

40 Watt - LDHL40W480 Series

CONSTANT CURRENT LED DRIVER FOR HAZARDOUS LOCATIONS



40W
LDHL40W480
UL TYPE HL

Model: LDHL40W480 Se-

- Drive Mode: Constant Current or Constant Voltage
- Output Power: 40W Max.
- Input Voltage: 347 to 480VAC, 50/60 Hz
- Number of Outputs: One
- Output Voltages: 3VDC - 130VDC
- Output Currents: 300mA - 4450mA
- Optional 0-10V or PWM Positive Dimming 10% ~ 100%
- UL Type HL Rated for Hazardous Locations

Environmental

1. Operating temperature: Tc 90C Maximum. Reference -30 to +60°C ambient
2. Storage temperature range: -40 to +85°C
3. Humidity (non-condensing): 5% - 95%RH
4. Cooling: Convection
5. Vibration Frequency: 5-55Hz/2g, 30 minutes
6. Impact resistance: 1g/s
7. MTBF@ 40°C: 482,000 hours @ Full Load per MIL-217F Notice 2.

Safety and Compliance

1. UL8750, CSA 22.2 safety compliant, UL Type HL
2. FCC, 47CFR Part 15 Class A compliant
3. Water resistant and Dust Proof Design: IP66, NEMA4, for Dry, Damp, Wet Locations.
4. Compact, Lightweight Design using 5VA rated case.
5. Safety Isolation between Primary and Secondary
6. EN61000-4-5: 3kV L-N, 8/20 usec surge protection.
7. Internal Thermal protection. Hick-up mode.
Off if Tc reaches \approx 105C, On when Tc reaches \approx 65C

Electrical Specifications at 25°C

- Input voltage range: 347-480Vac (Full Range 312 to 528VAC)
- Frequency: 47- 63HZ
- Power Factor: \geq 0.90, 347Vac \geq 60% Load, 480Vac \geq 80% Load
- THD%: \leq 20% at any load 347Vac/480Vac 50/60Hz
- Inrush current: $<$ 30A at 25C, 480V, cold start, Full Load
- Input current: 0.14A typical at 347Vac, 60Hz, Full Load
- Efficiency: 83% typical at 347Vac Full Load
- Line regulation accuracy: \pm 3%
- Load regulation accuracy: \pm 4%
- Leakage current: 600uA typical; Hold up time: half cycle

Constant Current Versions



IP66



Part Number ⁽²⁾	US Class 2	CN Class 2	Output Voltage Range	Output Constant Current	Current Accuracy	Output Power Maximum	Typical Efficiency ⁽¹⁾
LDHL40W480-130-C0300	NO	NO	44 - 130 VDC	300 mA	\pm 5%	40W	86%
LDHL40W480-114-C0350	NO	NO	38 - 114 VDC	350 mA	\pm 5%	40W	86%
LDHL40W480-100-C0400	NO	NO	33 - 100 VDC	400 mA	\pm 5%	40W	85%
LDHL40W480-89-C0450	NO	NO	30 - 89 VDC	450 mA	\pm 5%	40W	85%
LDHL40W480-72-C0550	NO	NO	24 - 72 VDC	550 mA	\pm 5%	40W	84%
LDHL40W480-57-C0700	YES	YES	20 - 57 VDC	700 mA	\pm 5%	40W	83%
LDHL40W480-48-C0830	YES	YES	16 - 48 VDC	830 mA	\pm 5%	40W	83%
LDHL40W480-45-C0900	YES	YES	16 - 45 VDC	900 mA	\pm 5%	40W	83%
LDHL40W480-40-C1000	YES	YES	13 - 40 VDC	1000 mA	\pm 5%	40W	82%
LDHL40W480-36-C1100	YES	YES	12 - 36 VDC	1100 mA	\pm 5%	40W	82%
LDHL40W480-30-C1400	YES	YES	10 - 30 VDC	1400 mA	\pm 5%	42W	82%
LDHL40W480-24-C1670	YES	YES	8 - 24 VDC	1670 mA	\pm 5%	40W	82%
LDHL40W480-22-C1820	YES	YES	7 - 22 VDC	1820 mA	\pm 5%	40W	82%
LDHL40W480-18-C2200	YES	YES	6 - 18 VDC	2200 mA	\pm 5%	40W	81%
LDHL40W480-15-C2680	YES	YES	5 - 15 VDC	2680 mA	\pm 5%	40W	81%
LDHL40W480-13-C3080	YES	YES	4 - 13 VDC	3080 mA	\pm 5%	40W	81%
LDHL40W480-12-C3330	YES	YES	4 - 12 VDC	3330 mA	\pm 5%	40W	81%
LDHL40W480-10-C4000	YES	YES	3 - 10 VDC	4000 mA	\pm 5%	40W	81%
LDHL40W480-09-C4450	YES	YES	3 - 9 VDC	4450 mA	\pm 5%	40W	80%

Notes

1. Typical efficiency measured at 347VAC input, full load
2. For dimmable versions add appropriate designator to the end of the part number: For Example: LDHL40W480-18-C2200-RD is 0-10V or resistance dimmable version, LDHL40W480-18-C2200-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, 500Hz to 1.5KHz, 0-10V Pulse. See page 4 for details.

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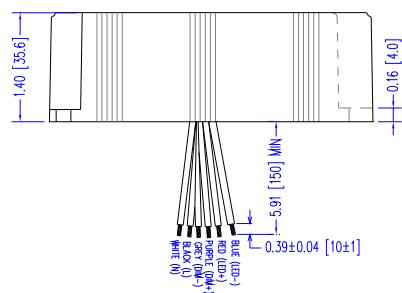
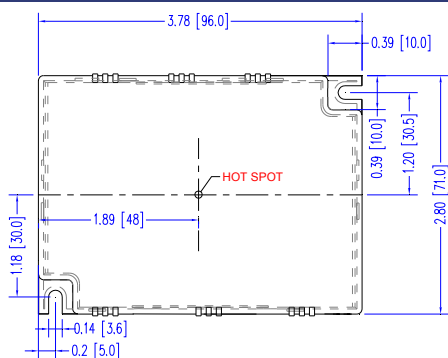
Constant Voltage Versions

Part Number	US Class 2	CN Class 2	Output Constant Voltage	Output Current Range	Voltage Accuracy	Output Power Maximum	Typical Efficiency ⁽¹⁾
LDHL40W480-130	NO	NO	130 VDC	75 - 300 mA	± 5%	40W	87%
LDHL40W480-114	NO	NO	114 VDC	75 - 350 mA	± 5%	40W	86%
LDHL40W480-100	NO	NO	100 VDC	100 - 400 mA	± 5%	40W	86%
LDHL40W480-89	NO	NO	89 VDC	113 - 450 mA	± 5%	40W	86%
LDHL40W480-72	NO	NO	72 VDC	138 - 550 mA	± 5%	40W	85%
LDHL40W480-57	YES	YES	57 VDC	175 - 700 mA	± 5%	40W	85%
LDHL40W480-48	YES	YES	48 VDC	208 - 830 mA	± 5%	40W	85%
LDHL40W480-45	YES	YES	45 VDC	225 - 900 mA	± 5%	40W	85%
LDHL40W480-40	YES	YES	40 VDC	250 - 1000 mA	± 5%	40W	85%
LDHL40W480-36	YES	YES	36 VDC	275 - 1100 mA	± 5%	40W	85%
LDHL40W480-30	YES	YES	30 VDC	350 - 1400 mA	± 5%	42W	85%
LDHL40W480-24	YES	YES	24 VDC	418 - 1670 mA	± 5%	40W	85%
LDHL40W480-22	YES	YES	22 VDC	455 - 1820 mA	± 5%	40W	85%
LDHL40W480-18	YES	YES	18 VDC	550 - 2200 mA	± 5%	40W	84%
LDHL40W480-15	YES	YES	15 VDC	670 - 2680 mA	± 5%	40W	84%
LDHL40W480-13	YES	YES	13 VDC	770 - 3080 mA	± 5%	40W	84%
LDHL40W480-12	YES	YES	12 VDC	825 - 3330 mA	± 5%	40W	83%
LDHL40W480-10	YES	YES	10 VDC	1000 - 4000 mA	± 5%	40W	83%
LDHL40W480-09	YES	YES	9 VDC	1113 - 4450 mA	± 5%	40W	82%

Mechanical Dimensions: Inches [mm]

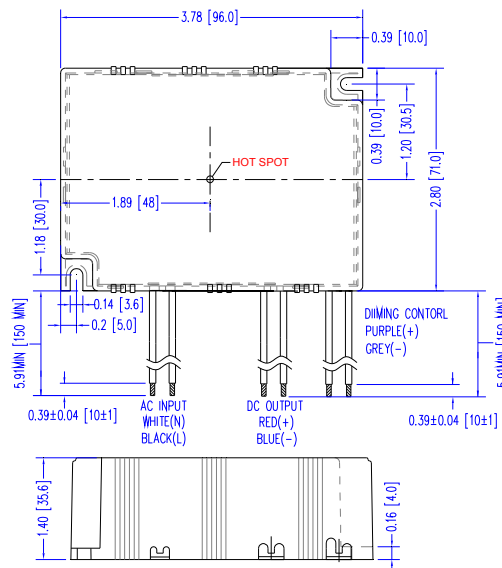
Material: Black 5VA Plastic Case
Fully Encapsulated
Weight: 364 grams (12.9 oz) Typical

STANDARD LEAD-OUTS ARE FROM BOTTOM



ALTERNATE LEAD-OUTS FROM SIDES

For Example:
LDHL40W480-36-C1100-SE is non dimmable version
LDHL40W480-36-C1100-RDSE is 0-10V dimmable version
LDHL40W480-36-C1100-PDSE is PWM dimmable version



Labeling Example

DC Output
+ = RED
- = BLUE

EPtronics LED Optimized Driver
Etronics, Inc.
www.EPtronics.com
800 643-0688/310 425-0700

AC Input
L = BLACK
N = WHITE

Part Number: LDHL40W480-57-C0700-RD
Input Voltage: 347- 480 VAC 50/60 Hz
Input Current: 0.15 Amp Max
Output Voltage: 20-57 VDC
Output Current: 700 mA Constant Current
Output Power: 40W Max
0-10V CCR Dimmable Output
UL & cUL Class 2 Output, UL Type HL

0-10V Dim Input
DIM+ = PURPLE
DIM- = GRAY

IP66
E325626 REV A1.2 Made in China

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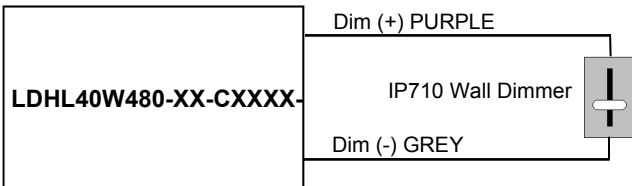
-RD 2-Wire 0-10V CCR Dimming Scheme

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

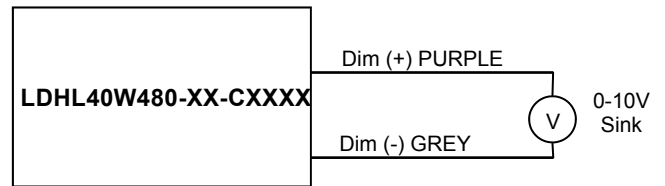
Notes

- RD 0-10V dimmable version comes with an extra two wires +Purple/-Grey on the output side.
- 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
- RD 0-10V dimmable version is not intended to dim below about 5% @ 0V or 10% @ 1.0V
- RD 0-10V dimmable version output will be 100% with Purple/Grey open and minimum with Purple/Grey Shorted.

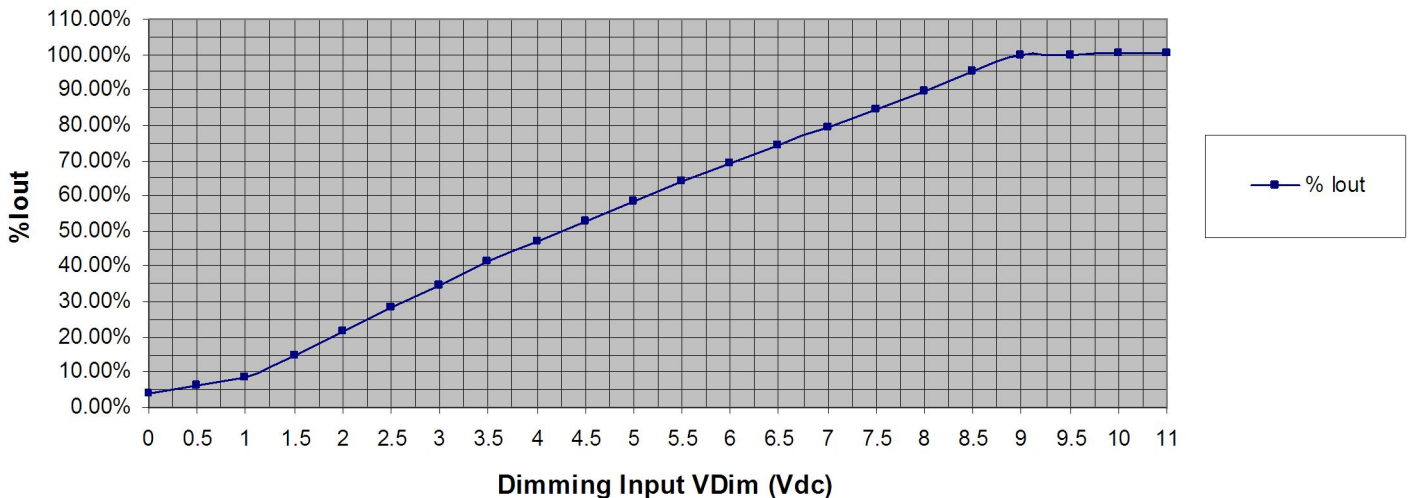
-RD 2-Wire Resistance Dimming Scheme



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



% Output Current vs. 0-10VDC Dimming Input



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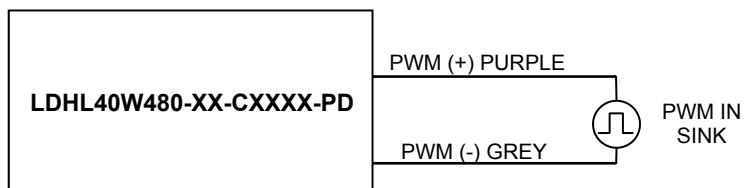
-PD 2-Wire CCR PWM Positive Dimming Scheme

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%

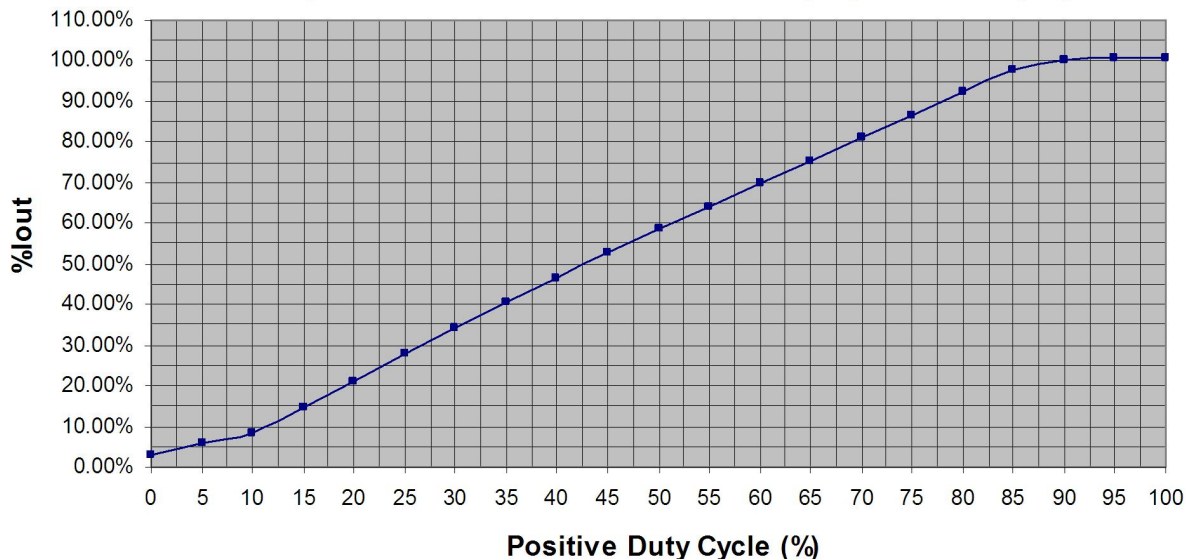
Notes

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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40W

Input Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Input Voltage	312 Vac	—	528 Vac	347, 380, 460, 480 Vac Nominal Values
Input Frequency	47 Hz	—	63 Hz	50/60Hz Nominal
Input AC Current	—	—	0.15 A	Measured at 347Vac/60Hz Input, Output Full load.
	—	—	0.11 A	Measured at 480Vac/60Hz Input, Output Full load.
Inrush Current (Peak)	—	14A	20A	Measured at 480Vac/60Hz Input, Output Full Load, Ta 25°C, Cold Start 50% I _{peak} duration \approx 750 μ sec (1/2*I _p ² *t)
Inrush Current (I ² t)	—	—	0.15 A ² s	
Leakage Current	—	—	0.28mA	Measured at 480Vac/60Hz Input, Output Full load.
	—	—	0.75mA	Measured at 480Vac/60Hz Input, Output Full load.
THD	—	—	20%	Measured at 347Vac, 380Vac, 460Vac, 480Vac Input, Any Load
Power Factor (PF)	—	—	0.90	Measured at 347Vac \geq 60% Load, 480Vac \geq 80% 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 _{pk-pk})	—	—	20% V _o	20 MHz BW, Full load output in parallel with 0.1 μ F ceramic & 10 μ F Electrolytic.
Ripple (I _{pk-pk})	—	—	50% I _o	20 MHz BW, Full load output in parallel with 0.1 μ F ceramic & 10 μ F Electrolytic. 120 Hz component (Flicker Free)
Start-up Time	—	1200 mS	2000 mS	Measured at 480Vac/60Hz Input, Output Full load.
Hold-up Time	—	100 mS	—	Typical @ 480Vac Input, Output Full load.

Environmental Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Case Temperature (T _c)	-30 °C	—	+90 °C	Measured at location specified on case.
Operating Temperature (T _a)	-30 °C	—	+60 °C	This is a reference range. T _c controls temperature range.
Storage Temperature (T _s)	-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	342,000 Hours	—	—	MIL-HDBK-217F Notice 2, T _a = 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 _o	Constant Current Limiting circuit.
Output Over Voltage (OVP)	—	—	120% V _o	No Damage, Auto recovery after fault is removed.
Over Temperature (OTP)	100 °C	105 °C	110 °C	Hick-up mode. Off if T _c reaches \approx 105C, On when T _c reaches \approx 65C

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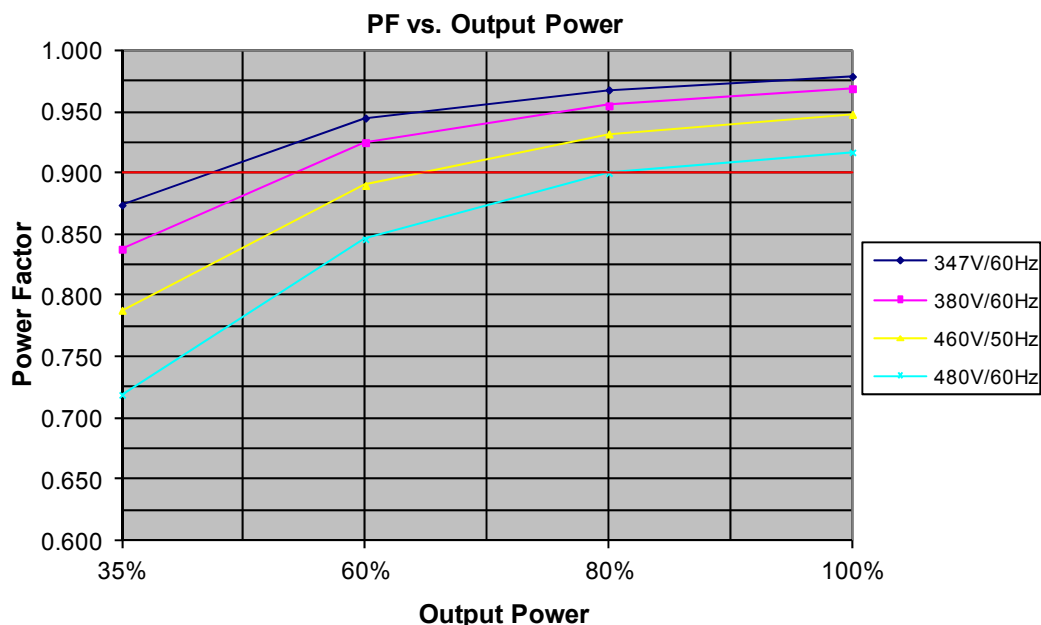
Safety Compliance

Safety	Notes/Standards
UL/CUL (TYPE HL Rated)	UL8750, UL1310 for UL Class 2 & CAN/CSA C22.2 No. 250.13, UL Type HL
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 Compliance

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)



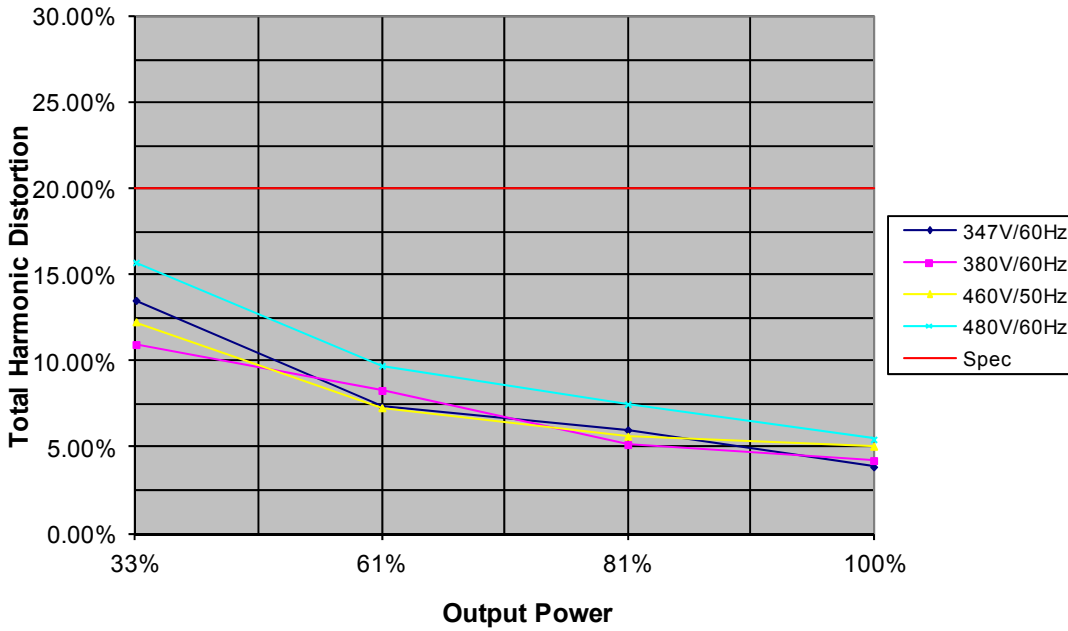
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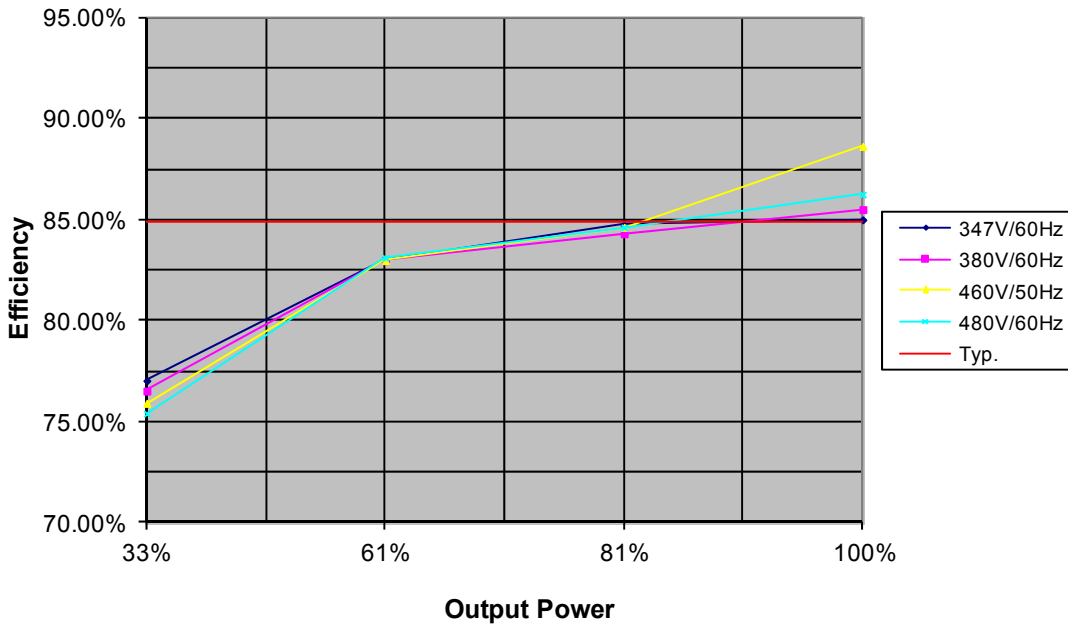
THD Curves (Typical)

THD vs. Output Power



Efficiency Curve (Typical) LDHL40W480-40-C1000-RD

Efficiency vs. Output Power

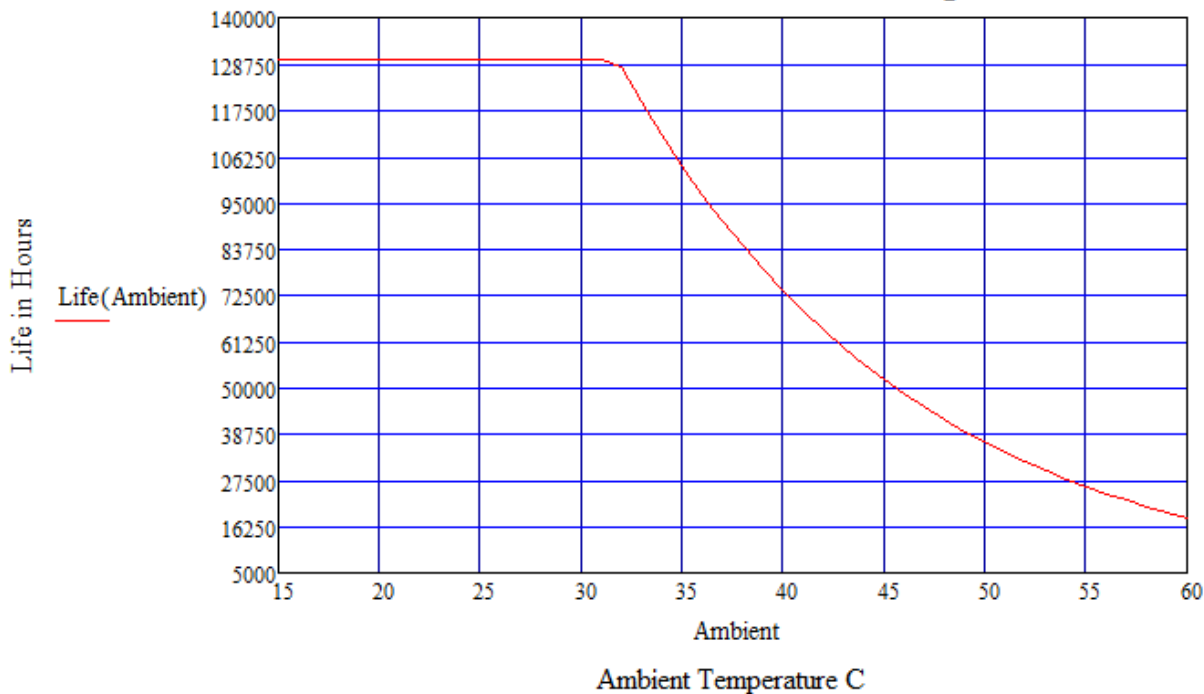


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Life vs. Ambient Temperature

LDHL40W480 Estimated Life Full Load @ 347Vac



Life vs. Case (Tc) Temperature

LDHL40W480 Estimated Life Full Load @ 347Vac

