

Description

Recessed LED module with interchangeable 2-inch round or square lens pinhole apertures are available in various finishes to suit any décor. Use with 4-inch nominal recessed housings suitable for residential and shallow plenum commercial construction or can be used to retrofit existing installations. Field interchangeable primary optics provide various distribution patterns and spacing to mounting height ratios. Use for general and task lighting in low to medium height ceilings where energy savings, long life and optical control are required.

Catalog #		Type
Project		
Comments		Date
Prepared by		

Specification Features

Module

- Field interchangeable and upgradable LED module consists of LED array, primary optic and driver.
- Integral die cast aluminum heat sink provides passive thermal cooling achieving L70 at 50,000 hours in IC and non-IC applications.

- Available in narrow flood, flood and wide flood distributions, ordered separately, ships with narrow flood installed.
- Also available in asymmetric distribution providing vertical illumination

Retention

- Heat treated compression springs hold module securely in the housing, can be removed thru the aperture for service or replacement

LED Array

- Proximity phosphors over chip on board LEDs provide a uniform source with high efficiency and no pixilation.
- Available in 90 CRI minimum, R9 greater than 50 and color accuracy within 3 SDCM provide color accuracy and uniformity.
- Compatible with Zhaga book 12 standards for interchangeability and can be replaced in the field

Gaskets

- Closed cell gaskets achieve restrictive airflow requirements without additional caulking

Primary Optic

- Precision molded TIR optic organizes source flux into useful beams without stray lumens in the field.
- Two-piece construction with matte black mounting ring and polarized turn and lock mounting aligns optic to source and minimizes backlight in the housing.
- Exceeds ENERGY STAR® color angular uniformity requirements, color deviation is typically less than 0.002 u' v'.

Trims

- Die formed steel trims are available in 2-inch round or square pinhole apertures and can be interchanged in the field.
- Available in a broad range of painted or plated finishes, can be painted in the field to match any décor.
- Magnetic attachment holds trim tightly to ceiling and eliminates light leaks.

Shielding

- Diffuse clear lens provides light control and source shielding.

Driver

- Integral UNV 120 - 277V 50/60 Hz constant current driver provides noise free operation.
- Continuous, flicker-free dimming from 100% to 5% with select leading or trailing edge 120V phase cut dimmers.
- Driver can be replaced in the field.
- Inline electrical quick connect and E26 adapter not provided.

Compliance

- cULus listed / certified for use with Halo housings, classified for use with other's housings, see instruction sheet for conditions of acceptability.
- Wet location listed in covered ceilings and IP65 certified.
- Airtight per ASTM-E283.
- Suitable for use in clothes closets when installed in accordance with the NEC 410.16 spacing requirements
- EMI/RFI emissions per FCC 47CFR Part 15 B.
- Contains no mercury or lead and RoHS compliant.
- Photometric testing in accordance with IES LM-79-08.
- Lumen maintenance projections in accordance with IES LM-80-08 and TM-21-11.
- Can be used for State of California Title 24 high efficacy luminaire compliance, reference the California Energy Commission Title 20 Appliance Efficiency Database for current listings.
- ENERGY STAR® listed, reference qualified product listings.
- Meets State of California voluntary lamp standards.
- Zhaga book 12 compatible.

Warranty

Five year limited warranty, consult website for details.
www.eaton.com/lighting/Legal



ML4D

TL43R

TL44S

900 Lumen Series

LED

2-Inch Round and Square Lens Pinhole Downlight

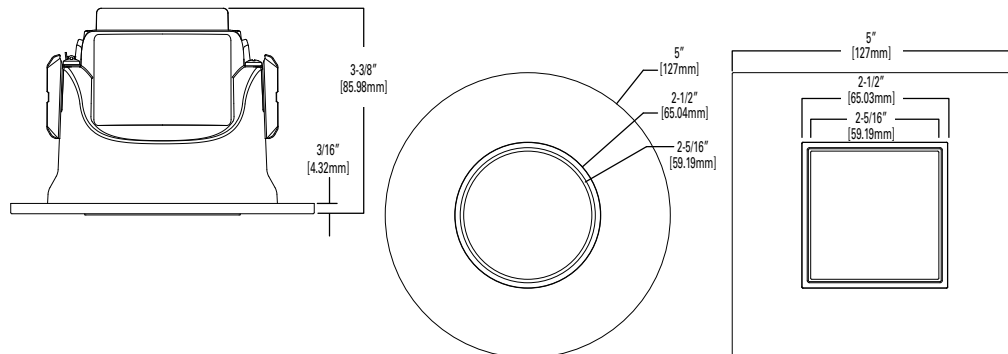


Refer to ENERGY STAR® Qualified Products List. Can be used to comply with California Title 24 High Efficacy requirements. Certified to California Appliance Efficiency Database under JAB. Indoor LED nominal CCT of 4000K or less.



Eaton is a founding member of the Zhaga Consortium

Dimensions



ENERGY DATA		
Lumens	900 Series	
Input Voltage	120V	277V
Input Current	101.6 (mA)	45.7 (mA)
Input Power	12.1 (W)	11.9 (W)
Efficiency	84.93 %	83.45 %
Inrush (A)	1.3	4.7
THD: ≤ 20%		
PF: ≥ 0.90		
T Ambient -40 - +40°C		
Sound Rating ≤ 20dba		

Ordering Information

SAMPLE NUMBER: ML4D09NFL927E - TL43R2GMWWB

A complete luminaire consists of a housing, LED module and trim, order separately.

Models	Lumens	Distribution	CRI/CCT	Driver	Accessories
ML4D = 4" LED module	09 =900 lumens (nominal)	NFL =25 degree narrow flood FL =40 degree flood	927 =90 CRI , 2700K 930 =90 CRI , 3000K 935 =90 CRI , 3500K 940 =90 CRI , 4000K	E =UNV 120 - 277V 50-60Hz, LE & TE phase cut 5% dimming at 120V only	TIR50AWW25 =asymmetric wall wash TIR50NFL25 =25° narrow flood TIR50FL40 =40° flood TIR50WFL55 =55° wide flood LH501MB12PK =Media holder for (1) 50mm lens, matte black, 12 pack HE26LED =Edison base adapter for retrofit HE26LED-24PK =Edison base adapter for retrofit 24 pack
Trims	Shielding	Flange Finish	Accessories		
TL43R = 2" round lens pinhole TL44S = 2" square lens pinhole	2G =Diffuse clear	MWWB =Matte white flange, white lens frame MWBB =Matte white flange, black lens frame MBBB =Matte black flange, black lens frame BNBB =Brushed nickel flange, black lens frame ORBBB =Oil rubbed bronze flange, black lens frame GBBB =German bronze flange, black lens frame BCuBB =Brushed copper, black lens frame	T24HWKIT =Title 24 hard wire kit, converts incandescent, low voltage and compact fluorescent housings to LED H4NCMF =4" new construction mounting frame compatible with H245RICAT, H99RTAT, H1499RICAT, and E4RTATSB remodeler housings.		

Housings

Halo Ultra-shallow LED Housings

H245ICAT=4" IC, airtight ultra-shallow new construction housing, LED, 120 - 277V
H245RICAT=4" IC, airtight ultra-shallow remodeler housing, LED, 120 - 277V

Halo LED Housings

H995ICAT=4" IC, airtight shallow new construction housing, LED, 120 - 277V
H995RICAT=4" IC, airtight shallow remodeler housing, LED, 120 - 277V

Halo Housings

H99TAT=4" non-IC, airtight shallow new construction housing, E26, 120V
H99RTAT=4" non-IC, airtight shallow remodeler housing, E26, 120V
H99ICAT=4" IC, airtight shallow new construction housing, E26, 120V
E4TATSB=4" non-IC, airtight shallow new construction housing, adjustable socket bracket, E26, 120V
E4RTATSB=4" non-IC, airtight shallow remodeler housing, adjustable socket bracket, E26, 120V
E4ICATSB=4" non-IC, airtight shallow new construction housing, adjustable socket bracket, E26, 120V

Halo Surface Mount Housings

HS4R=Surface round, 120-277V
HS4S=Surface square, 120-277V



HE26LED
Edison Base Adapter for retrofit (order separately)

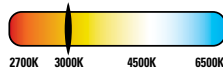
Photometry

ML4D09NFL930-TIR50NFL25-TL43R2G_X_TL44S2GX

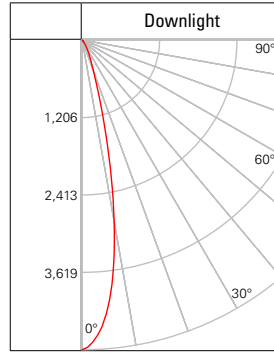
Description	Halo 2 Inch ML4 Round And Square Lensed Downlight-Narrow Flood Distribution
Test Number	P189395
Module	900 Series, 90CRI, Narrow Flood optic
Trim	2" Aperture, Open Round DL
Lumens	916 Lm
Efficacy	79.83
Spacing Criteria	0.39
CPCB	4688.3
Beam Angle (FWHM)	26.6

Color Metric Summary

TM-30-15	R _f = 91.5
	R _g = 97.7
CRI/CIE	R _a = 92.8
	R ₉ = 57.4



Candlepower Distribution



Candelas at Nadir

Angle	0-deg
0	4688
5	4166
10	2790
20	504
30	139
40	39
50	11
60	5
70	3
80	2
90	0

Foot-candle Values at Nadir

0 deg Aiming Angle		
DD	FC	DIA
5.5'	155	2
7'	95.7	2.6
8'	73.3	3
9'	57.9	3.4
10'	46.9	3.8
12'	32.6	4.6

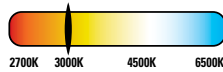
DD = distance down to illuminated work plane
FC = initial foot-candles at nadir
DIA = diameter

ML4D09NFL930-TIR50FL40-TL43R2G_X_TL44S2GX

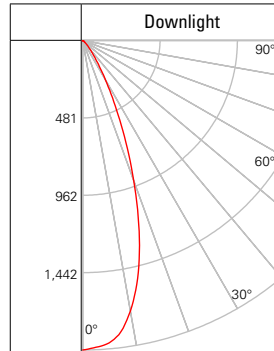
Description	Halo 2 Inch ML4 Round And Square Lensed Downlight- Flood Distribution
Test Number	P189401
Module	900 Series, 90CRI, Flood optic
Trim	2" Aperture, Open Round DL
Lumens	919 Lm
Efficacy	78.94
Spacing Criteria	0.64
CPCB	1868
Beam Angle (FWHM)	39.3

Color Metric Summary

TM-30-15	R _f = 91.4
	R _g = 97.7
CRI/CIE	R _a = 92.7
	R ₉ = 57.2



Candlepower Distribution



Candelas at Nadir

Angle	0-deg
0	1868
5	1832
10	1658
20	903
30	278
40	70
50	21
60	8
70	4
80	2
90	0

Foot-candle Values at Nadir

0 deg Aiming Angle		
DD	FC	DIA
5.5'	61.8	3.4
7'	38.1	4.4
8'	29.2	5
9'	23.1	5.8
10'	18.7	6.4
12'	13	7.6

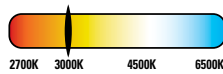
DD = distance down to illuminated work plane
FC = initial foot-candles at nadir
DIA = diameter

ML4D09NFL930-TIR50WFL55-TL43R2G_X_TL44S2GX

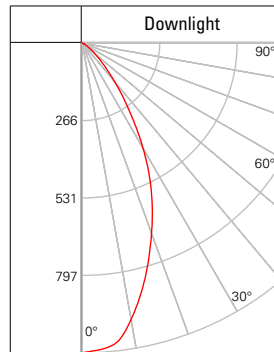
Description	Halo 2 Inch ML4 Round And Square Lensed Downlight-Wide Flood Distribution
Test Number	P189407
Module	900 Series, 90CRI, Wide Flood optic
Trim	2" Aperture, Open Round DL
Lumens	857 Lm
Efficacy	74.41
Spacing Criteria	0.78
CPCB	1032.3
Beam Angle (FWHM)	52.1

Color Metric Summary

TM-30-15	R _f = 91.4
	R _g = 97.6
CRI/CIE	R _a = 92.7
	R ₉ = 57.1



Candlepower Distribution



Candelas at Nadir

Angle	0-deg
0	1032
5	1017
10	936
20	675
30	406
40	166
50	54
60	16
70	5
80	1
90	0

Foot-candle Values at Nadir

0 deg Aiming Angle		
DD	FC	DIA
5.5'	34.1	4.2
7'	21.1	5.4
8'	16.1	6.2
9'	12.7	7
10'	10.3	7.8
12'	7.2	9.2

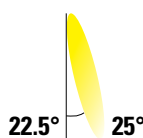
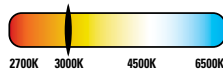
DD = distance down to illuminated work plane
FC = initial foot-candles at nadir
DIA = diameter

ML4D09NFL930-TIR50AWW25-TL43R2GMWWB_TL44S2GMWWB

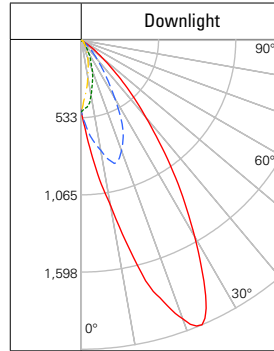
Description	Halo 2 Inch ML4 Round And Square Lensed Downlight-Asymmetric
Test Number	P189448
Module	900 Series, 90CRI, Asymmetric
Trim	2" Aperture, Open Round DL
Lumens	683 Lm
Efficacy	61.03
Spacing Criteria	1.51
Peak intensity	2070
Peak angle	23

Color Metric Summary

TM-30-15	R _f = 91.4
	R _g = 97.6
CRI/CIE	R _a = 92.7
	R ₉ = 57.0



Candlepower Distribution



Candelas at Nadir

Angle	0-deg
0	479
5	751
10	1115
20	1986
30	1520
40	675
50	190
60	27
70	2
80	2
90	0

Single Unit Footcandles 2.5' from wall (distance from fixture along wall)

DD	•
1'	0.4
2'	12.2
3'	28.9
4'	31.8
5'	26.5
6'	18.8
7'	12
8'	7.8
9'	5.2
10'	3.6

Multiplier Table

CCT Option	2700K	3000K	3500K	4000K
CCT Multiplier	0.946	1.000	1.020	1.042

Representative photometric test report for 3000K color temperature, 90CRI.
Multipliers may be used to determine relative lumen values with other color temperatures.