µA @ 120 Vac 800 µA @ 230 Vac 920 µA @ 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 •From 100% to 60% of rated power •Complies with DLC (Design Light Consortium) technical requirements
Efficiency	%	-	up to 92%	-	Measured with nominal input voltage
Isolation	The AC input to the main DC output is isolated				

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

	Units	Minimum	Typical	Maximum	Notes
Output Voltage (Vout)	Vdc		12, 24, 48		See ordering information for details
Output Current (Iout)	A			12 Vdc: 8 A 24 Vdc: 4 A 48 Vdc: 2 A	The rated output voltage for each model is achieved at Vin≥105 Vac & at Vin≥249 Vac for models with flying leads and with the "-S" suffix, and at Vin≥209 Vac for models with "-T" suffix.
Output Voltage Regulation	%	-5		5	•At nominal AC line voltage •Includes load and current set point variations.
Output Voltage Overshoot	%	-	-	10	The driver does not operate outside of the regulation requirements for more than 500 ms during power on with maximum load.
Ripple Voltage	≤ 5% of rated output voltage for each model				•Measured at maximum load and nominal input voltage. •Calculated in accordance with the IES Lighting Handbook, 9th edition.
Start-up Time	ms			500	•Measured from application of AC line voltage to 100% light output. •Complies with ENERGY STAR® luminaire specification.

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4 - ENVIRONMENTAL CONDITIONS

	Units	Minimum	Typical	Maximum	Notes
Operating Ambient Temperature (Ta)	°C	-20		50	50°C is the non-derated temperature (Refer to section 7 "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 13)
Storage Temperature	°C	-40		+85	
Humidity	%	5	-	95	Non-condensing
Cooling	Convection cooled				
Acoustic Noise	dBA			22	Measured at a distance of 1 foot (30 cm)
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 ≤ 70°C				
Lifetime	50,000 hours at Tc ≤ 70°C maximum case hot spot temperature (see hot spot •tc on label in page 13)				

5 - EMC COMPLIANCE AND SAFETY APPROVALS

EMC Compliance			
Conducted and Radiated EMI	•Models with flying leads and with "-S" suffix: Compliant with FCC CFR Title 47 Part 15 Class B at 120 Vac & Class A at 277 Vac •Models with "-T" suffix: Compliant with EN55015 (CISPR 15) at 220, 230, and 240 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	Models with flying leads and with "-S" suffix: UL8750 listed Class 2
cUL	Models with flying leads and with "-S" suffix: CAN/CSA C22.2 No. 250.13-14 LED equipment for lighting applications
CE	Models with "-T" suffix: IEC61347-2-13 electronic control gear for LED Modules & EN55015 (EMC compliance)
CB	For models with "-T" suffix
ENEC	For models with "-T" suffix

Safety	Units	Minimum	Typical	Maximum	Notes
Hi Pot (High Potential) or Dielectric voltage-withstand - Models with flying leads and with "-S" suffix	Vdc	2500			•Insulation between the input (AC line and Neutral) and the output •Tested at the RMS voltage equivalent of 1768 Vac
- Models with "-T" suffix		4242			•Tested at the RMS voltage equivalent of 3000 Vac •Meets class II reinforced/double insulation

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6 - PROTECTION FEATURES

Under-Voltage (Brownout)

The VLM100 series provides protection circuitry such that an application of an input voltage below the minimum stated in section 1 (Input Specification) shall not cause damage to the driver.

Short Circuit and Over Current Protection

The VLM100 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 VLM100 is equipped with an internal temperature sensor on the primary power train. Failure to stay within the convection power rating will cause the driver to shut down. The main output current will be resumed when the temperature of the built-in temperature sensor cools adequately.

Output Open Load

A no load condition will not damage the VLM100 or cause a hazardous condition. The driver will remain stable and operate normally after application of a load. When the LED load is removed, the output voltage of the VLM100 series is limited to 7% about the output voltage of each model.

Over Power Protection

The VLM100 will shut down and auto recover in the event of an over-power condition. This condition will cause no damage to the power supply.

Input Over Current Protection

The VLM100 series incorporates a primary AC line fuse for input over current protection.

7 - OUTPUT POWER DE-RATING AT ELEVATED TEMPERATURES

The VLM100 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 1).

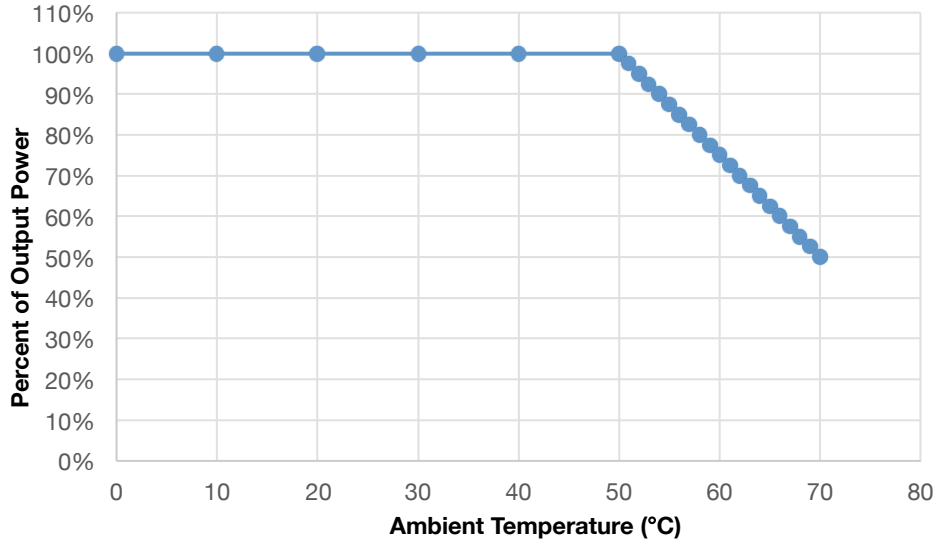

Figure 1

96 W, Efficient, Compact Non-Dimmable CV Class 2 / Class II LED Drivers

8 - 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 figure 1 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
2) Dissipation Factor (tan δ): 150% or less of initial specified value
3) Equivalent Series Resistance (ESR): 150% or less of initial specified value
4) Leakage current: less of initial specified value

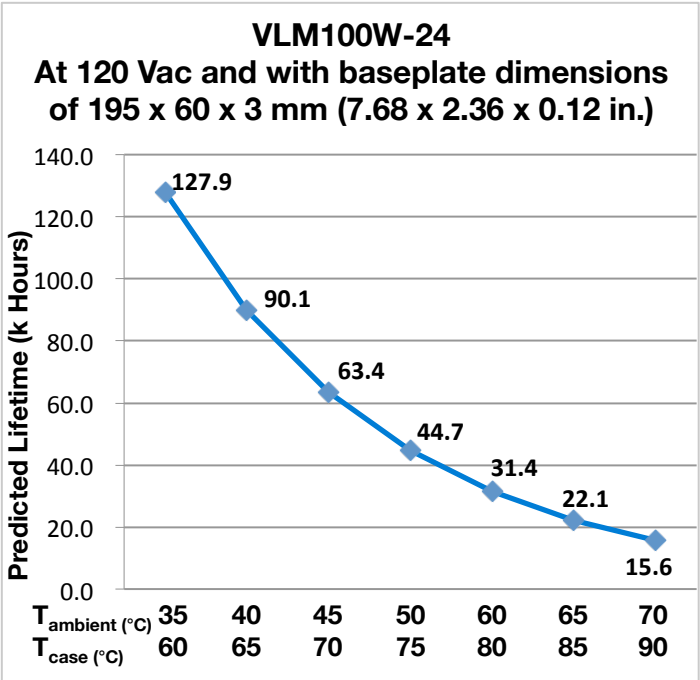

Figure 2

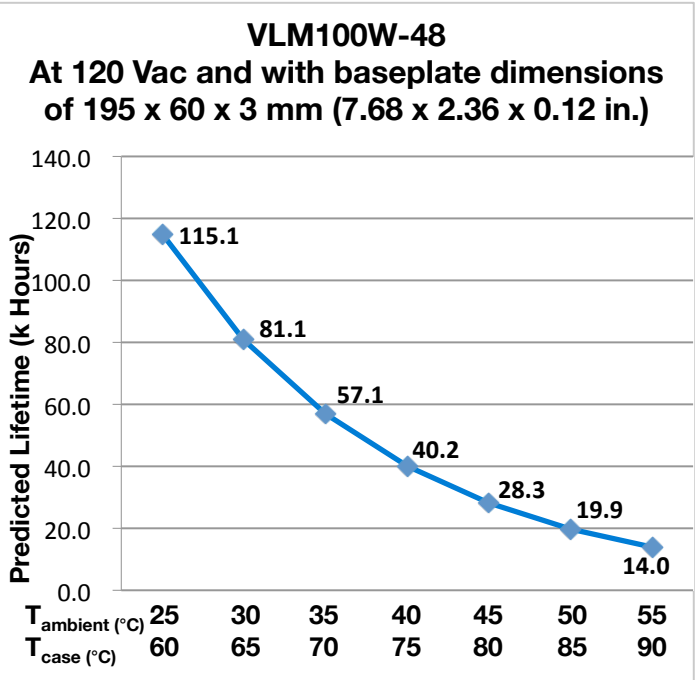

Figure 3

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.*

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9 – EFFICIENCY VERSUS LOAD

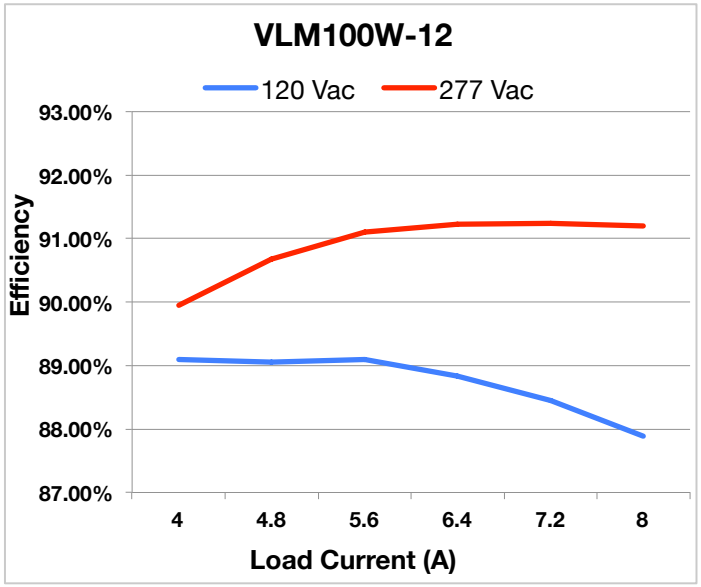

Figure 4

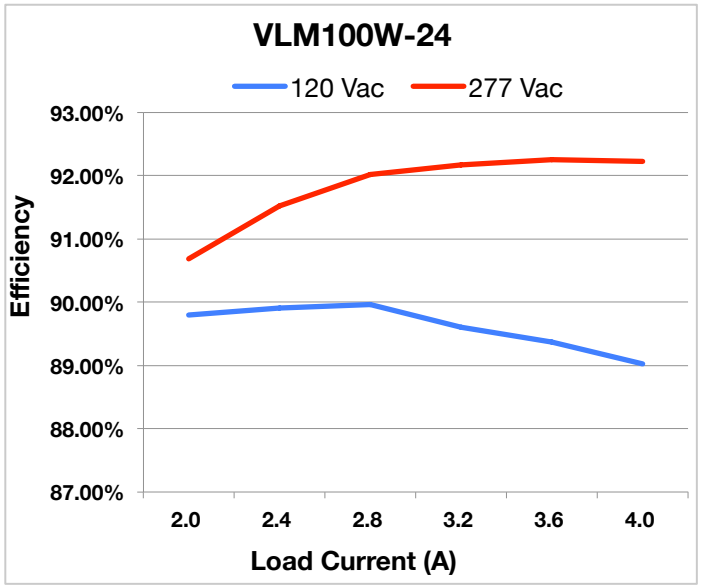

Figure 5

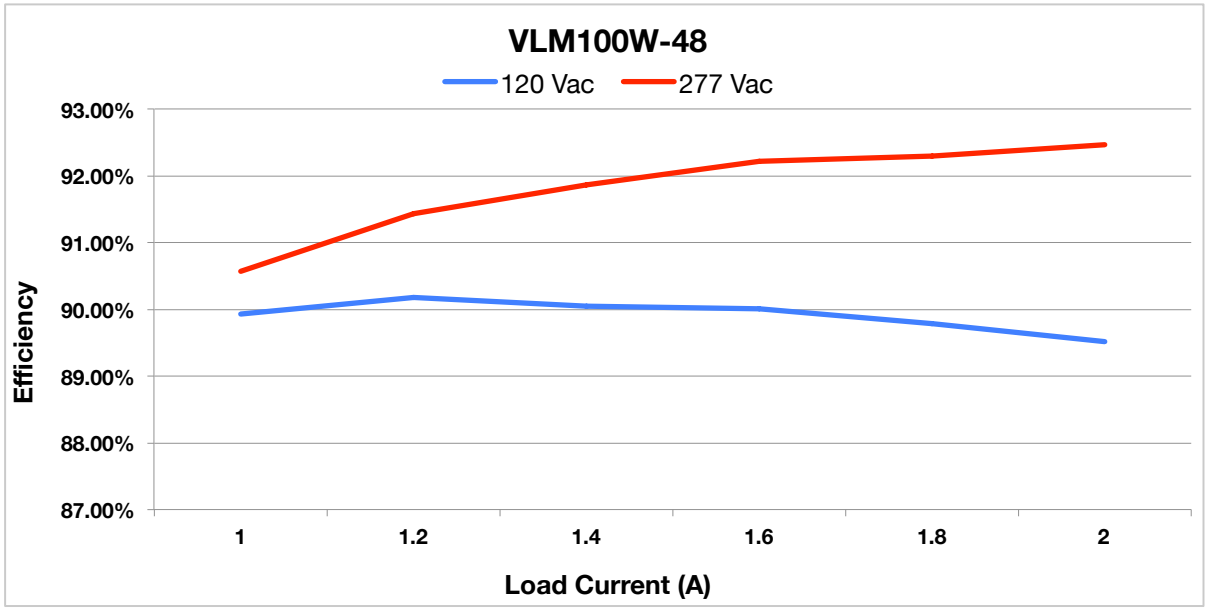

Figure 6

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10 – POWER FACTOR VERSUS LOAD

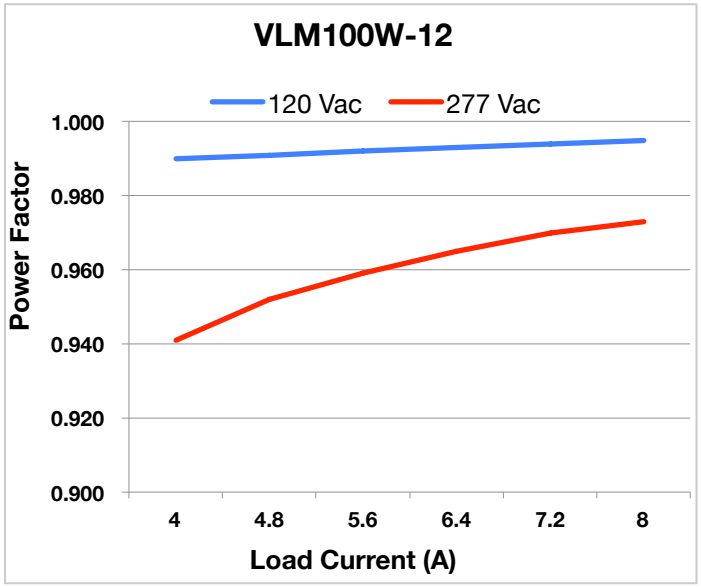

Figure 7

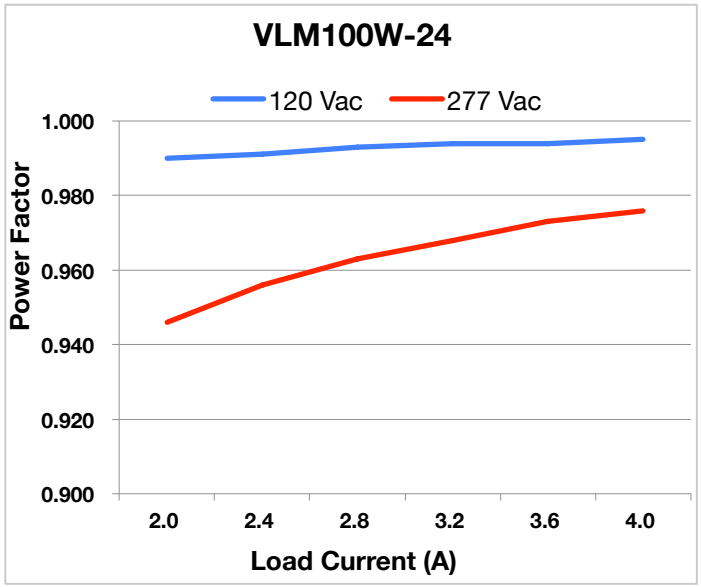

Figure 8

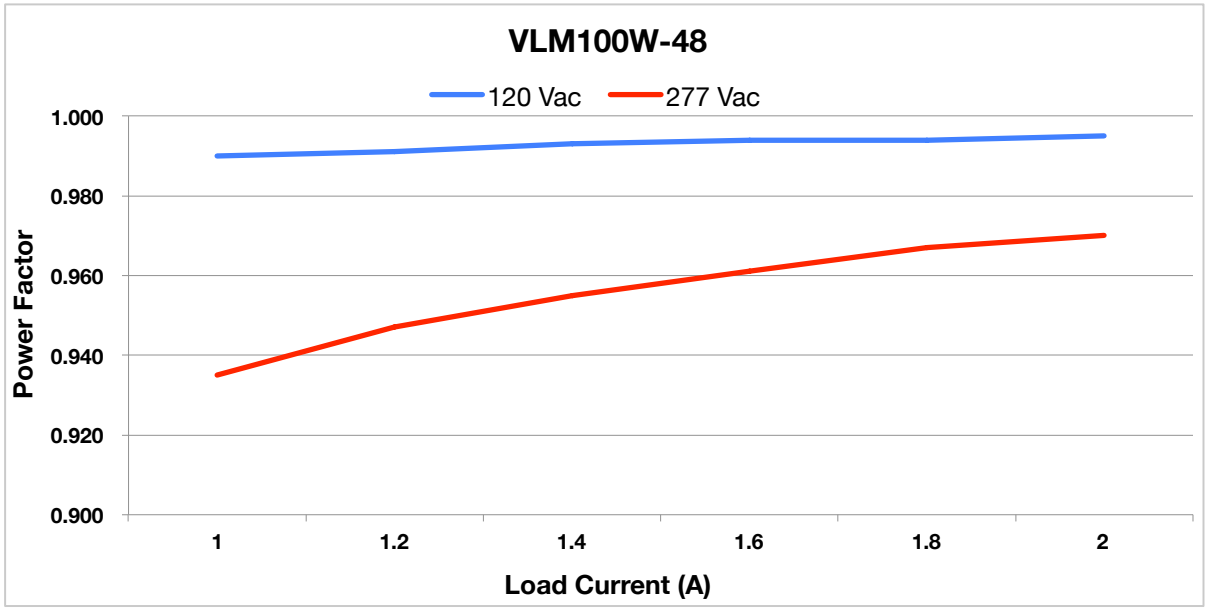

Figure 9

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11 – THD VERSUS LOAD

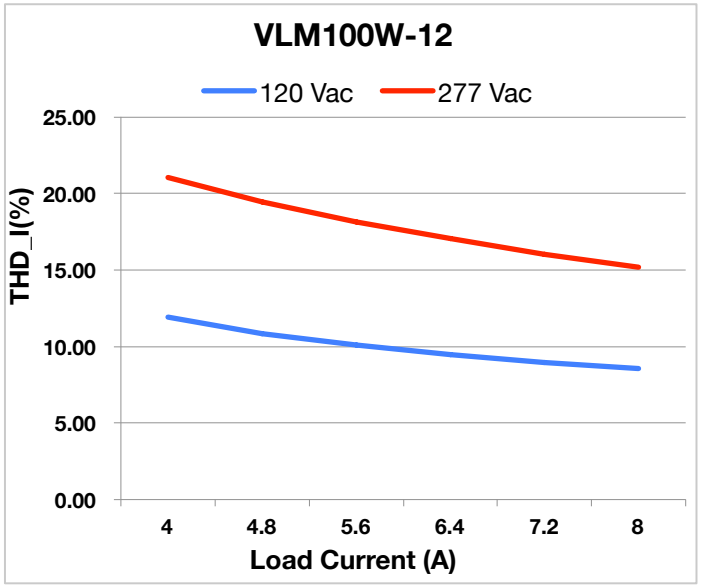


Figure 10

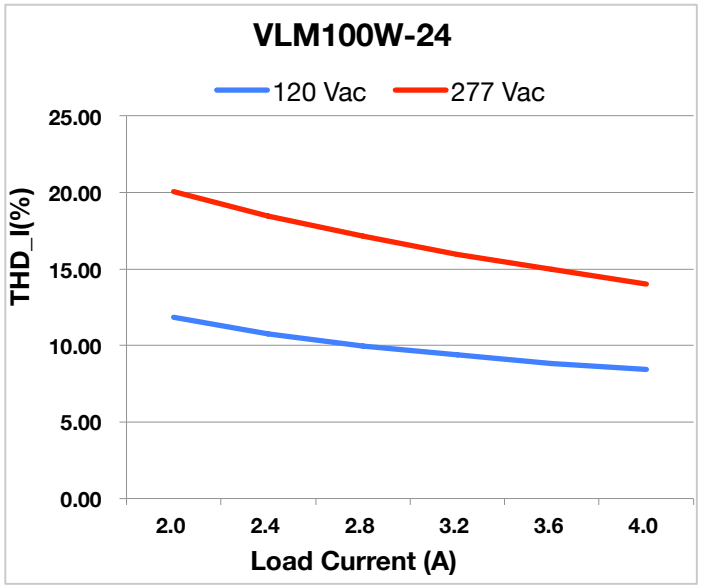


Figure 11

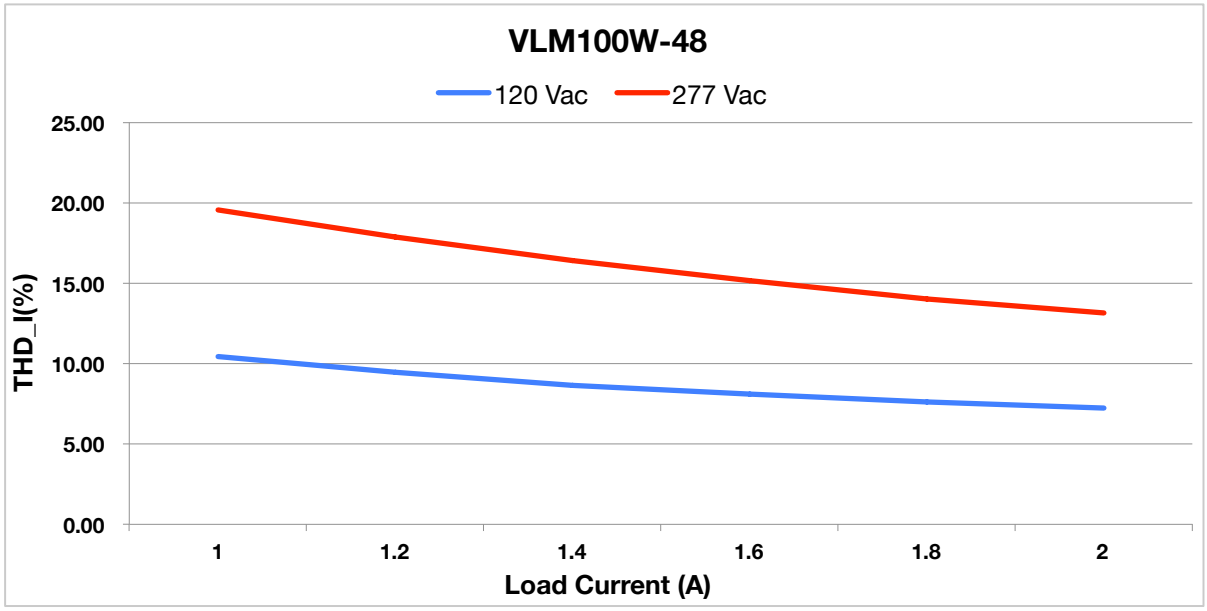
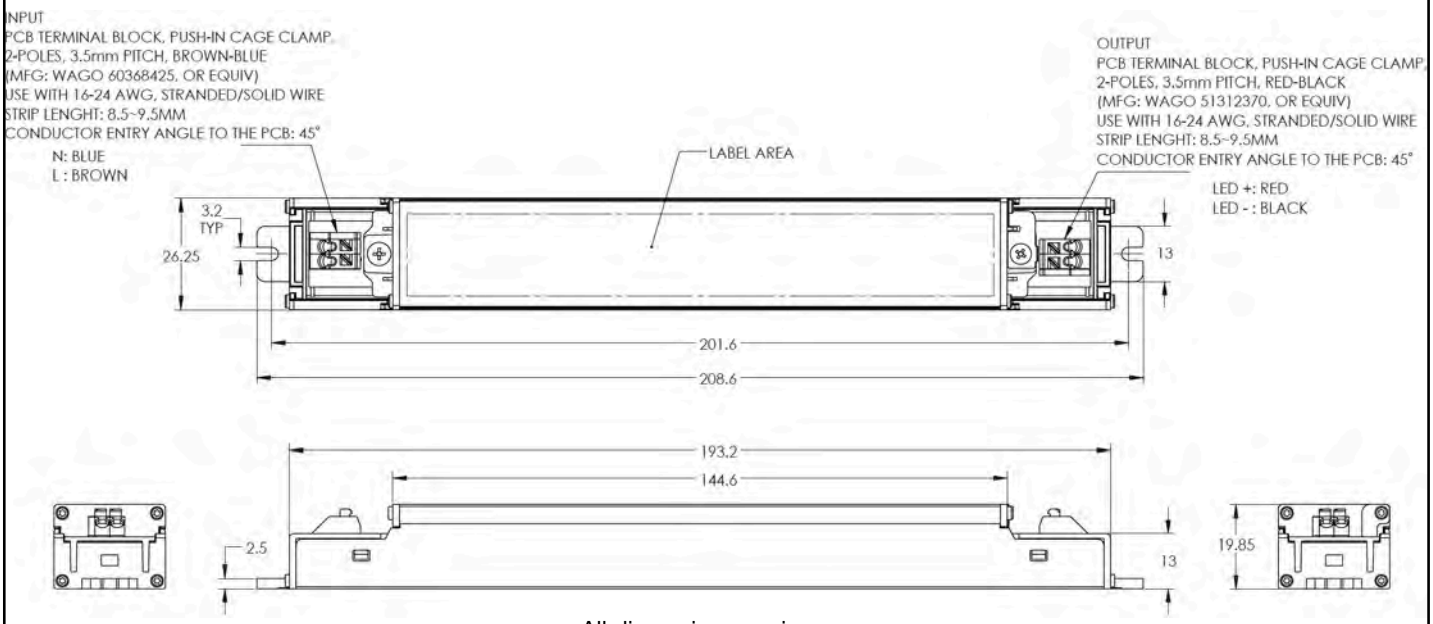


Figure 12

96 W, Efficient, Compact Non-Dimmable CV Class 2 / Class II LED Drivers

14 - OUTLINE DRAWINGS (MODELS WITH "-T" SUFFIX)

Dimensions: L 193.2 x W 26.25 x H 19.85 mm (L 7.60 x W 1.03 x H 0.78 in)
Weight:



All dimensions are in mm

Figure 14

12 - MECHANICAL DETAILS

- **Packaging Options:** Aluminum case
- **I/O Connections:**
  - **Models with flying leads and with "-S" suffix:** 18 AWG on all leads, 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 300 V insulation rating.
  - **Models with "T" suffix:** Terminal Blocks
- **Ingress Protection:** IP20 rated
- **Mounting Instructions:** The VLM100 driver case must be secured on a flat surface through the two mounting tabs, shown here below in the case outline drawings. We recommended mounting the VLM100 on a baseplate with dimensions of 195 x 60 x 3 mm (7.68 x 2.36 x 0.12 in.).

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16 - LABELING

The VLM100W-24 and VLM100E-24-T are used in figure 16 as examples to illustrate typical labels.

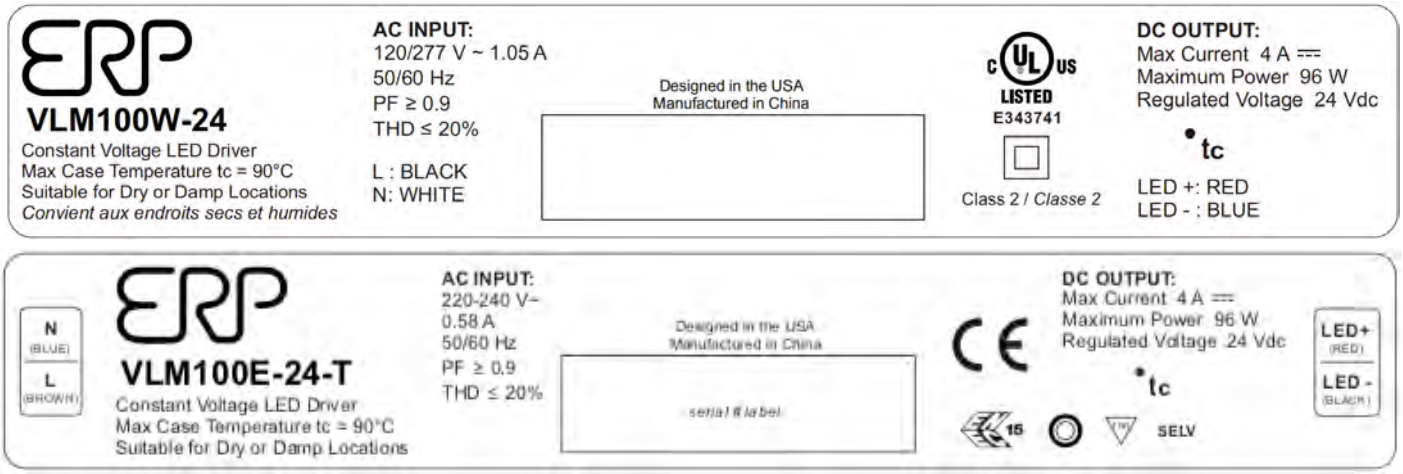

Figure 16

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