LIGHTOLIER
by signify

Downlighting

Calculite LED 4" gen 3

C4RTW Round Tunable White

Calculite LED 4" generation 3 features industry leading visual comfort, excellent uniform illumination over time, and patented installation flexibility.

Project:
Location:
Cat.No:
Type:
Lamps: Qty:
Notes:

Complete luminaire = Frame + Engine + Trim + Accessories (optional)

Frame

example: 4RN

Series	Aperture	Installation	Voltage / Options
4	**R**		
4 4" Non-IC *	**R** Round	**N** New Construction **R** Remodeler	**—** Universal 120 V/277 V **3** 347 V **EM** Emergency[2,3] **LC** Chicago Plenum[2]
		A Airseal IC[1]	**—** Universal 120 V/277 V

Engine

example: C4L10865MDUTW

Series	Lumens	CRI	CCT	Beam	Dimming	Voltage	Options
C4L							**TW**
C4L Calculite LED 4"	**10** 1000 lm **12** 1200 lm[1]	**8** 80 CRI	**65** 6500-2700K	**M** Medium (56°) **W** Wide (76°)[4]	**D** Dali 0.1%	**U** Universal 120 V/277 V/347 V	**TW** Tunable White
	12 1200 lm	**8** 80 CRI	**65** 6500-2700K	**M** Medium (56°) **W** Wide (76°)[4]	**P** Power over Ethernet[6]	**E** Ethernet 48 V DC	**TW** Tunable White

Trim

example: C4RDLCCP

Series	Aperture	Style	Finish	Flange
C4	**R**			
C4 Calculite LED 4"	**R** Round	**DL** Downlight **WW** Open Wall Wash[4] **LW** Lensed Wall Wash[4] **CW** Corner Wall Wash[4,5] **DW** Double Wall Wash[4,5]	**CL** Specular clear **CC** Comfort clear **CD** Comfort clear diffuse **CZ** Champagne bronze **BK** Black (matte)	**–** White (matte) **P** Polished **F** Flangeless[5]
			WH White (matte)	**–** White (matte) **F** Flangeless[5]

Accessories

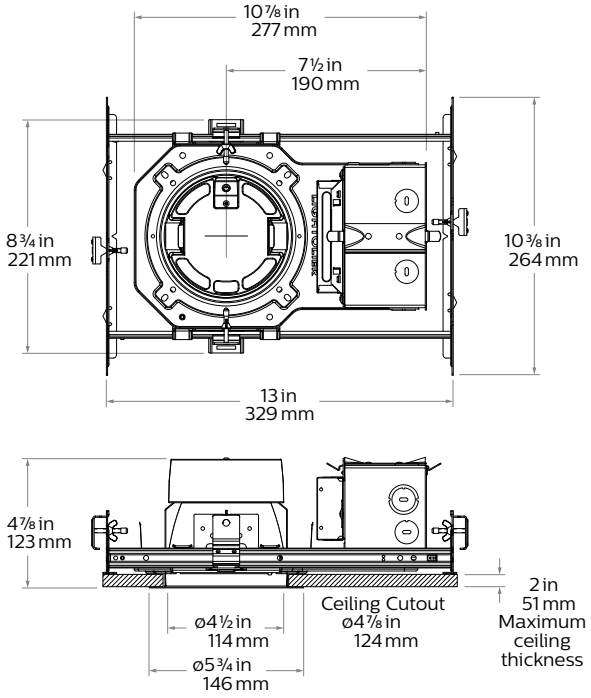
CA4RFT	Mud-in ring for use with flangeless installations (ordered with a flangeless trim)
CAEM	Field installable EM pack
C4RVPWH	IP65 rated vandal proof matte white accessory that mounts onto a flangeless trim (not available for use with Lensed Wall Wash)

1. The 1200lm (12) Dali package is only compatible with the Airseal (4RA) frame.
2. Emergency (EM) and Chicago Plenum (LC) options are only available with New construction (N) installations. Emergency (EM) option not available for PoE.
3. Emergency (EM) frame comes with emergency battery pack and ceiling mountable test switch. Reflector mounted test switch requires above ceiling access. For reflector mounted test switch, order emergency frame and add "EM" suffix to reflector (example: C4RDLCCEM).
4. Wide (W) beam is ideal for all Wall Wash (LW, WW, CW, DW) applications.
5. Corner (CW) and Double (DW) wall wash are not available with flangeless (F) option.
6. Power over Ethernet (PoE) option is only compatible with (4RN) and (4RR) frames.

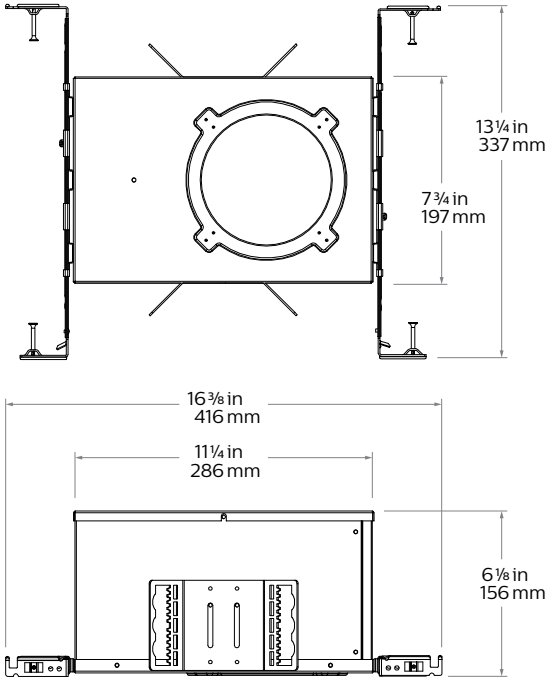
C4RTW Calculite LED 4" gen 3

Round Tunable White

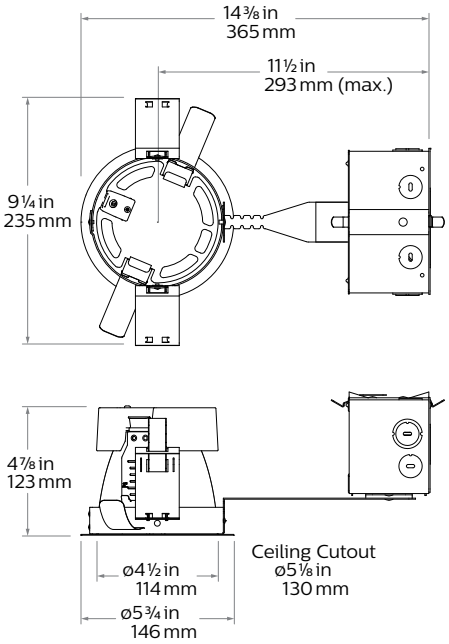
New Construction (N)



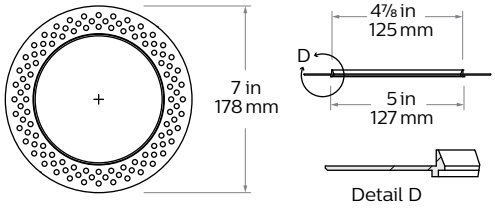
Chicago Plenum (LC)



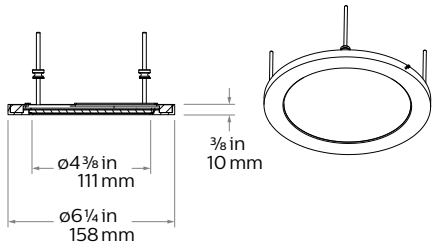
Remodeler (R)



Flangeless mud-in ring (CA4RFT) accessory



Vandal Proof (VP) accessory



C4RTW Calculite LED 4" gen 3

Round Tunable White

Disclaimers/Recommendations

For best performance, we recommend using Lightolier Dynalite products when designing your controls system.

CCT targeting table is for guidance only. Lightolier cannot guarantee color targeting precision, accuracy, or general performance with third party controls.

Lightolier cannot provide post sales configuration or commissioning support when using control systems that are not in the Lightolier product offering. Please contact your controls manufacturer for support.

Lightolier cannot provide guidance on programming dynamic show behaviors (circadian rhythm, daylight mimicry, etc.).

Any configuration, commissioning, or support is solely owned by the sales agent/rep/specifier.

Objective

Provide an application note to reps/agents/trade channel partners that provides information for integration of Lightolier tunable white luminaires with third party controllers.

All Lightolier tunable white luminaires leave the factory with the following settings:

Cool white CCT: 6500K

Warm white CCT: 2700K

When either channel is at 100% brightness
Warm white lumen output = Cool white lumen output

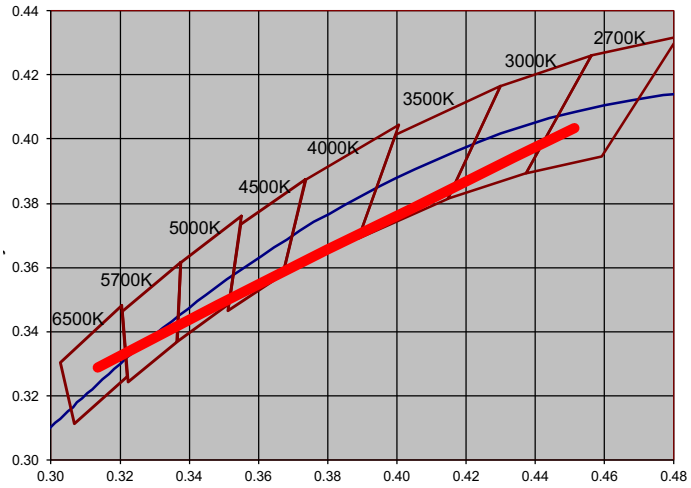
Communication protocol:
DALI 2.0 (Device Type 6)
Power over Ethernet 48V

CCT targeting guidance

Target CCT	WW%	CW%
2700K	100	0
3000K	82	18
3500K	66	34
4000K	49	51
5000K	24	76
6500K	0	100

Color information (Dali)

4" 1000lm	2700K	3000K	3500K	4000K	5000K	6500K
Flux (lms)	909	920	942	951	927	927
Power (W)	10.24	10.24	10.22	10.19	9.94	9.98
Efficacy (lm/W)	88.8	89.8	92.2	93.4	93.3	92.8
CCT	2766	2974	3423	3933	4866	6458
CRI	86	87	88	89	87	83
R9	21	26	33	36	32	13
x	0.4513	0.4335	0.404	0.3797	0.3483	0.3136
y	0.4034	0.394	0.3783	0.3653	0.3483	0.3288
Duv	-0.0019	-0.0036	-0.0053	-0.0052	-0.0029	0.0026



Lifetime (TM-21) data

Lumens	Narrow beam	Medium/Wide beam*
1000lm 1200lm	L90 @ 60,000hrs.	L90 @ 60,000hrs.

* Lutron 3000lm with Medium/Wide beam is L80 @ 60,000hrs.

Color information (PoE)

Flux (lm)	1300	1275	1284	1279	1266	1248	1221	1223
Power (W)	11.62	11.55	11.16	11	10.92	10.9	10.98	10.85
Efficacy (lm/W)	111.9	110.4	115.1	116.2	115.9	114.5	111.2	112.7
CCT	2729	2987	3508	4019	4536	5076	5869	6480
CRI	85	86	88	88	87	86	85	83
Color Rendering Index (R9)	16.5	23.1	31	33.9	33	28.6	22.3	14.1
x	0.4564	0.4336	0.3998	0.3762	0.3579	0.3425	0.3245	0.3132
y	0.4084	0.396	0.3773	0.3639	0.3535	0.3446	0.3342	0.3276
Duv	-0.0005	-0.0028	-0.0048	-0.0049	-0.0040	-0.0025	0.0001	0.0023
TM30 Rf	86	86	87	87	86	85	84	84
TM30 Rg	98	100	100	100	100	100	99	98

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Reflector

Specular clear (CL): Most specular and most efficient finish, delivers maximum photometric performance but can produce a mirror image effect of the interior space.

Comfort clear (CC): Semi-specular finish that softens the light at the source of the reflector and creates a subtle, even luminance from the reflector cone.

Comfort clear diffuse (CD): Slightly diffuse clear finish, that eliminates iridescence and reduces the mirror image effect inherent with specular finishes.

Vandal proof (VP): Provides an elegant solution for vandal resistant needs. One piece machined aluminum ring with impact resistant clear lens. Flangeless (F) flange must be ordered. Provides the luminaire with an IK10 impact and IP65 rating.

Champagne bronze (CZ): Semi-specular finish that softens light at the source of the reflector while providing a warmer reflector appearance (slightly warmer).

White (WH): (matte) Brightest illuminated aperture and provides the smoothest transition to most ceilings when off (white is only available with a white flange).

Black (BK): (matte) Specular finish that provides the lowest aperture brightness possible and significantly reduces source identification in a ceiling.

Flange

White (–): (matte) Provides the smoothest transition to ceilings when off.

Polished (P): (matches aperture) Produces a continuous look throughout the reflector (aperture matching).

Flangeless (F): (flush-mount) Creates a flush, virtually seamless transition from aperture to ceiling.

Frame-in-kits

New Construction

Galvanized stamped steel for dry or plaster ceilings. Preinstalled telescoping mounting bars from 13" to 24". For 4' distances, use 1/2" EMT, 1-1/2" x 1/2" U or C channel.

Max ceiling thickness is 2".

AirSeal

Black painted steel housing for dry or plaster ceilings. Pre-installed telescoping mounting bars from 13" to 24".

Patented install Mounting frame

With no driver attached, this versatile frame is independent of driver accommodating a wide range of lumen packages, driver types and CCTs, including 120V and 277V inputs.

Close-cut aperture design eliminates possibility of gap between ceiling opening & reflector flange.

Separate wiring compartment for wiring frame to building allows inspection prior to light engine install.

Simple plug-and-play connection between frame and light engine from below ceiling eliminates need for wiring between frame and LED driver, and also saves time during installation and future replacements/upgrades. Plug-and-play receptacle accommodates technology upgrade of light engines and replacements for the life of the building.

Drivers

- EldoLED ECOdrive Dali 1% Dimming

Rated life

60,0000 hrs at 70% lumen maintenance based on IES LM-80-08 and TM-21-11.

Power over Ethernet

Powered via Lightolier PoE lighting controller: Complies with FCC rules per Title 47 part 15 (Class A) for EMI / RFI (conducted & radiated). PoE lighting controller accessible from below ceiling.

Optical systems

Comfort throughout the space:
Patented optical system combines primary and secondary optics to provide a true 50° physical cutoff and 45° reflected cutoff virtually eliminating the view of the light source and bright spots in the reflector. A new reflector curve reduces reflector brightness by up to 50% compared to existing products, allowing for the use of higher lumen packages in smaller apertures without creating bright spots in the ceiling.

Light Engine

Quick connect power pack comprised of light source and driver allow for easy installation and replacement from below ceiling with no need for additional wiring. This allows for

- Frame and ceiling installation to be performed while still finalizing details such as lumen packages, CCT and control type.
- Easy replacement of electronics at end of life with minimal wasted material and labor required.
- Ease and upgradability of technology.

Options and Accessories

Flangeless mud-in ring: Use **CA4RFT** for use with flangless plaster installations.

Sloped ceilings: Compatible with sloped ceiling adapters (see **SCA** spec sheet).

Labels and Listings

- cULus listed for wet locations (downlights)
- RoHS certified

Warranty

5 year limited warranty

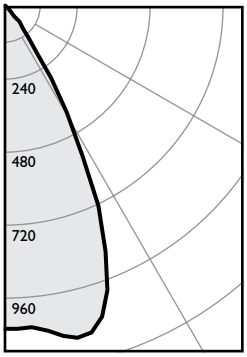
Visit Signify.com/warranties for more information on Signify's standard 5-year limited warranty on complete luminaire systems.

C4RTW Calculite LED 4" gen 3

Round Tunable White (with Dali driver)

Medium beam, 1000lm Engine, 88.8 lm/W

Candela Curve



Frame: **4RN**
Engine: **C4L10865MDUTW**
Trim: **C4RDLCL**

Output lumens:	909.5 lms
Input watts:	10.2 W
CRI:	80 min
CCT[1]:	2700K
Spacing Crit.:	0.8
Beam Angle:	52°

Zonal summary

Zone	Lumens	%Luminaire
0-30	732	80.5%
0-40	863	94.9%
0-60	905	99.6%
0-90	909	100.0%

Angle	Mean CP	Lumens
0	1060	
5	1063	103
10	1103	
15	1112	307
20	992	
25	726	323
30	405	
35	190	131
40	99	
45	48	38
50	10	
55	5	5
60	3	
65	2	2
70	2	
75	1	1
80	1	
85	1	0
90	0	

Single unit data

Height to lighted plane	Initial center beam foot-candles	Beam diameter (ft)*
5'	42	4.0'
6'	29	4.8'
7'	22	5.6'
8'	17	6.4'
9'	13	7.2'

* Beam diameter is where foot-candles drop to 50% of maximum.

Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq. ft.
5'	41.8	0.45
6'	27.5	0.30
7'	19.6	0.21
8'	16.3	0.18
9'	13.1	0.14

38' x 38' x 10' Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Efficacy: 88.8 lm/w
Report[2]: 1215GFR

Adjustment factors

Finish	CCT	Lumens
CL = 100%	80CRI 4000K = 103%	1500lm = ???%
CC = 95%	80CRI 3500K = 100%	1000lm = 100%
CD = 87%	80CRI 3000K = 95%	
CZ = 63%	80CRI 2700K = 93%	
WH = 87%	90CRI 3000K = 83%	
BK = 57%	90CRI 2700K = 78%	

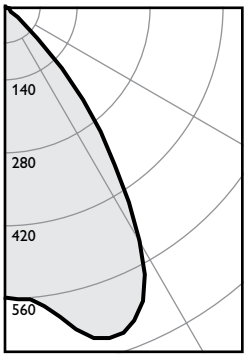
Coefficients of utilization

Ceiling	80%				70%		50%		30%		0%
Wall	70	50	30	10	50	10	50	10	50	10	0
RCR	Zonal cavity method - Effective floor reflectance = 20%										
0	119	119	119	119	116	116	111	111	106	106	100
1	114	111	109	107	109	105	105	102	101	99	94
2	109	104	100	97	102	96	99	94	96	92	88
3	104	97	93	89	96	88	94	87	91	86	83
4	99	92	86	82	90	82	88	81	86	80	78
5	94	86	81	77	85	76	84	76	82	75	73
6	90	81	76	72	81	71	79	71	78	71	69
7	86	77	71	67	76	67	75	67	74	66	65
8	82	73	67	63	72	63	71	63	70	63	61
9	78	69	64	60	69	60	68	59	67	59	58
10	75	66	60	57	65	56	64	56	64	56	55

Room Cavity Ratio

Wide beam, 1200lm Engine, 81.7 lm/W

Candela Curve



Frame: **4RN**
Engine: **C4L12865WDUTW**
Trim: **C4RDLCL**

Output lumens:	837 lms
Input watts:	10.2 W
CRI:	80 min
CCT[1]:	2700K
Spacing Crit.:	1.1
Beam Angle:	72°

Zonal summary

Zone	Lumens	%Luminaire
0-30	519	62.0%
0-40	750	89.6%
0-60	833	99.5%
0-90	837	100.0%

Angle	Mean CP	Lumens
0	557	
5	563	55
10	603	
15	654	184
20	663	
25	622	280
30	516	
35	370	231
40	233	
45	87	76
50	15	
55	8	7
60	4	
65	3	3
70	2	
75	1	1
80	1	
85	0	0
90	0	

Single unit data

Height to lighted plane	Initial center beam foot-candles	Beam diameter (ft)*
5'	22	5.5'
6'	15	6.6'
7'	11	7.7'
8'	9	8.8'
9'	7	9.9'

* Beam diameter is where foot-candles drop to 50% of maximum.

Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq. ft.
5'	37.7	0.45
6'	24.8	0.30
7'	17.7	0.21
8'	14.7	0.18
9'	11.8	0.14

38' x 38' x 10' Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Efficacy: 81.7 lm/w
Report[2]: 1216GFR

Adjustment factors

Finish	CCT	Lumens
CL = 100%	80CRI 4000K = 102%	1500lm = ???%
CC = 95%	80CRI 3500K = 100%	1000lm = 100%
CD = 87%	80CRI 3000K = 97%	
CZ = 63%	80CRI 2700K = 87%	
WH = 87%	90CRI 3000K = 77%	
BK = 57%	90CRI 2700K = 73%	

Coefficients of utilization

Ceiling	80%				70%		50%		30%		0%
Wall	70	50	30	10	50	10	50	10	50	10	0
RCR	Zonal cavity method - Effective floor reflectance = 20%										
0	119	119	119	119	116	116	111	111	106	106	100
1	113	110	108	105	108	104	104	100	100	97	93
2	107	102	98	94	100	93	97	91	94	89	85
3	101	94	89	85	93	84	90	83	88	81	79
4	95	87	81	77	86	77	84	76	82	75	72
5	90	81	75	70	80	70	78	69	77	69	67
6	85	75	69	64	75	64	73	64	72	63	61
7	80	70	64	59	70	59	68	59	67	59	57
8	76	66	59	55	65	55	64	54	63	54	53
9	72	61	55	51	61	51	60	51	59	50	49
10	68	58	51	47	57	47	56	47	56	47	45

Room Cavity Ratio

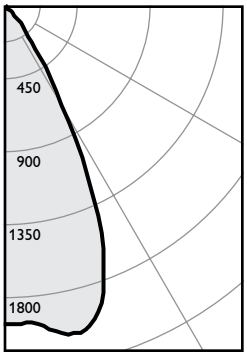
1. Correlated Color Temperature within specs as defined in ANSI_NEMA_ANSLG C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products.
2. Tested using absolute photometry as specified in LM79: IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.

C4RTW Calculite LED 4" gen 3

Round Tunable White (with PoE driver)

Medium beam, 1300lm Engine, 112.1 lm/W

Candela Curve



Frame: **4RN**
Engine: **C4L12865MPETW**
Trim: **C4RDLCL**

Output lumens:	1301 lms
Input watts:	11.6 W
CRI:	80 min
CCT[1]:	2700K
Spacing Crit.:	0.8
Beam Angle:	52°

Zonal summary

Zone	Lumens	%Luminaire
0-30	1068	82.1%
0-40	1251	96.2%
0-60	1299	99.9%
0-90	1301	100.0%

Angle	Mean CP	Lumens
0	1576	
5	1575	153
10	1644	
15	1639	452
20	1441	
25	1044	463
30	573	
35	270	183
40	138	
45	57	45
50	6	
55	2	2
60	2	
65	1	1
70	1	
75	0	0
80	0	
85	0	0
90	0	

Single unit data

Height to lighted plane	Initial center beam foot-candles	Beam diameter (ft)*
5'	63	4.0'
6'	44	4.8'
7'	32	5.6'
8'	25	6.4'
9'	19	7.2'

* Beam diameter is where foot-candles drop to 50% of maximum.

Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq. ft.
5'		0.51
6'		0.34
7'		0.24
8'		0.20
9'		0.16

38' x 38' x 10' Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Efficacy: 112.1 lm/w
Report[2]: 1644GFR

Adjustment factors

Finish		CCT		Lumens	
CL	= 100%	80CRI 4000K	= 103%	1500lm	= ???%
CC	= 95%	80CRI 3500K	= 100%	1000lm	= 100%
CD	= 87%	80CRI 3000K	= 95%		
CZ	= 63%	80CRI 2700K	= 93%		
WH	= 87%	90CRI 3000K	= 83%		
BK	= 57%	90CRI 2700K	= 78%		

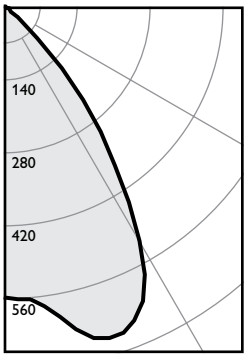
Coefficients of utilization

Ceiling	80%				70%		50%		30%		0%
Wall	70	50	30	10	50	10	50	10	50	10	0
RCR	Zonal cavity method - Effective floor reflectance = 20%										
0	119	119	119	119	116	116	111	111	106	106	100
1	114	111	109	107	109	105	105	102	101	99	94
2	109	104	101	97	103	96	99	94	96	92	89
3	104	98	93	90	97	89	94	88	92	86	83
4	99	92	87	83	91	83	89	82	87	81	78
5	95	87	82	78	86	77	84	77	83	76	74
6	90	82	77	73	81	72	80	72	79	71	70
7	86	78	72	68	77	68	76	68	75	67	66
8	82	74	68	64	73	64	72	64	71	64	62
9	79	70	64	61	69	61	69	60	68	60	59
10	76	67	61	58	66	57	65	57	65	57	56

Room Cavity Ratio

Wide beam, 1200lm Engine, 101.8 lm/W

Candela Curve



Frame: **4RN**
Engine: **C4L12865WPETW**
Trim: **C4RDLCL**

Output lumens:	1181 lms
Input watts:	11.6 W
CRI:	80 min
CCT[1]:	2700K
Spacing Crit.:	1.1
Beam Angle:	68°

Zonal summary

Zone	Lumens	%Luminaire
0-30	746	63.1%
0-40	1076	91.1%
0-60	1179	99.8%
0-90	1181	100.0%

Angle	Mean CP	Lumens
0	772	
5	782	77
10	857	
15	935	263
20	952	
25	898	405
30	746	
35	531	330
40	328	
45	115	100
50	10	
55	4	4
60	2	
65	1	1
70	1	
75	0	1
80	0	
85	0	0
90	0	

Single unit data

Height to lighted plane	Initial center beam foot-candles	Beam diameter (ft)*
5'	31	5.5'
6'	21	6.6'
7'	16	7.7'
8'	12	8.8'
9'	10	9.9'

* Beam diameter is where foot-candles drop to 50% of maximum.

Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq. ft.
5'		0.51
6'		0.34
7'		0.24
8'		0.20
9'		0.16

38' x 38' x 10' Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Efficacy: 101.8 lm/w
Report[2]: 1643GFR

Adjustment factors

Finish		CCT		Lumens	
CL	= 100%	80CRI 4000K	= 102%	1500lm	= ???%
CC	= 95%	80CRI 3500K	= 100%	1000lm	= 100%
CD	= 87%	80CRI 3000K	= 97%		
CZ	= 63%	80CRI 2700K	= 87%		
WH	= 87%	90CRI 3000K	= 77%		
BK	= 57%	90CRI 2700K	= 73%		

Coefficients of utilization

Ceiling	80%				70%		50%		30%		0%
Wall	70	50	30	10	50	10	50	10	50	10	0
RCR	Zonal cavity method - Effective floor reflectance = 20%										
0	119	119	119	119	116	116	111	111	106	106	100
1	113	110	108	105	108	104	104	101	100	98	93
2	107	102	98	94	100	93	97	91	94	89	86
3	101	95	89	85	93	85	91	83	88	82	79
4	96	88	82	78	87	77	85	76	82	75	73
5	91	82	75	71	81	71	79	70	77	69	67
6	85	76	70	65	75	65	74	64	72	64	62
7	81	71	64	60	70	60	69	59	68	59	57
8	76	66	60	55	66	55	64	55	63	55	53
9	72	62	56	51	61	51	60	51	60	51	49
10	68	58	52	48	58	48	57	48	56	47	46

Room Cavity Ratio

1. Correlated Color Temperature within specs as defined in ANSI_NEMA_ANSLG C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products.
2. Tested using absolute photometry as specified in LM79: IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.

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