

OVERVIEW

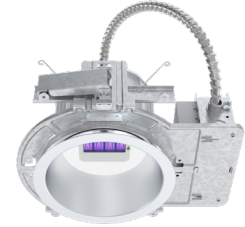
PURO Protect 222 Round Downlight for New Construction

6"

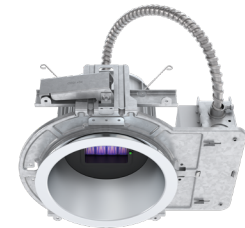
Feature Set

- Visible light integrated with filtered far-UVC 222nm light module in Hybrid and UV-only solutions
- One piece self-flanged trim construction; flangeless (FL) optional
- 65° Cutoff to source and source image
- 90+ CRI standard
- Medium Wide 1.0 S:MH distribution standard
- Fixtures are damp location listed
- Available with 1% dimming

Distribution



PPDN 222H



PPDN 222

Luminaire Type:

Catalog Number:

EXAMPLE: PPDN 222H C100 40 15 CL FL SS UNV D01 90

Series	Wavelength ¹	Programming Options	Color Temperature ²	Nominal Lumen Values ²
PPDN PPDN 6in New Construction Round Downlight	222³ 222nm UV module only (no visible light)	A090 Dose Level for 108 inch (min) to 113.9 inch (max) Height from Floor to Module Face	30 3000 K	10 1000 lumens
	222H Visible light integrated with 222nm UV module	B095 Dose Level for 114 inch (min) to 119.9 inch (max) Height from Floor to Module Face	35 3500 K	15 1500 lumens
		C100 Dose Level for 120 inch (min) to 125.9 inch (max) Height from Floor to Module Face	40 4000 K	
		D105 Dose Level for 126 inch (min) to 131.9 inch (max) Height from Floor to Module Face		
		E110 Dose Level for 132 inch (min) or Greater Height from Floor to Module Face		

Reflector & Flange Color	Trim Style	Finish	Voltage	Driver ¹
CL Clear	SF Self-flanged FL Flangeless. For use in dry wall ceilings only.	SS Semi- specular	UNV 120	D01 0-10V driver dims to 1%

Options
90³ High CRI (90+)

Programming Option Table		
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture
A090	Minimum 9' AFF to 9' 5" AFF	Minimum 8' 9" AFF to 9' 2" AFF
B095	Minimum 9' 6" AFF to 9'-11" AFF	Minimum 9' 3" AFF to 9'-8" AFF
C100	Minimum 10' AFF to 10' 5" AFF	Minimum 9'-9" AFF to 10'-2" AFF
D105	Minimum 10'-6" AFF to 10'-11" AFF	Minimum 10'-3" AFF to 10'-8" AFF
E110	Minimum 11' AFF and above	Minimum 10'-9" AFF and above

AFF: Above Finished Floor

ACCESSORIES – order as separate catalog numbers (shipped separately)	
PP RING6	6" Aperture ceiling thickness adapter (extends mounting frame to accommodate ceiling thickness up to 5").
PP GOOF MW	White ceiling opening goof ring adapters. To cover a hole greater than 7 1/8" ID and less than 11" OD. Not for use with flangeless (FL) trims.
PP GOOF MB	Black ceiling opening goof ring adapters. To cover a hole greater than 7 1/8" ID and less than 11" OD. Not for use with flangeless (FL) trims.

ORDERING NOTES
1. Visible light of 222H versions only suitable for dimming. For a list of compatible drivers please contact PURO Lighting.
2. Color Temperature/Nominal Lumen Values available for 222H version only.
3. Not available for 222 module only version.

UV Disinfection*

Care222® UV disinfection technology limits the reproduction of pathogens¹ by utilizing 222nm wavelengths to inactivate viruses and bacteria by disrupting the DNA/RNA.

Care222 technology operates continually and meets exposure guidelines for occupied space established by the American Conference of Governmental Industrial Hygienists (ACGIH®)². Occupants can be present in the space, during treatment, when installed and used in accordance with written instructions.

UV Lamp Module Source

Care222® mercury-free far-UVC excimer lamp. Emits a soft violet glow from 1.75" x 2.38" [44.5mm x 60.3mm] opening when powered.

UV Filter

Patented short pass filter for narrow band 222nm emission that removes longer wavelengths that can penetrate the living tissue in skin or beyond the top layer of the cornea in the eyes.

UV Wavelength

Emitted Wavelength Range is 200nm ~ 230nm with Peak Wavelength at 222nm far-UVC.

UV Lamp Module Run Time

Requires no external controls or startup commissioning. UV lamp module will operate on 12-minute cycles for a duration of between 10 and 50 seconds each cycle. The duration will depend on the specific dose chosen to meet the application design requirements.

UV lamp rated for 3000 hours (approximately 5 years of life based on activated hours).³

Optical Assembly

Optical design with 65° cutoff to source and source image. (Cutoff does not apply to UV222 module only version).

Top-down flash characteristic for superior glare control.

Unitized optics have mechanical attachment of the light engine to the lower reflector for optical alignment.

Medium Wide 1.0 S:MH distribution standard.

Electrical

The luminaire operates from a 50 or 60 Hz ±3 Hz AC line over a voltage ranging from 120 VAC to 277 VAC.

Power factor > 0.9.

Requires unswitched leg for UVC module. Single circuit; not intended for use with wall switches. Connect to an unswitched circuit intended for 24/7/365 continuous operation.

Dimming

The luminaire is capable of continuous dimming without perceivable stroboscopic flicker as measured by flicker index (ANSI/IES RP-16-10) over a range of 100 – 1.0% of rated lumen output with a smooth shut off function to step to 0%.

Construction

Luminaire housing is constructed of 16-gauge galvanized steel and has preinstalled telescopic mounting bars with maximum 32" and minimum 15" extension and 4" vertical adjustment.

Luminaires are suitable for installation in ceilings up to 1½" thick. (specify ceiling thickness adapter to extend frame to accommodate ceiling thickness up to 5").

Tool-less adjustments are possible after installation.

25°C ambient temperature standard (1/2" clearance on all sides from non-combustible materials in non-IC applications, unless marked spacing noted otherwise). For use in insulated ceilings, a 3" clearance on all sides from insulation is required (unless marked spacing noted otherwise).

Listings

UL listed and certified to meet US standards for LED luminaires and germicidal equipment for use in occupied spaces.

Meets California ozone emissions limits. California Air Resources Board (CARB) certified. Damp location listed.

Registration

EPA Est. No.: 97727-IN-1

Disclaimer

*All references to "disinfection" are referring generally to bioburden reduction and are not intended to refer to any specific definition of the term as may be used for other purposes by the U.S. Food and Drug Administration or the U.S. Environmental Protection Agency. Bioburden reduction is a function of fixture run time and the distance to the UV light source, airflow, room size, shadow areas and/or other factors, and the level of reduction will vary within a specific space. These fixtures are not intended for use in the cure, mitigation or prevention of disease and are not certified or approved for use as for the disinfection of medical devices by the FDA. It is the obligation of the end-user to consult with appropriately qualified Professional Engineer(s), a Certified Infection Control professional and a Certified Industrial Hygienist, as applicable, to determine whether this fixture meets [these fixtures meet] the applicable requirements for system performance, code compliance, safety (including safety and hazard alerting signs), suitability and effectiveness for use in a particular application design.

For sale only in the United States of America and Mexico. Not registered as a pesticide device and not intended for sale into the following U.S. states: Hawaii, New Mexico, Wyoming, Colorado, Oklahoma, West Virginia, Indiana, and the District of Columbia.

1. Reference pages 4-6 of this document under Projected Virus Inactivation and Projected Bacteria Inactivation
2. ACGIH® 2021 TLVs® and BEIs® - Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices; when installed and used in accordance with written instructions.
3. Average rated life based on industry standard measurements and not a performance claim specific to any individual product.

Precautionary Statements

- Emitters used in this fixture are in the EXEMPT RISK GROUP for photobiological risk, as described in IEC 62471, when correctly commissioned and properly installed in accordance with written instructions.
 - See Installation Instructions for proper usage guidelines and warnings regarding risks resulting from misuse.
- See below for information about potential limited photodegradation of materials.
- This fixture may generate ozone. Each emitter in the fixture has an ozone emission maximum concentration of 0.001 ppm over an 8-hour period, as tested in accordance with UL 867. Precautions that can be taken, if needed, to ensure that ozone concentration stays within applicable permissible exposure limits are described in the Installation Instructions.

Buy American Act

This product is assembled in the USA and meets the Buy America(n) government procurement requirements under FAR, DFARS and DOT regulations.

Photometrics

LEDs tested to LM-80 standards in an accredited lab. Measured in accordance with LM-79-08 IESNA standard. Extrapolated life calculated per IESNA TM-21-21. 70% Lumen maintenance at 60,000 hours.
Color variation <2.5-step MacAdam ellipse (2.5SDCM).

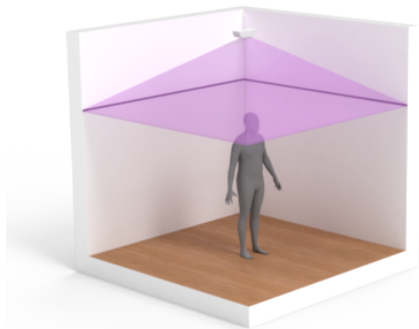
Warranty

2-year limited warranty for Hybrid (H) and UV Module only versions. These are the only warranties provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located under PURO Lighting: www.purolighting.com/warranty

Note:

Actual performance may differ as a result of end user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.

Projected UV Exposure and Exposure Limits



This chart illustrates mounting height configurations for the PPDN fixture, incorporating Care222® technology, that provide a UV exposure dose within the exposure guidelines¹ established and published by the American Conference of Governmental Industrial Hygienists (ACGIH®). For the UV exposure dose to remain within the ACGIH guidelines for the level of UV exposure a typical worker can be exposed to without adverse health effects, the maximum exposure dose must not exceed 23 mJ/cm² (millijoules per square centimeter) for an 8-hour period of time. Per the UL 8802 standard, the upper limit of occupied space is defined to be a test plane 7' Above Finished Floor (AFF). This calculated maximum exposure dose represents the dose an individual would receive over an 8-hour period at 7' Above Finished Floor (AFF) even if stationary in the location of maximum dose.

The levels of exposure in the ACGIH guidelines are quantified as Threshold Limit Values (TLVs®) and are expressed as Time-Weighted Averages (TWAs). The TLVs for incoherent ultraviolet (UV) radiation are established for wavelengths between 180 and 400 nm and represent conditions under which it is believed that nearly all healthy workers may be repeatedly exposed without acute adverse health effects such as erythema and photokeratitis. ACGIH guidelines are designed for use by industrial hygienists in making decisions regarding safe levels of exposure to hazards in the workplace.

1. ACGIH® 2021 TLVs® and BEIs® - Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices; when installed and used in accordance with written instructions.

Distance			Maximum 8 hr Dose mJ/cm ²	Meets ACGIH® TLV-TWA <23 mJ/cm ²
Mounting Height to Module Face	Mounting Height to Fixture Aperture	Mounting Height to Head Height		
9'	8'-9"	2'	22.41	Yes
9'-6"	9'-3"	2'-6"	22.78	Yes
10'	9'-9"	3'	21.77	Yes
10'-6"	10'-3"	3'-6"	21.82	Yes
11'	10'-9"	4'	20.4	Yes
12'	11'-9"	5'	12.72	Yes

Projected Virus and Bacteria Inactivation

Use this chart to estimate the effectiveness of one PPDN fixture, mounted at various mounting heights (Z) and having different areas of coverage (X x Y), at inactivating the pathogens listed below on surfaces. The calculated average dose for each scenario is determined from Visual® lighting application software radiometric modeling¹ and is then correlated with laboratory research² to derive predicted inactivation effectiveness for specific pathogens. The analysis assumes that a horizontal plane positioned 2'-6" Above Finished Floor (AFF) is receiving the dose. For different areas of coverage or multiple fixture layouts, consult a PURO Lighting Specialist.

1. The results presented here are based upon a 12'x12'x15' high empty room with all surface reflectance assumed to be 5%.
2. Reference [Pathogen Inactivation Dose Reference List](#) - 222nm, 254nm & Pulsed Xenon UV Light Sources.
3. As a result of computational limitations and simplifying modeling assumptions in Visual, variations in actual product performance from tested product samples, and/or variations in field conditions from laboratory testing conditions, the accuracy of calculated output values identifying radiometric quantities and any resulting derived radiation dose predictions may be adversely affected. See complete disclaimer at [VISUAL LIGHTING DISCLAIMER](#)

4'x4' Area (X x Y)			Calculated Average Dose ³ mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		Feline Calicivirus			Influenza			SARS-CoV-2		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	4.5 mJ/cm ² over 24 hr	80.3 %	34.1 hr	102.2 hr	>99.4 %	10.7 hr	32.0 hr	>99.9 %	6.4 hr	19.2 hr
B095	9.6'	9'-3"	6.6 mJ/cm ² over 24 hr	90.8 %	23.2 hr	69.6 hr	>99.9 %	7.3 hr	21.8 hr	>99.9 %	4.4 hr	13.1 hr
C100	10'	9'-9"	8.2 mJ/cm ² over 24 hr	94.8 %	18.7 hr	56.1 hr	>99.9 %	5.9 hr	17.6 hr	>99.9 %	3.5 hr	10.5 hr
D105	10'6"	10'-3"	10.2 mJ/cm ² over 24 hr	97.5 %	15.0 hr	45.0 hr	>99.9 %	4.7 hr	14.1 hr	>99.9 %	2.8 hr	8.5 hr
E110	11'	10'-9"	11.4 mJ/cm ² over 24 hr	98.3 %	13.5 hr	40.4 hr	>99.9 %	4.2 hr	12.7 hr	>99.9 %	2.5 hr	7.6 hr
E110	12'	11'-9"	9.3 mJ/cm ² over 24 hr	96.4 %	16.6 hr	49.7 hr	>99.9 %	5.2 hr	15.6 hr	>99.9 %	3.1 hr	9.3 hr

4'x4' Area (X x Y)			Calculated Average Dose ³ mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		MRSA			Salmonella			E. coli		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	4.5 mJ/cm ² over 24 hr	90.5 %	23.5 hr	70.5 hr	97.3 %	15.3 hr	45.8 hr	99.4 %	10.7 hr	32.0 hr
B095	9.6'	9'-3"	6.6 mJ/cm ² over 24 hr	96.8 %	16.0 hr	48.0 hr	99.5 %	10.4 hr	31.2 hr	>99.9 %	7.3 hr	21.8 hr
C100	10'	9'-9"	8.2 mJ/cm ² over 24 hr	98.6 %	12.9 hr	38.7 hr	99.9 %	8.4 hr	25.1 hr	>99.9 %	5.9 hr	17.6 hr
D105	10'6"	10'-3"	10.2 mJ/cm ² over 24 hr	99.5 %	10.3 hr	31.0 hr	>99.9 %	6.7 hr	20.2 hr	>99.9 %	4.7 hr	14.1 hr
E110	11'	10'-9"	11.4 mJ/cm ² over 24 hr	99.7 %	9.3 hr	27.9 hr	>99.9 %	6.0 hr	18.1 hr	>99.9 %	4.2 hr	12.7 hr
E110	12'	11'-9"	9.3 mJ/cm ² over 24 hr	99.2 %	11.4 hr	34.3 hr	>99.9 %	7.4 hr	22.3 hr	>99.9 %	5.2 hr	15.6 hr

6'x6' Area (X x Y)			Calculated Average Dose ³ mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		Feline Calicivirus			Influenza			SARS-CoV-2		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	3.5 mJ/cm ² over 24 hr	71.4 %	44.2 hr	132.5 hr	98.2 %	13.8 hr	41.5 hr	99.9 %	8.3 hr	24.9 hr
B095	9.6'	9'-3"	5.3 mJ/cm ² over 24 hr	85.2 %	28.9 hr	86.8 hr	99.8 %	9.1 hr	27.2 hr	>99.9 %	5.4 hr	16.3 hr
C100	10'	9'-9"	6.8 mJ/cm ² over 24 hr	91.4 %	22.6 hr	67.7 hr	>99.9 %	7.1 hr	21.2 hr	>99.9 %	4.2 hr	12.7 hr
D105	10'6"	10'-3"	8.7 mJ/cm ² over 24 hr	95.6 %	17.6 hr	52.9 hr	>99.9 %	5.5 hr	16.6 hr	>99.9 %	3.3 hr	9.9 hr
E110	11'	10'-9"	9.9 mJ/cm ² over 24 hr	97.2 %	15.5 hr	46.5 hr	>99.9 %	4.8 hr	14.5 hr	>99.9 %	2.9 hr	8.7 hr
E110	12'	11'-9"	8.3 mJ/cm ² over 24 hr	95.0 %	18.5 hr	55.4 hr	>99.9 %	5.8 hr	17.3 hr	>99.9 %	3.5 hr	10.4 hr

6'x6' Area (X x Y)			Calculated Average Dose ³ mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		MRSA			Salmonella			E. coli		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	3.5 mJ/cm ² over 24 hr	83.7 %	30.5 hr	91.4 hr	93.9 %	19.8 hr	59.4 hr	98.2 %	13.8 hr	41.5 hr
B095	9.6'	9'-3"	5.3 mJ/cm ² over 24 hr	93.7 %	19.9 hr	59.8 hr	98.6 %	13.0 hr	38.9 hr	99.8 %	9.1 hr	27.2 hr
C100	10'	9'-9"	6.8 mJ/cm ² over 24 hr	97.1 %	15.6 hr	46.7 hr	99.6 %	10.1 hr	30.4 hr	>99.9 %	7.1 hr	21.2 hr
D105	10'6"	10'-3"	8.7 mJ/cm ² over 24 hr	98.9 %	12.2 hr	36.5 hr	>99.9 %	7.9 hr	23.7 hr	>99.9 %	5.5 hr	16.6 hr
E110	11'	10'-9"	9.9 mJ/cm ² over 24 hr	99.4 %	10.7 hr	32.0 hr	>99.9 %	6.9 hr	20.8 hr	>99.9 %	4.9 hr	14.6 hr
E110	12'	11'-9"	8.3 mJ/cm ² over 24 hr	98.7 %	12.7 hr	38.2 hr	99.9 %	8.3 hr	24.8 hr	>99.9 %	5.8 hr	17.4 hr

Projected Virus and Bacteria Inactivation

Use this chart to estimate the effectiveness of one PPDN fixture, mounted at various mounting heights (Z) and having different areas of coverage (X x Y), at inactivating the pathogens listed below on surfaces. The calculated average dose for each scenario is determined from Visual® lighting application software radiometric modeling¹ and is then correlated with laboratory research² to derive predicted inactivation effectiveness for specific pathogens. The analysis assumes that a horizontal plane positioned 2'-6" Above Finished Floor (AFF) is receiving the dose. For different areas of coverage or multiple fixture layouts, consult a PURO Lighting Specialist.

1. The results presented here are based upon a 12'x12'x15' high empty room with all surface reflectance assumed to be 5%.
2. Reference [Pathogen Inactivation Dose Reference List](#) - 222nm, 254nm & Pulsed Xenon UV Light Sources.
3. As a result of computational limitations and simplifying modeling assumptions in Visual, variations in actual product performance from tested product samples, and/or variations in field conditions from laboratory testing conditions, the accuracy of calculated output values identifying radiometric quantities and any resulting derived radiation dose predictions may be adversely affected. See complete disclaimer at [VISUAL LIGHTING DISCLAIMER](#)

8'x8' Area (X x Y)			Calculated Average Dose ³ mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		Feline Calicivirus			Influenza			SARS-CoV-2		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	2.4 mJ/cm ² over 24 hr	58.5 %	62.8 hr	188.5 hr	94.0 %	19.7 hr	59.0 hr	99.1 %	11.8 hr	35.4 hr
B095	9.6'	9'-3"	3.9 mJ/cm ² over 24 hr	75.4 %	39.4 hr	118.2 hr	98.9 %	12.3 hr	37.0 hr	>99.9 %	7.4 hr	22.2 hr
C100	10'	9'-9"	5.2 mJ/cm ² over 24 hr	84.5 %	29.7 hr	89.0 hr	99.7 %	9.3 hr	27.9 hr	>99.9 %	5.6 hr	16.7 hr
D105	10'6"	10'-3"	6.9 mJ/cm ² over 24 hr	91.5 %	22.4 hr	67.1 hr	>99.9 %	7.0 hr	21.0 hr	>99.9 %	4.2 hr	12.6 hr
E110	11'	10'-9"	8.0 mJ/cm ² over 24 hr	94.4 %	19.1 hr	57.3 hr	>99.9 %	6.0 hr	18.0 hr	>99.9 %	3.6 hr	10.8 hr
E110	12'	11'-9"	7.1 mJ/cm ² over 24 hr	92.1 %	21.7 hr	65.2 hr	>99.9 %	6.8 hr	20.4 hr	>99.9 %	4.1 hr	12.3 hr

8'x8' Area (X x Y)			Calculated Average Dose ³ mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		MRSA			Salmonella			E. coli		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	2.4 mJ/cm ² over 24 hr	72.1 %	43.3 hr	130.0 hr	85.9 %	28.2 hr	84.5 hr	94.0 %	19.7 hr	59.1 hr
B095	9.6'	9'-3"	3.9 mJ/cm ² over 24 hr	86.9 %	27.2 hr	81.5 hr	95.6 %	17.7 hr	53.0 hr	98.9 %	12.4 hr	37.1 hr
C100	10'	9'-9"	5.2 mJ/cm ² over 24 hr	93.3 %	20.4 hr	61.3 hr	98.4 %	13.3 hr	39.9 hr	99.7 %	9.3 hr	27.9 hr
D105	10'6"	10'-3"	6.9 mJ/cm ² over 24 hr	97.2 %	15.4 hr	46.3 hr	99.6 %	10.0 hr	30.1 hr	>99.9 %	7.0 hr	21.0 hr
E110	11'	10'-9"	8.0 mJ/cm ² over 24 hr	98.5 %	13.2 hr	39.5 hr	99.8 %	8.6 hr	25.7 hr	>99.9 %	6.0 hr	18.0 hr
E110	12'	11'-9"	7.1 mJ/cm ² over 24 hr	97.5 %	15.0 hr	45.0 hr	99.7 %	9.7 hr	29.2 hr	>99.9 %	6.8 hr	20.4 hr

10'x10' Area (X x Y)			Calculated Average Dose ³ mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		Feline Calicivirus			Influenza			SARS-CoV-2		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	1.7 mJ/cm ² over 24 hr	45.2 %	91.8 hr	275.4 hr	85.4 %	28.7 hr	86.2 hr	95.9 %	17.2 hr	51.7 hr
B095	9.6'	9'-3"	2.7 mJ/cm ² over 24 hr	62.8 %	55.9 hr	167.8 hr	95.7 %	17.5 hr	52.6 hr	99.5 %	10.5 hr	31.5 hr
C100	10'	9'-9"	3.8 mJ/cm ² over 24 hr	74.1 %	40.9 hr	122.6 hr	98.7 %	12.8 hr	38.4 hr	>99.9 %	7.7 hr	23.0 hr
D105	10'6"	10'-3"	5.1 mJ/cm ² over 24 hr	84.2 %	30.0 hr	90.0 hr	99.7 %	9.4 hr	28.2 hr	>99.9 %	5.6 hr	16.9 hr
E110	11'	10'-9"	6.2 mJ/cm ² over 24 hr	89.1 %	24.9 hr	74.7 hr	>99.9 %	7.8 hr	23.4 hr	>99.9 %	4.7 hr	14.0 hr
E110	12'	11'-9"	5.7 mJ/cm ² over 24 hr	87.1 %	27.0 hr	81.0 hr	99.9 %	8.5 hr	25.4 hr	>99.9 %	5.1 hr	15.2 hr

10'x10' Area (X x Y)			Calculated Average Dose ³ mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		MRSA			Salmonella			E. coli		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	1.7 mJ/cm ² over 24 hr	58.2 %	63.3 hr	189.9 hr	73.9 %	41.2 hr	123.5 hr	85.4 %	28.8 hr	86.3 hr
B095	9.6'	9'-3"	2.7 mJ/cm ² over 24 hr	76.1 %	38.6 hr	115.7 hr	89.0 %	25.1 hr	75.2 hr	95.7 %	17.5 hr	52.6 hr
C100	10'	9'-9"	3.8 mJ/cm ² over 24 hr	85.9 %	28.2 hr	84.6 hr	95.1 %	18.3 hr	55.0 hr	98.7 %	12.8 hr	38.4 hr
D105	10'6"	10'-3"	5.1 mJ/cm ² over 24 hr	93.1 %	20.7 hr	62.1 hr	98.4 %	13.4 hr	40.3 hr	99.7 %	9.4 hr	28.2 hr
E110	11'	10'-9"	6.2 mJ/cm ² over 24 hr	96.0 %	17.2 hr	51.5 hr	99.3 %	11.2 hr	33.5 hr	>99.9 %	7.8 hr	23.4 hr
E110	12'	11'-9"	5.7 mJ/cm ² over 24 hr	94.9 %	18.6 hr	55.8 hr	99.0 %	12.1 hr	36.3 hr	99.9 %	8.5 hr	25.4 hr

Projected Virus and Bacteria Inactivation

Use this chart to estimate the effectiveness of one PPDN fixture, mounted at various mounting heights (Z) and having different areas of coverage (X x Y), at inactivating the pathogens listed below on surfaces. The calculated average dose for each scenario is determined from Visual® lighting application software radiometric modeling¹ and is then correlated with laboratory research² to derive predicted inactivation effectiveness for specific pathogens. The analysis assumes that a horizontal plane positioned 2'-6" Above Finished Floor (AFF) is receiving the dose. For different areas of coverage or multiple fixture layouts, consult a PURO Lighting Specialist.

1. The results presented here are based upon a 12'x12'x15' high empty room with all surface reflectance assumed to be 5%.
2. Reference [Pathogen Inactivation Dose Reference List](#) - 222nm, 254nm & Pulsed Xenon UV Light Sources.
3. As a result of computational limitations and simplifying modeling assumptions in Visual, variations in actual product performance from tested product samples, and/or variations in field conditions from laboratory testing conditions, the accuracy of calculated output values identifying radiometric quantities and any resulting derived radiation dose predictions may be adversely affected. See complete disclaimer at [VISUAL LIGHTING DISCLAIMER](#)

12'x12' Area (X x Y)			Calculated Average Dose ² mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		Feline Calicivirus			Influenza			SARS-CoV-2		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	1.2 mJ/cm ² over 24 hr	34.6 %	129.9 hr	389.7 hr	74.3 %	40.7 hr	122.0 hr	89.6 %	24.4 hr	73.2 hr
B095	9.6'	9'-3"	2.0 mJ/cm ² over 24 hr	50.7 %	78.2 hr	234.6 hr	89.5 %	24.5 hr	73.5 hr	97.7 %	14.7 hr	44.1 hr
C100	10'	9'-9"	2.7 mJ/cm ² over 24 hr	62.5 %	56.4 hr	169.1 hr	95.6 %	17.6 hr	52.9 hr	99.5 %	10.6 hr	31.8 hr
D105	10'6"	10'-3"	3.8 mJ/cm ² over 24 hr	74.2 %	40.8 hr	122.3 hr	98.7 %	12.8 hr	38.3 hr	>99.9 %	7.7 hr	23.0 hr
E110	11'	10'-9"	4.6 mJ/cm ² over 24 hr	81.1 %	33.2 hr	99.5 hr	99.5 %	10.4 hr	31.2 hr	>99.9 %	6.2 hr	18.7 hr
E110	12'	11'-9"	4.4 mJ/cm ² over 24 hr	79.8 %	34.5 hr	103.6 hr	99.4 %	10.8 hr	32.4 hr	>99.9 %	6.5 hr	19.5 hr

12'x12' Area (X x Y)			Calculated Average Dose ² mJ/cm ²	Surface Pathogen Inactivation ²								
Programming Option	Mounting Height to Module Face	Mounting Height to Fixture Aperture		MRSA			Salmonella			E.coli		
			% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	% in 24 Hours	Hrs to 90%	Hrs to 99.9%	
A090	9'	8'-9"	1.2 mJ/cm ² over 24 hr	46.0 %	89.6 hr	268.8 hr	61.3 %	58.2 hr	174.7 hr	74.3 %	40.7 hr	122.2 hr
B095	9.6'	9'-3"	2.0 mJ/cm ² over 24 hr	64.1 %	53.9 hr	161.8 hr	79.3 %	35.1 hr	105.2 hr	89.5 %	24.5 hr	73.5 hr
C100	10'	9'-9"	2.7 mJ/cm ² over 24 hr	75.9 %	38.9 hr	116.6 hr	88.8 %	25.3 hr	75.8 hr	95.6 %	17.7 hr	53.0 hr
D105	10'6"	10'-3"	3.8 mJ/cm ² over 24 hr	86.0 %	28.1 hr	84.3 hr	95.1 %	18.3 hr	54.8 hr	98.7 %	12.8 hr	38.3 hr
E110	11'	10'-9"	4.6 mJ/cm ² over 24 hr	91.1 %	22.9 hr	68.6 hr	97.6 %	14.9 hr	44.6 hr	99.5 %	10.4 hr	31.2 hr
E110	12'	11'-9"	4.4 mJ/cm ² over 24 hr	90.2 %	23.8 hr	71.4 hr	97.2 %	15.5 hr	46.4 hr	99.4 %	10.8 hr	32.5 hr

Projected Photodegradation Effect

Use the chart (below left) to estimate the photodegradation effect on surfaces from one PPDN fixture, mounted at various mounting heights (Z) and having different areas of coverage (X x Y)⁴. The calculated average dose⁵ for each scenario is determined from Visual® lighting application software radiometric modeling and is then correlated with independent laboratory photodegradation testing⁶. The analysis assumes that a horizontal plane positioned 2'-6" Above Finished Floor (AFF) is receiving the dose. Note that the calculated doses as presented are average values on the designated calculation plane. Calculated doses at specific points may be higher or lower than the average value. To estimate the photodegradation effect for different areas of coverage, at specific points, or multiple fixture layouts, consult a PURO Lighting Specialist.

4. The results presented here are based upon a 12'x12'x15' high empty room with all surface reflectance assumed to be 5%.
5. As a result of computational limitations and simplifying modeling assumptions in Visual, variations in actual product performance from tested product samples, and/or variations in field conditions from laboratory testing conditions, the accuracy of calculated output values identifying radiometric quantities and any resulting derived radiation dose predictions may be adversely affected. See complete disclaimer at [VISUAL LIGHTING DISCLAIMER](#)
6. Independent laboratory photodegradation testing performed by Assured Testing Services, Ridgeway, PA, Test Report 28545, August 12, 2020.

4'x4' Area (X x Y)			Calculated Avg. 24hr Dose ⁵	Years to Dose of 54,000 mJ/cm ² *	Photodegradation Effect at Dose of 54,000 mJ/cm ² *									
Programming	Mounting Height to Module Face	Mounting Height to Fixture Aperture	mJ/cm ²		Material	Before UV exposure	After UV exposure	Average Δ E**	Average Δ - Durometer Hardness***					
A090	9'	8'-9"	4.5	32.9	Polyvinyl chloride (PVC)			27.27	3					
B095	9'-6"	9'-3"	6.6	22.4		Polypropylene			3.86	-1				
C100	10'	9'-9"	8.2	18.0			Polyethylene			5.50	0			
D105	10'-6"	10'-3"	10.2	14.5		Polytetrafluoroethylene (PTFE)				1.02	0			
E110	11'	10'-9"	11.4	13.0			Clear polymethyl methacrylate			2.50	3			
E110	12'	11'-9"	9.3	15.9				White polymethyl methacrylate			9.08	-3		
6' x 6' Area (X x Y)			Calculated Avg. 24hr Dose ⁵	Years to Dose of 54,000 mJ/cm ² *	Polyoxymethylene					4.47	5			
Programming	Mounting Height to Module Face	Mounting Height to Fixture Aperture	mJ/cm ²			8' x 8' Area (X x Y)	Calculated Avg. 24hr Dose ⁵	Years to Dose of 54,000 mJ/cm ² *	Polycarbonate			6.89	-3	
A090	9'	8'-9"	3.5	42.3	Acrylonitrile butadiene styrene (ABS)					0.90	0			
B095	9'-6"	9'-3"	5.3	27.9		Polyester			1.13	-1				
C100	10'	9'-9"	6.8	21.8			Nylon			6.77	-4			
D105	10'-6"	10'-3"	8.7	17.0		10' x 10' Area		Calculated Avg. 24hr Dose ⁵	Years to Dose of 54,000 mJ/cm ² *	12' x 12' Area	Calculated Avg. 24hr Dose ⁵	Years to Dose of 54,000 mJ/cm ² *		
E110	11'	10'-9"	9.9	14.9				Programming			Mounting Height to Module Face		Mounting Height to Fixture Aperture	mJ/cm ²
E110	12'	11'-9"	8.3	17.8		A090		9'	8'-9"	1.7	87.0	A090	9'	8'-9"
A090	9'	8'-9"	2.4	61.6	B095	9'-6"	9'-3"	2.7	54.8	B095	9'-6"	9'-3"	2	74.0
B095	9'-6"	9'-3"	3.9	37.9	C100	10'	9'-9"	3.8	38.9	C100	10'	9'-9"	2.7	54.8
C100	10'	9'-9"	5.2	28.5	D105	10'-6"	10'-3"	5.1	29.0	D105	10'-6"	10'-3"	3.8	38.9
D105	10'-6"	10'-3"	6.9	21.4	E110	11'	10'-9"	6.2	23.9	E110	11'	10'-9"	4.6	32.2
E110	11'	10'-9"	8	18.5	E110	12'	11'-9"	5.7	26.0	E110	12'	11'-9"	4.4	33.6
E110	12'	11'-9"	7.1	20.8										

PHOTODEGRADATION

Material	Photodegradation Effect at Dose of 54,000 mJ/cm ² *			
	Before UV exposure	After UV exposure	Average Δ E**	Average Δ - Durometer Hardness***
Cotton			2.12	N/A
Wool			2.73	N/A
Pine/Fir			7.79	1
Oak			8.73	-14
Poplar			11.65	-7
Low grade paper (copy paper)			4.15	N/A
Rag paper (stationary writing paper)			7.44	N/A
Oil paint on paper			1.47	N/A
Watercolors on rag paper			3.12	N/A
Window glass			0.11	N/A
Vinyl flooring			2.13	-2
Wall paper			3.83	N/A
Newsprint Color			8.13	N/A
Barcode paper label			1.34	N/A

Independent Lab Test Results⁶ for Determining Photodegradation Effect for Far-UVC Filtered 222nm technology (Care222®)

* The independent test lab results compared materials at an initial state of no UV exposure and a final state of UV exposure at 54,000 mJ/cm².

** ΔE is a benchmark used to measure color difference compared to a known set of CIELAB color coordinates defined by the International Commission on Illumination (CIE). The Photodegradation Testing Results table presents data calculated by the CIE76 formula, ΔE*ab. CIE76 is a formula that relates a measured color difference to a known set of CIELAB coordinates. ΔE*ab ~ 2.3 equates to a Just Noticeable Difference

*** Durometer Hardness is a benchmark of material hardness, as measured by a Shore Durometer device. The Photodegradation Testing Results table presents the difference in measured material hardness over the exposure dose. For the majority of the materials tested there was no or only a very small change in Durometer Hardness. Unvarnished Oak and Poplar showed some change in Durometer Hardness.

Comparing Far-UVC Filtered 222nm Disinfection Technology (Care222®) Photodegradation Effect to General Illumination Photodegradation Effect

To compare photodegradation caused by UV to photodegradation caused by general illumination, which also causes a photodegradation effect, a Just Noticeable Difference (ΔE*ab ~ 2.3) in a space illuminated by a white light source to an illuminance of 50 fc would occur as soon as 6 months for highly sensitive materials and as long as 30 years for minimally sensitive materials.* There is recognizable photodegradation of materials caused by almost all light sources including incandescent, fluorescent, halogen, metal halide, LED, and UV. While some UV sources, depending on spectral content and intensity, can cause substantial photodegradation, the information presented in the Photodegradation Testing Results table illustrates specifically the generally minimal photodegradation effect of far-UVC filtered 222nm technology (Care222®) when utilizing these products in typical application.

* ANSI/IES RP-30-20 Recommended Practice: Lighting Museums, Table C-2

6. Independent laboratory photodegradation testing performed by Assured Testing Services, Ridgeway, PA, Test Report 28545, August 12, 2020.

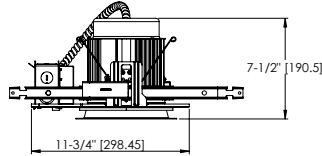
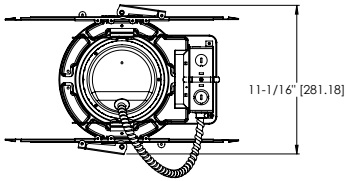
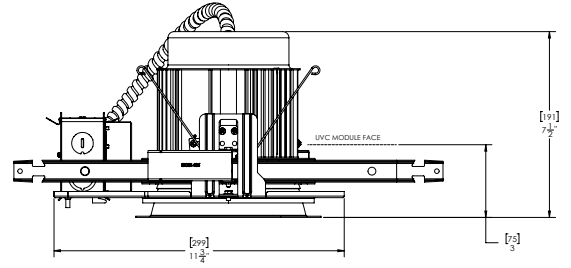
500LM-2000LM Standard

Module Regression in Trim

Aperture: 6 1/4" [15.9] Ceiling Opening: 7 1/8" [18.1] self-flanged

Overlap Trim: 7 1/2" [19.1] 7 1/4" [18.4] flangeless

*Dimensions in inches [centimeters]



DIMENSIONAL DATA