

## 96 Watt - LP96W480 Series

CONSTANT VOLTAGE OR CONSTANT CURRENT LED DRIVER WITH DIMMING



DIMMING  
LP96W480 Series  
**96W**

### Model: LP96W480 Series

- Drive Mode: Constant Current or Constant Voltage
- Technology: PFC Corrected 2-Stage Switch Mode
- Output Power: 96W Max.
- Input Voltage: 277 to 480VAC, 50/60Hz
- Number of Outputs: One
- Output Voltages: 6VDC - 274VDC
- Output Currents: 350mA - 5350mA
- Optional 0-10V or PWM Positive Dimming 10% ~ 100%

### Environmental

1. Operating temperature: Tc 90C Maximum. Reference -30 to +65°C ambient
2. UL Type TL (Tref Max/Meas. Tref): 90/66°C
3. Storage temperature range: -40 to +85°C
4. Humidity (non-condensing): 5% - 95%RH
5. Cooling: Convection
6. Vibration Frequency: 5-55Hz/2g, 30 minutes
7. Impact resistance: 1g/s
8. MTBF@ 40°C: 474,000 hours @ Full Load per MIL-217F Notice 2.

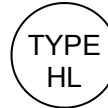
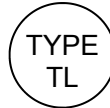
### Safety and Compliance

1. UL8750, EN61347, CSA 22.2, UL Type TL & HL recognized.
2. FCC, 47CFR Part 15 Class A certified
3. Water resistant and Dust Proof Design: IP66, NEMA6, for Dry, Damp, Wet Locations.
4. Safety Isolation between Primary and Secondary
5. EN61000-4-5: 3kV/6kV 8/20 µsec surge protection.
6. Protection: output over-voltage, output over-current, output short circuit, auto recovery.
7. Internal Thermal protection. Hick-up mode.  
Off if Tc reaches ~110C, On when Tc reaches ~65C

### Electrical Specifications at 25°C

- Input voltage range: 277 to 480VAC
- Frequency: 47- 63HZ
- Power Factor: ≥ 0.90 at ≥ 50% Load 277Vac/347Vac, ≥ 60% Load 480Vac
- THD%: ≤ 20% at ≥ 60% Load 277Vac/347Vac/480Vac
- Inrush current: <30A at 25C, 480Vac, cold start, Max. Load
- Input current: 0.45A Maximum
- Efficiency: Up to 88% typical at 480Vac Full Load
- Line regulation accuracy: ± 3%
- Load regulation accuracy: ± 4%
- Leakage current: 700uA typical; Hold up time: half cycle

### Constant Current Versions



IP66



Part Number <sup>(2)</sup>	US Class 2	CN Class 2	UL Types	Output Voltage Range	Output Constant Current	Current Accuracy	Output Power Maximum	Typical Efficiency <sup>(1)</sup>
LP96W480-274-C0350	NO	NO	TL & HL	92 - 274 VDC	350 mA	± 5%	96W	88%
LP96W480-213-C0450	NO	NO	TL & HL	71 - 213 VDC	450 mA	± 5%	96W	88%
LP96W480-137-C0700	NO	NO	TL & HL	46 - 137 VDC	700 mA	± 5%	96W	86%
LP96W480-92-C1050	NO	NO	TL & HL	31 - 92 VDC	1050 mA	± 5%	96W	86%
LP96W480-69-C1400	NO	NO	TL & HL	23 - 69 VDC	1400 mA	± 5%	96W	86%
LP96W480-54-C1750	YES	NO	TL & HL	18 - 54 VDC	1750 mA	± 5%	96W	85%
LP96W480-48-C2000	YES	NO	TL & HL	16 - 48 VDC	2000 mA	± 5%	96W	85%
LP96W480-46-C2100	YES	NO	TL & HL	16 - 46 VDC	2100 mA	± 5%	96W	85%
LP96W480-39-C2450	YES	YES	TL & HL	14 - 39 VDC	2450 mA	± 5%	96W	84%
LP96W480-36-C2660	YES	YES	TL & HL	12 - 36 VDC	2660 mA	± 5%	96W	84%
LP96W480-34-C2800	YES	YES	TL & HL	12 - 34 VDC	2800 mA	± 5%	96W	84%
LP96W480-30-C3150	YES	YES	TL & HL	10 - 30 VDC	3150 mA	± 5%	96W	84%
LP96W480-27-C3500	YES	YES	TL & HL	9 - 27 VDC	3500 mA	± 5%	96W	83%
LP96W480-25-C3840	YES	YES	TL & HL	9 - 25 VDC	3840 mA	± 5%	96W	83%
LP96W480-24-C4000	YES	YES	TL & HL	8 - 24 VDC	4000 mA	± 5%	96W	81%
LP96W480-20-C4800	YES	YES	TL & HL	7 - 20 VDC	4800 mA	± 5%	96W	81%
LP96W480-18-C5350	NO	NO	TL & HL	6 - 18 VDC	5350 mA	± 5%	96W	81%

### Notes

1. Typical efficiency measured at 480VAC input, full load
2. For dimmable versions add appropriate designator to the end of the part number: For Example: LP96W480-24-C4000-RD is 0-10V or resistance dimmable version, LP96W480-24-C4000-PD is PWM dimmable version.  
-RD 0-10V & Resistance dimmable version comes with an extra two wires +Purple/-Grey on the output side.  
-PD PWM Dimmable version comes with an extra two wires +Purple/-Grey on the output side.
3. -RD 0-10V Dimming is compatible with most quality 0-10V wall dimmers and direct 0-10V analog signal. See page 3 for details.
4. -PD PWM version is PWM Dimmable via a positive 10% to 100% Duty Cycle, 400Hz to 1KHz, 0-10V Pulse. See page 4 for details.

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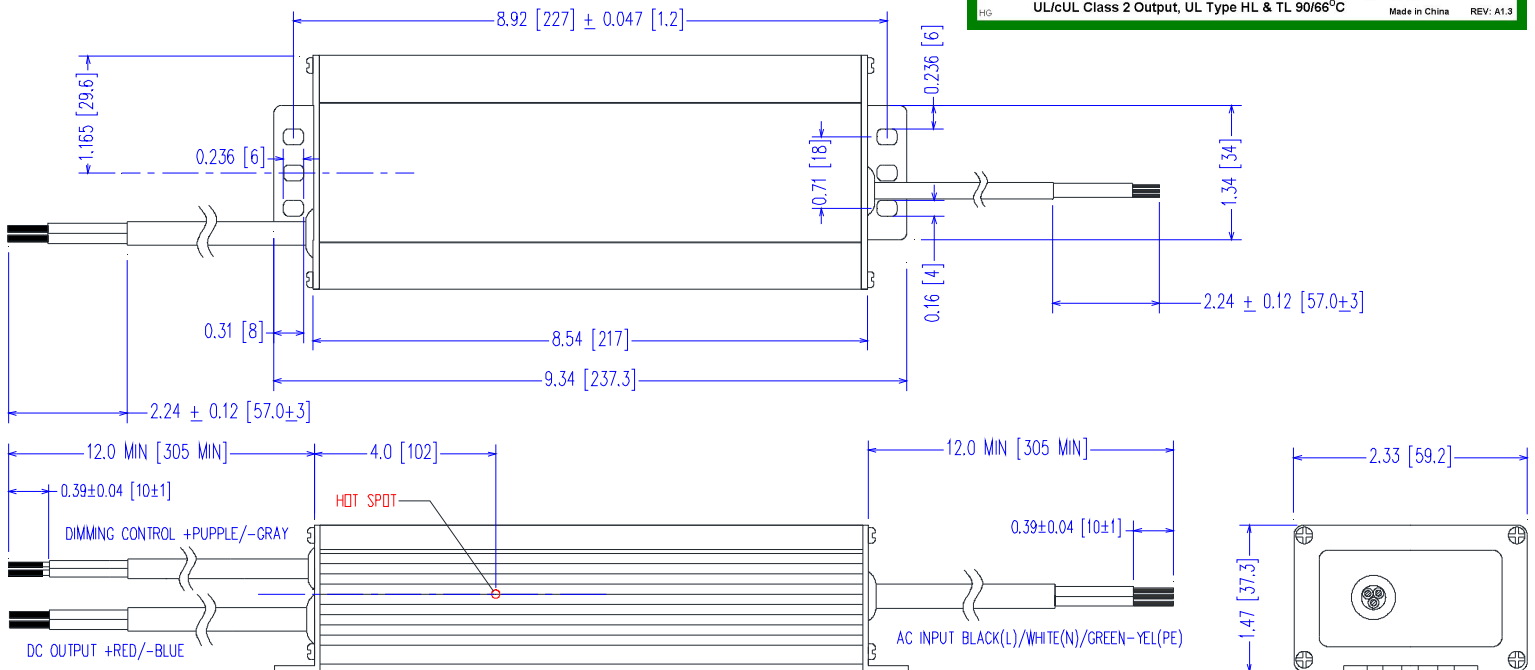
## Constant Voltage Versions

Part Number	US Class 2	CN Class 2	UL Types	Output Constant Voltage	Output Current Range	Voltage Accuracy	Output Power Maximum	Typical Efficiency <sup>(1)</sup>
LP96W480-274	NO	NO	TL & HL	274 VDC	88 - 350 mA	± 5%	96W	88%
LP96W480-213	NO	NO	TL & HL	213 VDC	113 - 450 mA	± 5%	96W	88%
LP96W480-137	NO	NO	TL & HL	137 VDC	175 - 700 mA	± 5%	96W	86%
LP96W480-92	NO	NO	TL & HL	92 VDC	263 - 1050 mA	± 5%	96W	86%
LP96W480-69	NO	NO	TL & HL	69 VDC	350 - 1400 mA	± 5%	96W	86%
LP96W480-54	YES	YES	TL & HL	54 VDC	438 - 1750 mA	± 5%	96W	85%
LP96W480-48	YES	YES	TL & HL	48 VDC	500 - 2000 mA	± 5%	96W	85%
LP96W480-46	YES	YES	TL & HL	46 VDC	525 - 2100 mA	± 3%	96W	85%
LP96W480-39	YES	YES	TL & HL	39 VDC	613 - 2450 mA	± 5%	96W	84%
LP96W480-36	YES	YES	TL & HL	36 VDC	665 - 2660 mA	± 5%	96W	84%
LP96W480-34	YES	YES	TL & HL	34 VDC	700 - 2800 mA	± 5%	96W	84%
LP96W480-30	YES	YES	TL & HL	30 VDC	788 - 3150 mA	± 5%	96W	84%
LP96W480-27	YES	YES	TL & HL	27 VDC	875 - 3500 mA	± 5%	96W	83%
LP96W480-25	YES	YES	TL & HL	25 VDC	960 - 3840 mA	± 5%	96W	83%
LP96W480-24	YES	YES	TL & HL	24 VDC	1000 - 4000 mA	± 5%	96W	81%
LP96W480-20	YES	YES	TL & HL	20 VDC	1200 - 4800 mA	± 5%	96W	81%
LP96W480-18	NO	NO	TL & HL	18 VDC	1338 - 5350 mA	± 5%	96W	81%

## Mechanical Dimensions: Inches [mm]

Material: Black Aluminum Housing  
Fully Encapsulated  
Weight: 32.1 oz (910 grams) Typical

## Labeling Example



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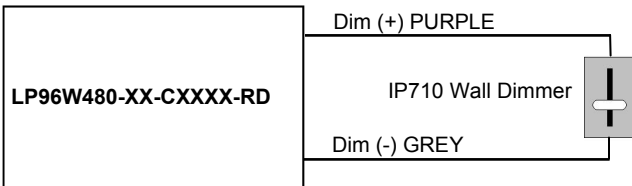
### -RD 2-Wire 0-10V CCR Dimming Scheme

Parameters	Minimum	Typical	Maximum
Source Current out of 0-10V Purple Wire	0mA	—	2mA
Absolute Voltage Range on 0-10V (+) Purple Wire	-2.0V	—	+15V
Sink Current into 0-10V Purple Wire	0mA	—	1.2mA

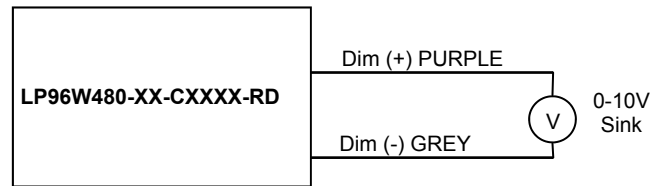
### Notes

1. -RD 0-10V dimmable version comes with an extra two wires +Purple/-Grey on the output side.
2. -RD version is compatible with most 0-10V Wall Slide dimmers and direct 0-10V analog signal. Recommended wall slide dimmer is Leviton IP710 or equivalent
3. -RD 0-10V dimmable version is not intended to dim below about 5% @ 0V or 10% @ 1.0V
4. -RD 0-10V dimmable version output will be 100% with Purple/Grey open and minimum with Purple/Grey Shorted.

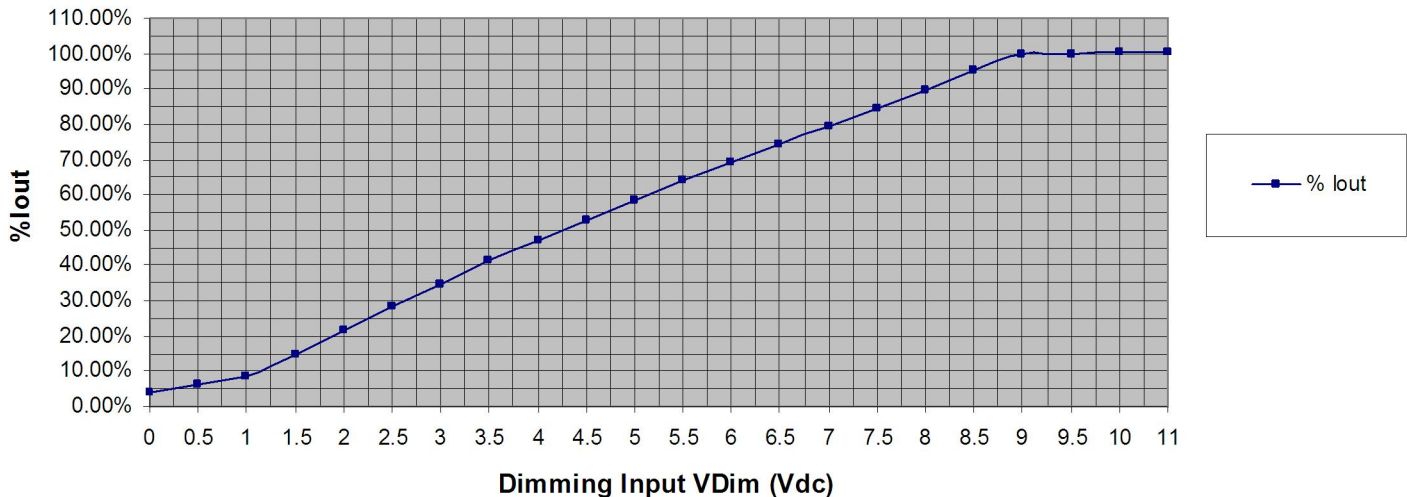
### -RD 2-Wire Resistance Dimming Scheme



### -RD 2-Wire 0-10V Analog Dimming Scheme



% Output Current vs. 0-10VDC Dimming Input



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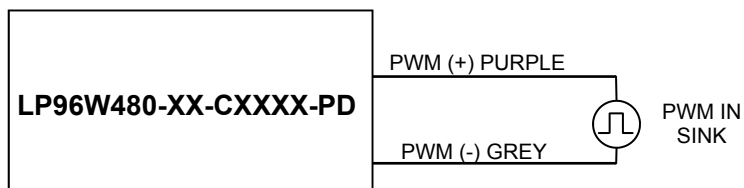
## -PD 2-Wire CCR PWM Positive Dimming Scheme

Parameters	Minimum	Typical	Maximum
Absolute Maximum Voltage Range on PWM Input (Purple Wire)	-2.0V	10V	+15V
Input LOW Level Voltage Range (Purple Wire)	-2.0V	0V	+5.5V
Input HIGH Level Voltage Range (Purple Wire)	+9.0V	10V	+15V
Current into PWM Input (Purple Wire)	0mA	—	1.2mA
Source Current out of PWM Input (Purple Wire)	0mA	—	2mA
PWM Input Signal Frequency	500Hz	—	1500Hz
PWM Input Signal Positive Duty Cycle	0%	10-90%	100%

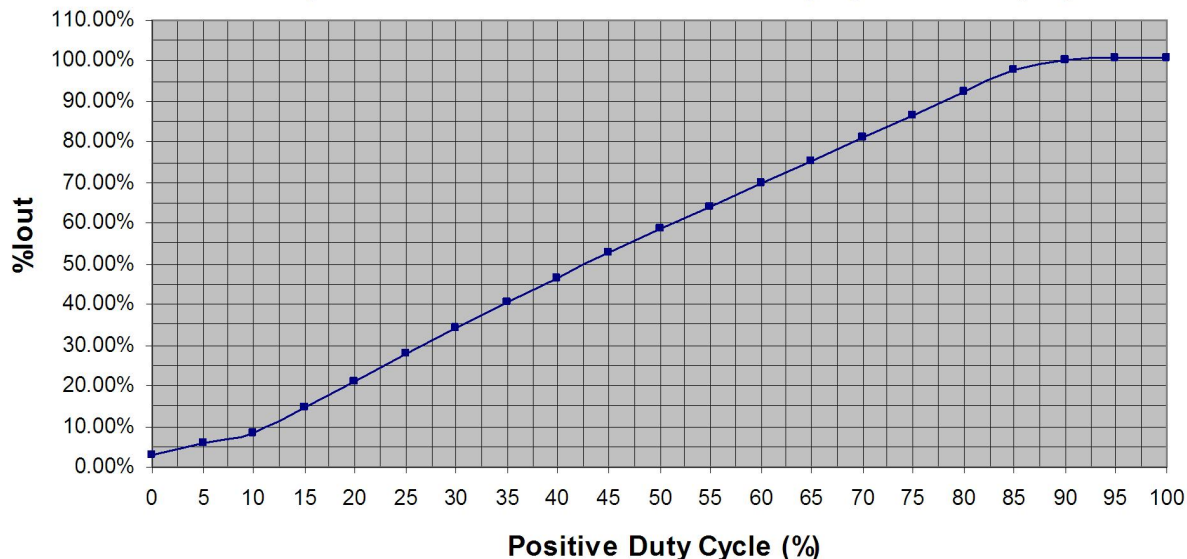
## Notes

1. -PD PWM Dimmable version comes with an extra 2 wires +Purple/-Grey on the output side.
2. -PD PWM Dimmable version is not intended to dim below about 5% @ 0% Duty Cycle or 10% @ 10% Duty Cycle
3. -PD PWM dimmable version output will be 100% with Purple/Grey open and minimum with Purple/Grey Shorted.

## -PD 2-Wire PWM Positive Dimming Scheme



% Output Current vs. 1.0 kHz, Positive Duty Cycle Dimming Input



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### Input Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Input Voltage	250 Vac	—	528 Vac	277, 347, 380, 460, 480 Vac Nominal Values
Input Frequency	47 Hz	—	63 Hz	50/60Hz Nominal
Input AC Current	—	—	0.31 A	Measured at 347Vac/60Hz Input, Output Full load.
	—	—	0.23 A	Measured at 480Vac/60Hz Input, Output Full load.
Inrush Current (Peak)	—	20A	30A	Measured at 480Vac/60Hz Input, Output Full Load, Ta 25°C, Cold Start 50% I <sub>peak</sub> duration $\approx$ 750 $\mu$ sec (1/2*I <sub>p</sub> <sup>2</sup> *t)
Inrush Current (I <sup>2</sup> t)	—	—	0.34 A <sup>2</sup> s	
Leakage Current	—	0.65mA	—	Measured at 277Vac/60Hz Input, Output Full load.
	—	0.73mA	—	Measured at 480Vac/60Hz Input, Output Full load.
THD	—	—	20%	Measured at 277Vac, 347Vac, 380Vac, 460Vac, 480Vac $\geq$ 60% Load
Power Factor (PF)	—	—	0.90	Measured at 277Vac, 347Vac $\geq$ 50% Load, 480Vac $\geq$ 60% Load

### Output Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
DC Output Voltage	Per Table	—	Per Table	Per Tables on Page 1
DC Output Constant Current	-5%	Per Table	+5%	Per Tables on Page 1
Output Power	—	—	Per Table	Per Tables on Page 1
Ripple & Noise (V <sub>pk-pk</sub> )	—	—	3% V <sub>o</sub>	20 MHz BW, Full load output in parallel with 0.1 $\mu$ F ceramic & 10 $\mu$ F Electrolytic.
Ripple (I <sub>pk-pk</sub> )	—	—	5% I <sub>o</sub>	20 MHz BW, Full load output in parallel with 0.1 $\mu$ F ceramic & 10 $\mu$ F Electrolytic. 120 Hz component (Flicker Free)
Start-up Time	—	400 mS	1000 mS	Measured at 480Vac/60Hz Input, Output Full load.
Hold-up Time	—	200 mS	—	Typical @ 480Vac Input, Output Full load.

### Environmental Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Case Temperature (T <sub>c</sub> )	-30 °C	—	+90 °C	Measured at location specified on case.
Operating Temperature (T <sub>a</sub> )	-30 °C	—	+65 °C	This is a reference range. T <sub>c</sub> controls temperature range.
Storage Temperature (T <sub>s</sub> )	-40 °C	—	+85 °C	Non operating temperature range.
Operating Humidity	—	—	95% RH	Relative Humidity, non-condensing.
Vibration	5 Hz	—	55 Hz	2G, 10 minutes/1 cycle, period 30 minutes, each along X, Y, Z axis.
MTBF	474,000 Hours	—	—	MIL-HDBK-217F Notice 2, T <sub>a</sub> = 25C, Output Full Load.

### Protection Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Output Short Circuit (SCP)	—	—	—	No Damage, Auto recovery after short is removed.
Output Over Current (OCP)	—	—	+8% I <sub>o</sub>	Constant Current Limiting circuit.
Output Over Voltage (OVP)	—	—	120% V <sub>o</sub>	No Damage, Auto recovery after fault is removed.

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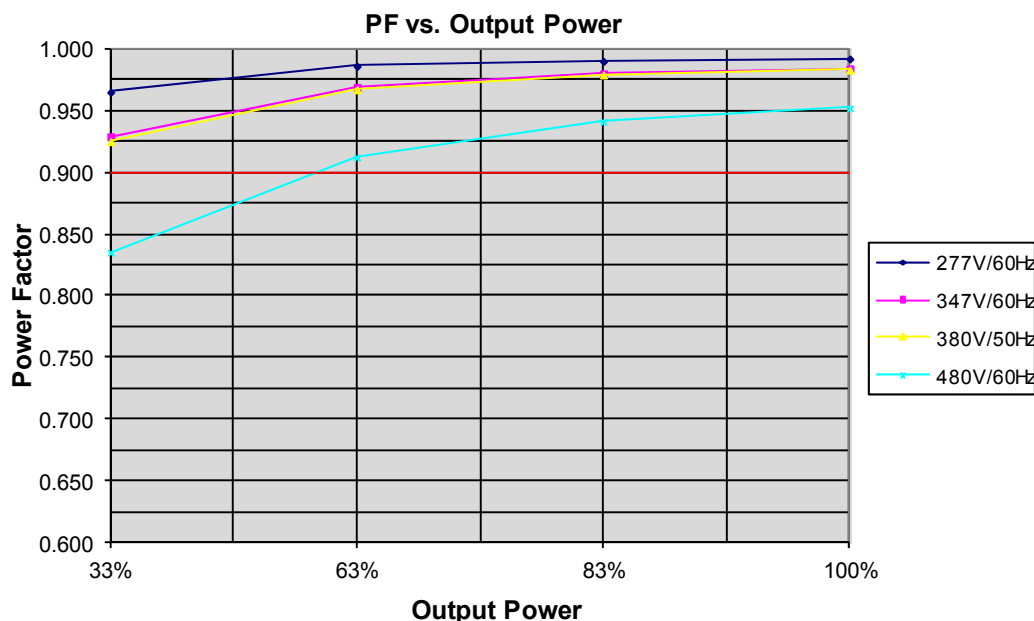
## Safety Certification

Safety	Notes/Standards
UL/CUL	UL8750, UL1310 for UL Class 2 & CAN/CSA C22.2 No. 250.13, UL Type HL & TL 90/66°C
Withstand Voltage	Input to Output: 3750 Vac
Isolation Resistance	Input to Output: >100 MΩ, 500VDC @ 25 °C, 70 % RH
Dimming Circuit	Dim+ Purple/Dim- Grey are considered part of the secondary circuit.

## EMC Certification

Standard	Notes/Conditions
FCC, 47CFR Part 15	Class A
EN 61000-3-2	Part 3-2: Limits for harmonic current emissions Class C, ≥80% Rated Power
EN 61000-3-3	Part 3-3: Limitation of voltage changes, voltage fluctuations and flicker.
EN 61000-4-5	Part 4-5: Surge Immunity test, 3 kV L-N
Energy Star	Energy Star transient protection: Ballast or driver shall comply with ANSI/IEEE C62.41.1-2002 and ANSI/IEEE C62.41.2-2002, Category A operation. The line transient shall consist of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode.

## Power Factor Curves (Typical)



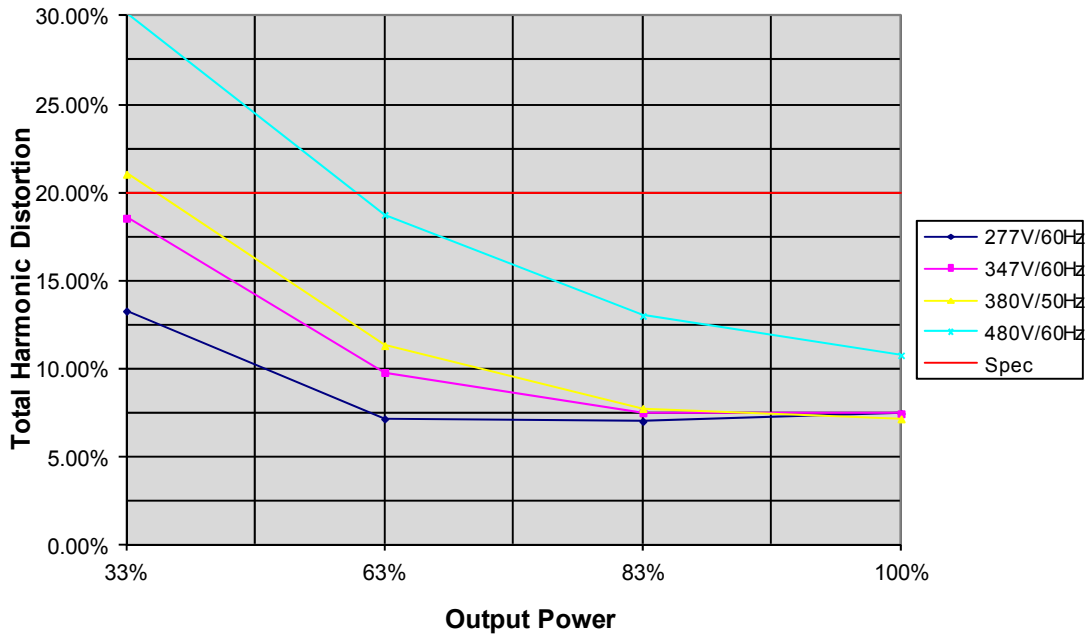
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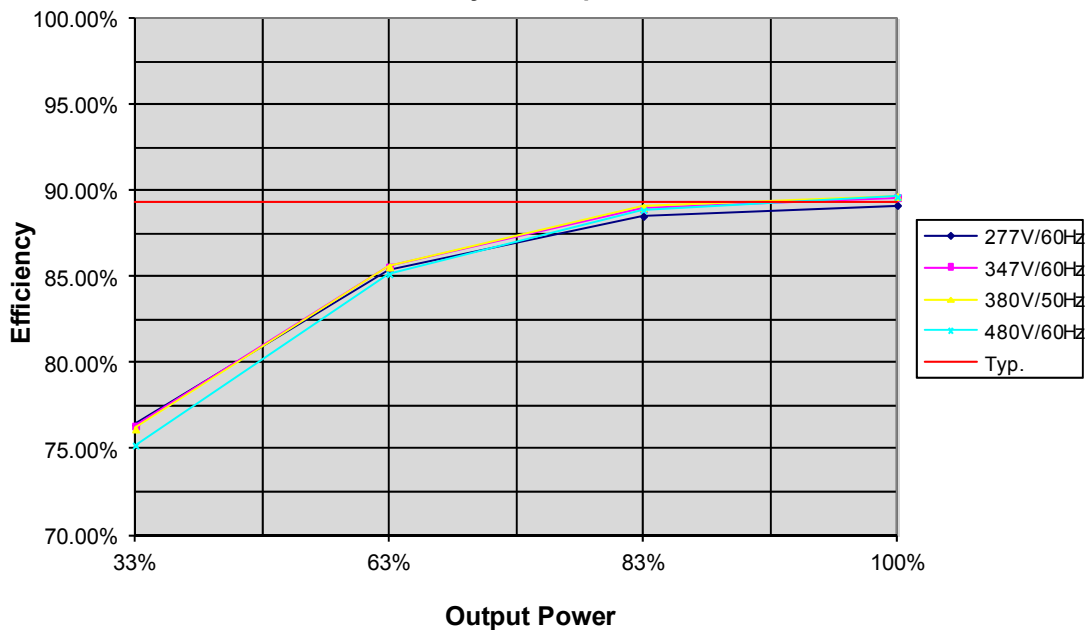
### THD Curves (Typical)

THD vs. Output Power



### Efficiency Curve (Typical)

Efficiency vs. Output Power



96W

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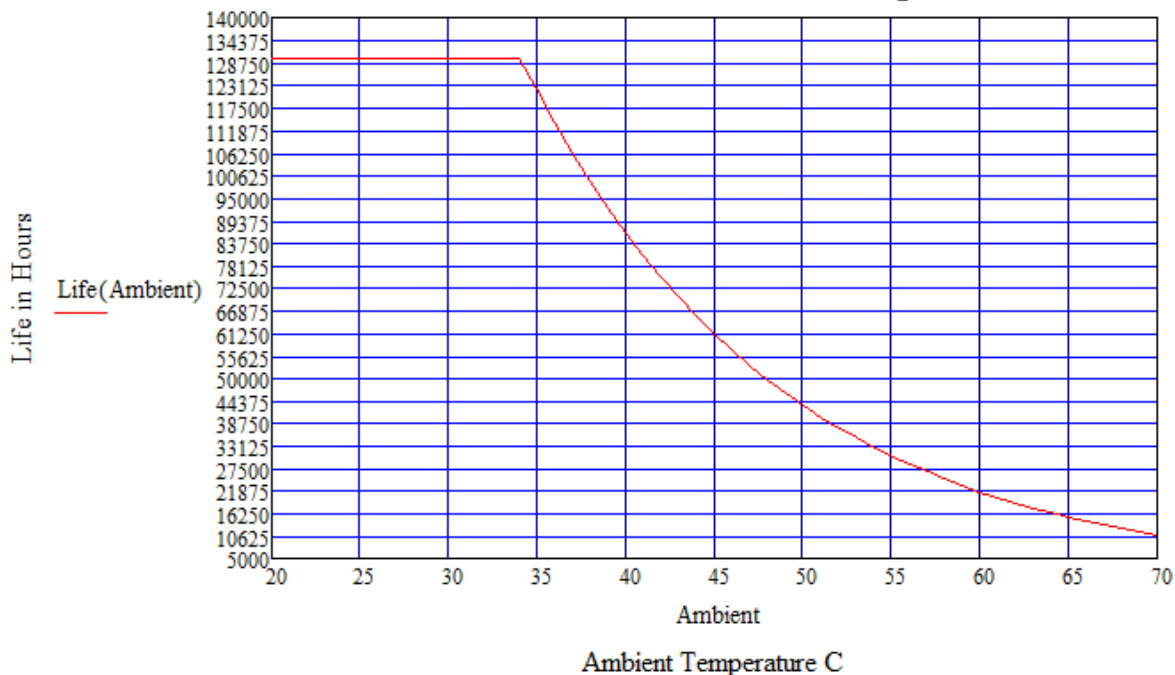
LED Optimized Drivers

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## Life vs. Ambient Temperature

LP96W480 Estimated Life Full Load @ 347Vac



## Life vs. Case (Tc) Temperature

LP96W480 Estimated Life Full Load @ 347Vac

