

LM-79-08 Test Report for OSRAM SYLVANIA INC.

100 Endicott Street
Danvers, MA 01923

Model(s): Spectrum Lighting HMI1707LED-42W-5K-EX/SM/BZ

20 January 2011

This test report presents the results of measurements performed on the Spectrum Lighting HMI1707LED-42W-5K-EX/SM/BZ in accordance with LM-79-08 Electrical and Photometric Measurements of Solid-State Lighting Products.

Test Personnel: M. Sapcoe

Test Date: 14 January 2011

NVLAP

Signatory:



Dr. Ronald O. Daubach

Laboratory:

Metrology & Analytics Services

NVLAP Code: 100403-0

OSRAM SYLVANIA INC.

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Report Number: LM792011012001



FOR THE SCOPE OF ACCREDITATION UNDER NVLAP LAB CODE 100403-0

This report does not imply product certification, approval or endorsement by NVLAP, NIST or any agency of the federal government.

General Information

Product tested

The product tested is the Spectrum Lighting HMI1707LED-42W-5K-EX/SM/BZ.

Purpose of test

This test report is prepared on behalf of OSRAM SYLVANIA INC. in accordance with American National Standards Institute standards, Illumination Engineering Society of North America Lighting Methods and International Commission on Illumination (CIE) publications listed below:

- IESNA LM-79-08, Approved Method for the Electrical and Photometric Testing of Solid-State Lighting Products
- IESNA LM-28-1989, Guide for the Selection, Care and Use of Electrical Instruments in the Photometric Laboratory
- CIE Publication No. 13.3-1995, Method of Measuring and Specifying the Color Rendering of Light Sources.

The objective is to demonstrate compliance of the product evaluated to LM-79-08 Electrical and Photometric Measurements of Solid-State Lighting Products.

Laboratory Accreditation

Metrology & Analytics Services (MAS) is a department of the Central Research and Services Laboratory of OSRAM SYLVANIA INC. The MAS is located at 71 Cherry Hill Drive, Beverly, MA 01915.

The MAS is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP), Energy Efficient Lighting (EEL) program. NVLAP is a division of the National Institute of Standards and Technology. The MAS NVLAP Laboratory Code is 100403-0.

Test Equipment

Goniometry

Description	Manufacturer	Model No.	Serial No.	Calibration (Cycle in yrs.)
High Speed Goniophotometer OL 770 Multi-channel	Lighting Sciences, Inc.	6240	6240TE0168T	11/4/2010 (1)
Spectroradiometer	Gooch and Housego	770VIS/NIR	10414127	11/4/2010 (1)
Digital Power Meter	Yokogawa	WT1600	91K110635	10/5/2010 (1)
Power Supply	Kikusui	PCR4000L	DJ002858	Not Required
Digital Thermometer	Fluke	52	6200078	6/30/2010 (1)

Calibrated for lumimous intensity and spectral irradiance using NIST intensity standard lamp NBS 10189.
Assigned candela reading per 844/257263-96 is 1537cd.

Procedure

Goniospectroradiometry

Measurements were made in compliance with IESNA LM-79-2008. The luminaire was operated in its intended orientation in application. The luminaire reference plane was located at the center of the luminaire goniometer at a test distance of 45 feet from the detectors. The luminaire was operated at an input voltage of 120VAC supplied by a four contact connection.

The luminaire was stabilized per the criteria of LM-79 prior to the measurement.

Ambient temperature was 25 °C.

One vertical scan was taken due to rotational symmetry of the source output. Color uniformity was measured at two horizontal angles, 0° and 90°.

Total operating time is approximately 6 hours.

SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ

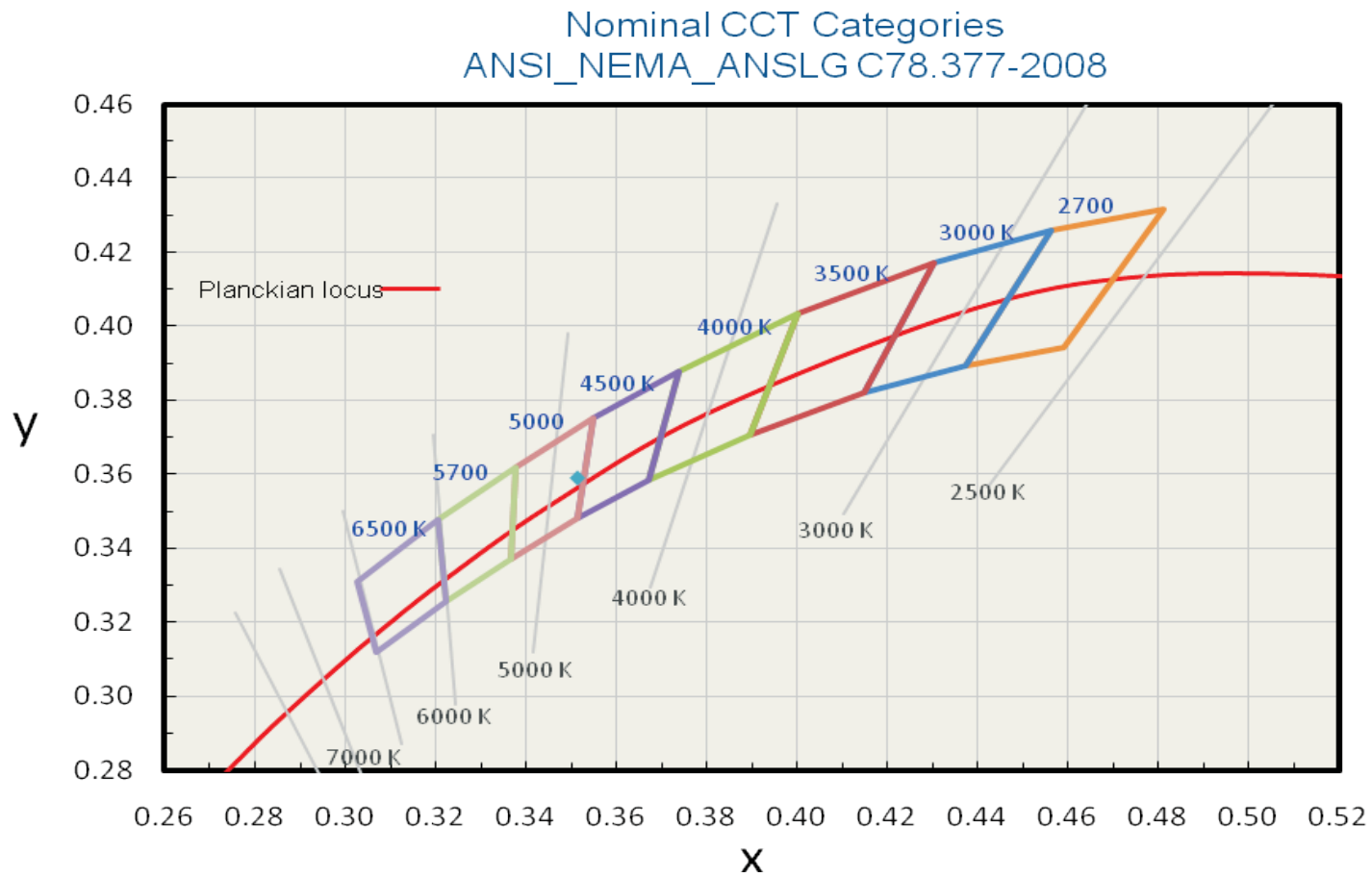
Summary of Measured and Derived Performance Parameters

Spectroradiometric Results	
Voltage /V	119.99
Current /A	0.386
Wattage /W	45.85
Power Factor	0.991
Lumens	2748
Efficacy /LPW	59.9
x	0.3513
y	0.3589
u'	0.2128
v'	0.4891
Duv	0.0049
CCT /K	4799
CRI	88
R9	53

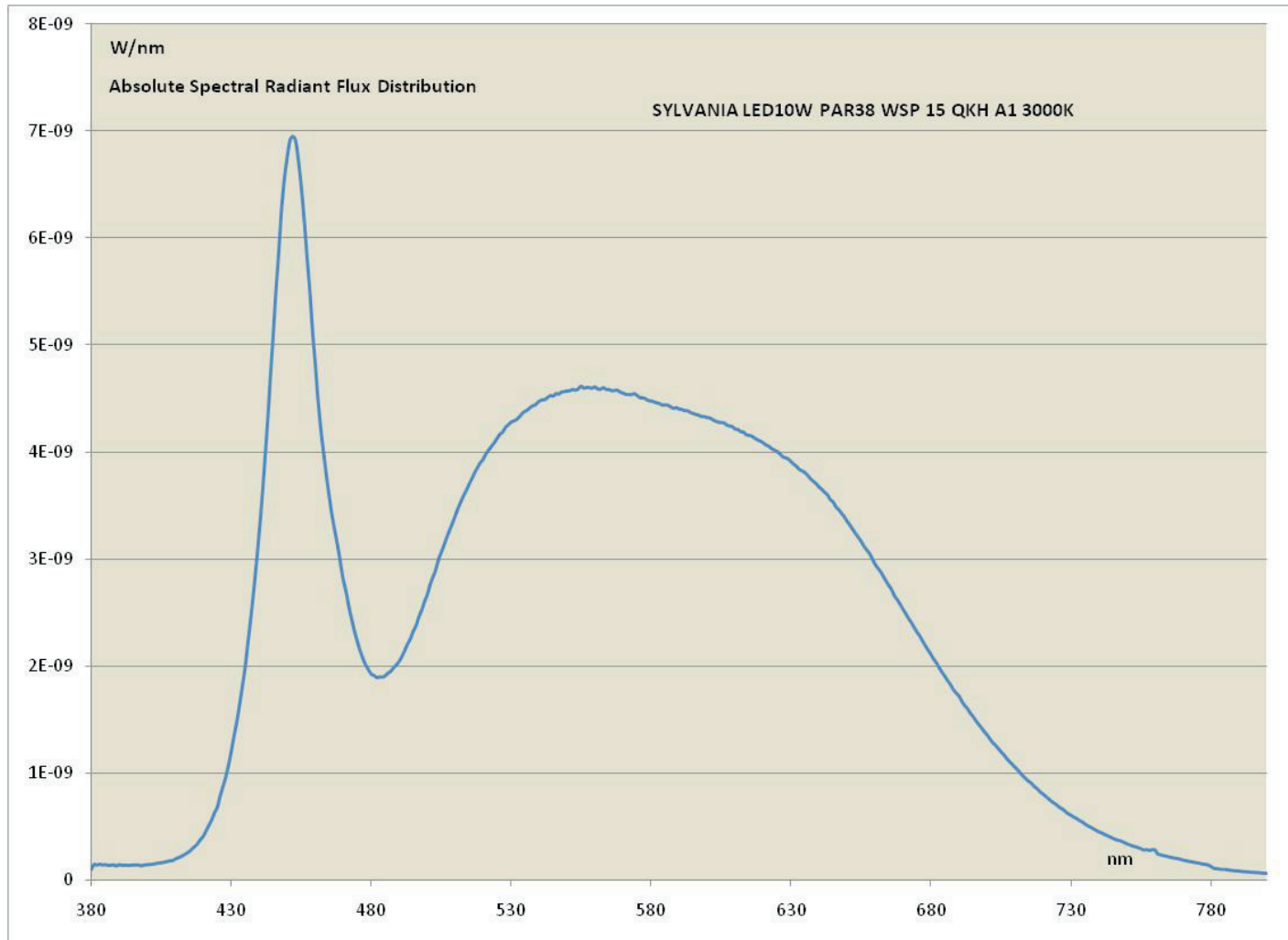
Special Color Rendering Indices	
R1	88
R2	90
R3	90
R4	88
R5	86
R6	84
R7	94
R8	84
R9	53
R10	75
R11	86
R12	60
R13	88
R14	94

SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ

Chromaticity Compliance Plot



SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ



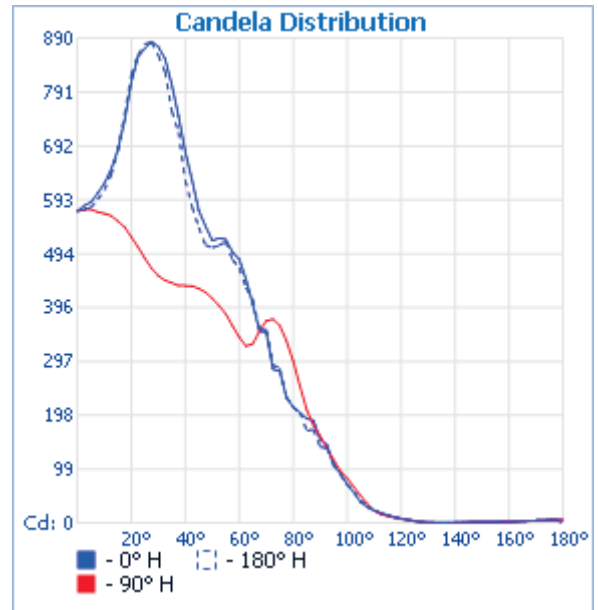
SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ

Absolute Spectral Radiant Flux in W/nm for visible wavelength range

nm	W/nm	nm	W/nm	nm	W/nm	nm	W/nm	nm	W/nm
380	9.358E-11	464	3.780E-09	548	4.560E-09	632	3.862E-09	716	8.987E-10
382	1.366E-10	466	3.407E-09	550	4.570E-09	634	3.822E-09	718	8.488E-10
384	1.384E-10	468	3.124E-09	552	4.583E-09	636	3.779E-09	720	8.012E-10
386	1.337E-10	470	2.805E-09	554	4.590E-09	638	3.724E-09	722	7.563E-10
388	1.382E-10	472	2.557E-09	556	4.595E-09	640	3.670E-09	724	7.150E-10
390	1.407E-10	474	2.327E-09	558	4.599E-09	642	3.621E-09	726	6.737E-10
392	1.374E-10	476	2.145E-09	560	4.606E-09	644	3.554E-09	728	6.390E-10
394	1.355E-10	478	2.009E-09	562	4.586E-09	646	3.487E-09	730	6.023E-10
396	1.366E-10	480	1.923E-09	564	4.583E-09	648	3.427E-09	732	5.720E-10
398	1.299E-10	482	1.889E-09	566	4.570E-09	650	3.351E-09	734	5.413E-10
400	1.401E-10	484	1.894E-09	568	4.575E-09	652	3.275E-09	736	5.046E-10
402	1.452E-10	486	1.931E-09	570	4.549E-09	654	3.203E-09	738	4.766E-10
404	1.559E-10	488	1.981E-09	572	4.536E-09	656	3.120E-09	740	4.473E-10
406	1.637E-10	490	2.041E-09	574	4.545E-09	658	3.051E-09	742	4.229E-10
408	1.767E-10	492	2.142E-09	576	4.507E-09	660	2.950E-09	744	3.996E-10
410	1.937E-10	494	2.252E-09	578	4.496E-09	662	2.879E-09	746	3.752E-10
412	2.156E-10	496	2.373E-09	580	4.476E-09	664	2.790E-09	748	3.601E-10
414	2.468E-10	498	2.517E-09	582	4.458E-09	666	2.707E-09	750	3.343E-10
416	2.888E-10	500	2.660E-09	584	4.437E-09	668	2.616E-09	752	3.152E-10
418	3.370E-10	502	2.826E-09	586	4.435E-09	670	2.527E-09	754	2.990E-10
420	4.046E-10	504	2.989E-09	588	4.405E-09	672	2.441E-09	756	2.776E-10
422	5.071E-10	506	3.126E-09	590	4.400E-09	674	2.357E-09	758	2.737E-10
424	6.238E-10	508	3.264E-09	592	4.385E-09	676	2.278E-09	760	2.783E-10
426	7.764E-10	510	3.399E-09	594	4.368E-09	678	2.185E-09	762	2.342E-10
428	9.546E-10	512	3.532E-09	596	4.349E-09	680	2.104E-09	764	2.210E-10
430	1.198E-09	514	3.640E-09	598	4.330E-09	682	2.025E-09	766	2.082E-10
432	1.476E-09	516	3.751E-09	600	4.318E-09	684	1.938E-09	768	1.990E-10
434	1.812E-09	518	3.853E-09	602	4.300E-09	686	1.859E-09	770	1.835E-10
436	2.220E-09	520	3.928E-09	604	4.278E-09	688	1.776E-09	772	1.724E-10
438	2.690E-09	522	4.018E-09	606	4.272E-09	690	1.718E-09	774	1.622E-10
440	3.250E-09	524	4.086E-09	608	4.242E-09	692	1.630E-09	776	1.535E-10
442	3.916E-09	526	4.165E-09	610	4.212E-09	694	1.559E-09	778	1.445E-10
444	4.691E-09	528	4.228E-09	612	4.188E-09	696	1.487E-09	780	1.239E-10
446	5.507E-09	530	4.278E-09	614	4.159E-09	698	1.420E-09	782	1.036E-10
448	6.271E-09	532	4.303E-09	616	4.146E-09	700	1.354E-09	784	9.651E-11
450	6.756E-09	534	4.360E-09	618	4.111E-09	702	1.283E-09	786	9.255E-11
452	6.948E-09	536	4.394E-09	620	4.086E-09	704	1.227E-09	788	8.607E-11
454	6.728E-09	538	4.432E-09	622	4.054E-09	706	1.168E-09	790	8.058E-11
456	6.193E-09	540	4.473E-09	624	4.017E-09	708	1.105E-09	792	7.501E-11
458	5.530E-09	542	4.488E-09	626	3.982E-09	710	1.052E-09	794	7.092E-11
460	4.828E-09	544	4.526E-09	628	3.944E-09	712	9.943E-10	796	6.720E-11
462	4.217E-09	546	4.544E-09	630	3.908E-09	714	9.403E-10	798	6.295E-11
								800	5.899E-11

SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ

Filename: 20104652
 Manufacturer: OSRAM SYLVANIA
 Luminaire: Spectrum Lighting
 Luminaire Cat: HMI1707LED-42W-5K-EX/SM/BZ
 Lamp: 48 LEDs
 Lamp Cat: N/A. LUMINAIRE OUTPUT: 2748 Lms.
 Lamp Output: 1 lamp(s), rated Lumens/lamp: 2752.884
 Max Candela: 883.9 at Horizontal: 0°, Vertical: 27.5°
 Input Wattage: 45.9
 Luminous Opening: Point
 Test: 20104652
 Test Lab: OSRAM SYLVANIA
 Photometry: Type C
 CIE Class: Direct



Roadway Summary

Cutoff Classification: NONCUTOFF
 Distribution: TYPE III, VERY SHORT
 Max Cd, 90 Deg Vert: 163.8
 Max Cd, 80 to <90 Deg: 300.6

	Lumens	% Lamp
Downward Street Side:	1,282.7	46.6%
Downward House Side:	1,272.9	46.2%
Downward Total:	2,555.6	92.8%
Upward Street Side:	97.2	3.5%
Upward House Side:	100.1	3.6%
Upward Total:	197.3	7.2%
Total Lumens:	2,752.9	100%

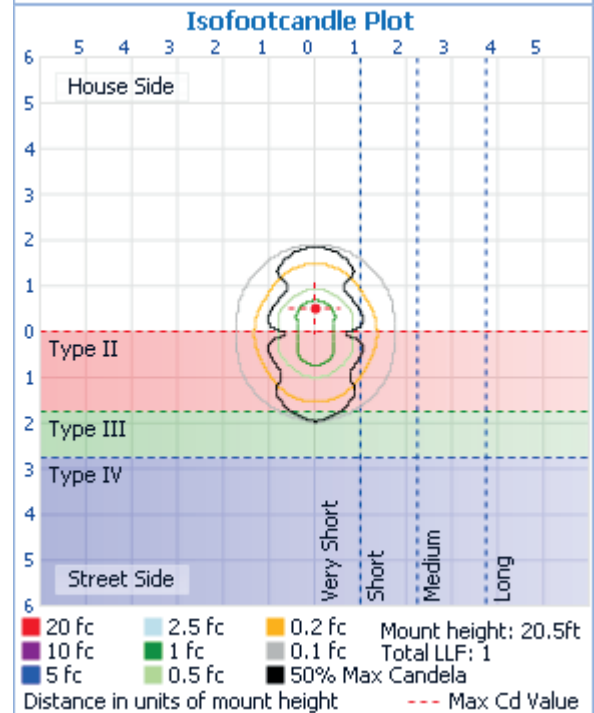
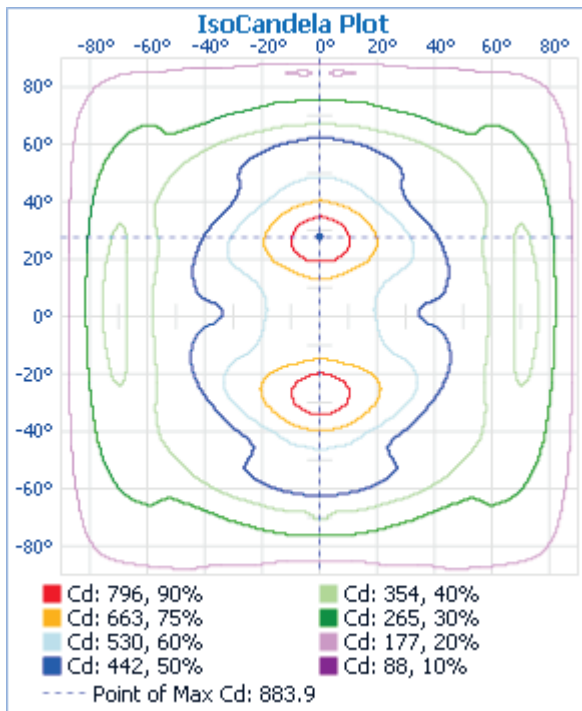
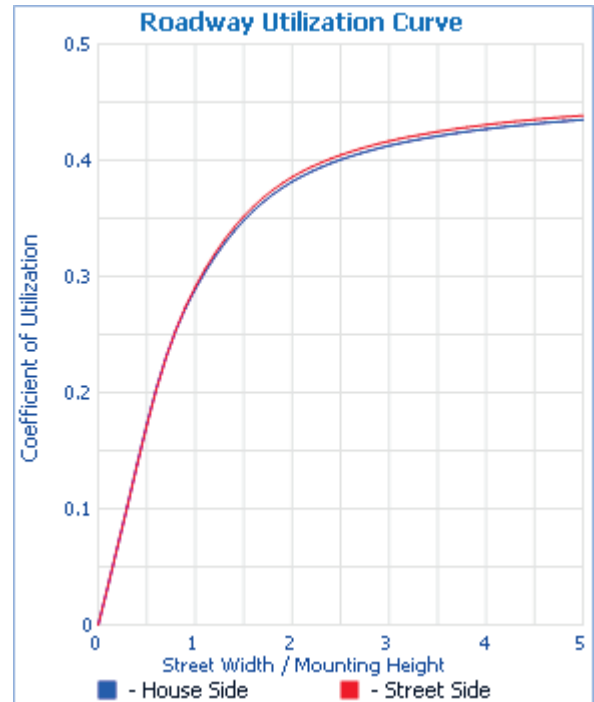
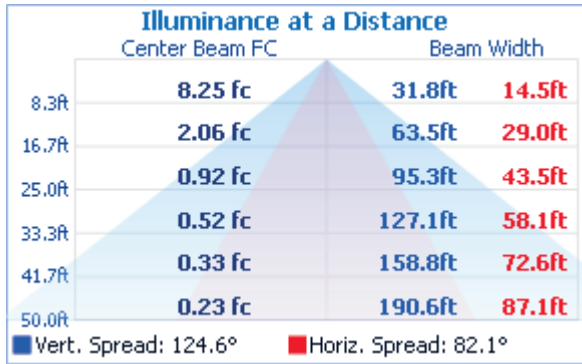
Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	531.6	19.3%
0-40	913.1	33.2%
0-60	1,675.8	60.9%
60-90	879.7	32%
70-100	642.0	23.3%
90-120	189.7	6.9%
0-90	2,555.6	92.8%
90-180	197.3	7.2%
0-180	2,752.9	100%

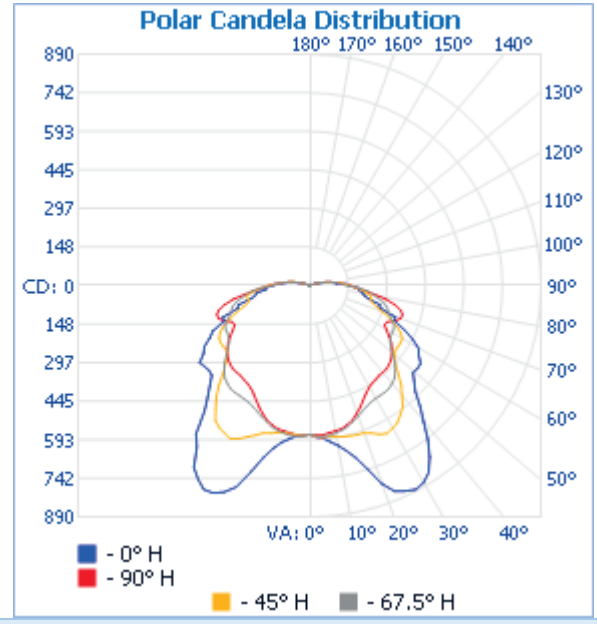
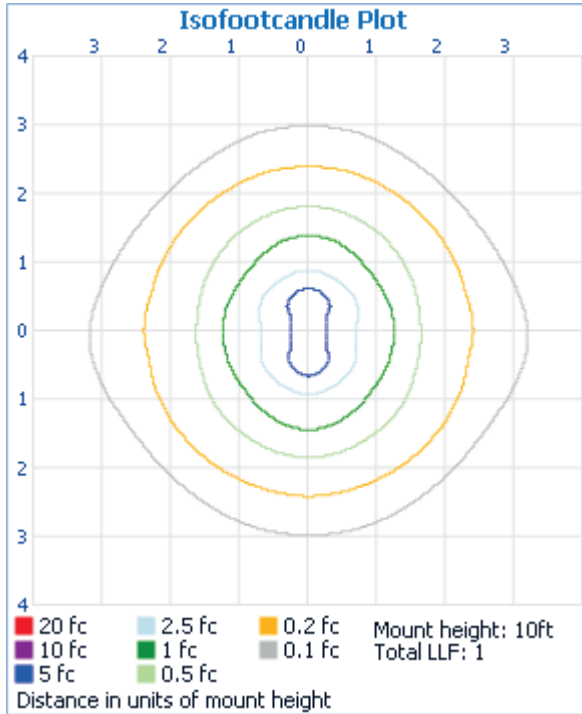
Lumens Per Zone

Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	13.9	0.5%	90-95	73.2	2.7%
5-10	41.8	1.5%	95-100	51.5	1.9%
10-15	70.7	2.6%	100-105	33.3	1.2%
15-20	102.4	3.7%	105-110	17.5	0.6%
20-25	136.7	5.0%	110-115	8.9	0.3%
25-30	166.2	6.0%	115-120	5.2	0.2%
30-35	186.7	6.8%	120-125	2.8	0.1%
35-40	194.8	7.1%	125-130	1.0	0%
40-45	192.2	7.0%	130-135	0.4	0%
45-50	187.8	6.8%	135-140	0.4	0%
50-55	189.6	6.9%	140-145	0.4	0%
55-60	193.2	7.0%	145-150	0.4	0%
60-65	188.3	6.8%	150-155	0.4	0%
65-70	174.1	6.3%	155-160	0.4	0%
70-75	157.5	5.7%	160-165	0.5	0%
75-80	140.3	5.1%	165-170	0.5	0%
80-85	121.8	4.4%	170-175	0.4	0%
85-90	97.7	3.5%	175-180	0.1	0%

SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ



SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ



Flood Summary				
	Efficiency	Lumens	Horizontal Spread	Vertical Spread
Field (10%):	96.8%	2,665.6	n/a	195.4
Beam (50%):	50.1%	1,380.3	82.1	124.6
Total:	100%	2,753.1		

SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ

Intensity (Candlepower)

Candela Table - Type C	
	0 5 15 25 35 45 55 60 62.5 65 67.5 70 72.5 75 77.5 80 82.5 85 87.5 90 95 105 115 125 135 145 155 165 175 180
0	573 573
2.5	583 585 584 584 584 583 581 580 579 579 579 578 578 578 577 577 576 576 576 576 575 575 576 576 577 577 577 578 577 577 576
5	589 589 588 588 589 588 585 583 583 582 581 580 580 579 578 578 577 576 576 576 576 576 576 577 576 576 577 578 579 580
7.5	606 607 604 600 591 584 584 584 584 583 582 580 578 577 576 575 574 573 572 571 571 570 572 574 574 578 583 586 591 594
10	624 626 621 613 600 590 581 577 578 577 576 576 575 573 572 570 570 570 569 568 568 564 569 571 574 581 591 599 606 611
12.5	649 653 642 626 610 596 580 575 574 572 570 569 567 565 564 562 562 563 564 564 562 558 566 569 579 592 607 623 634 639
15	685 690 673 648 625 597 579 568 564 561 562 562 559 556 553 552 552 553 553 554 553 554 560 571 587 605 629 658 673 683
17.5	739 745 719 677 635 602 572 562 556 551 548 549 548 545 542 539 538 540 541 544 541 548 556 574 594 630 666 710 735 750
20	810 817 783 721 658 603 567 553 548 543 538 534 533 529 526 523 523 523 523 525 526 537 548 572 612 660 719 776 809 823
22.5	856 862 825 766 688 614 565 545 538 533 524 518 517 515 510 506 505 502 503 507 505 521 544 576 629 697 763 814 853 860
25	871 874 837 777 713 630 566 544 531 522 515 508 501 500 495 489 488 487 483 486 488 507 535 586 649 716 771 839 862 880
27.5	884 882 844 776 704 641 568 543 529 516 506 498 488 484 482 472 470 471 468 468 473 495 532 591 663 717 793 841 878 883
30	875 867 826 765 702 635 571 543 529 514 503 492 482 474 466 462 457 456 454 454 461 486 534 595 655 725 762 822 848 859
32.5	852 840 802 744 686 626 573 542 526 516 502 490 478 469 460 454 449 445 446 446 453 482 535 597 648 688 753 789 821 829
35	805 788 755 711 658 608 566 540 526 513 501 488 478 468 458 450 444 441 439 441 450 482 530 583 632 666 698 740 764 756
37.5	747 731 704 661 620 588 551 532 522 510 500 486 474 465 459 450 443 439 438 436 446 480 524 565 594 618 648 687 713 718
40	682 667 645 612 576 552 535 521 514 503 492 483 474 465 456 448 443 437 436 436 443 476 513 545 559 565 593 614 637 629
42.5	629 617 592 560 532 521 512 501 495 490 483 475 467 460 452 445 441 437 435 435 440 467 496 514 516 517 526 567 579 581
45	574 571 554 520 498 484 481 476 474 471 465 460 456 450 446 439 439 434 432 431 434 457 472 471 469 469 493 521 538 543
47.5	545 541 530 500 466 447 448 449 448 446 445 440 440 437 432 432 428 428 425 424 426 440 443 435 438 442 470 494 509 510
50	519 521 509 485 451 427 419 422 419 417 419 420 418 418 417 417 418 414 414 413 414 420 415 406 416 430 456 491 497 506
52.5	523 525 510 477 447 414 400 393 395 395 396 397 398 399 399 402 401 401 403 399 400 399 390 387 405 430 461 492 503 510
55	521 525 506 474 445 413 389 380 378 379 378 377 378 379 382 383 384 386 386 384 380 379 374 379 406 433 467 494 509 516
57.5	498 499 483 464 438 412 392 380 374 372 369 368 365 363 365 362 365 364 364 362 360 363 370 385 407 434 462 481 485 484
60	484 480 461 437 422 411 395 384 377 372 365 362 356 352 348 344 344 342 342 341 341 354 374 386 402 422 438 457 470 468
62.5	447 440 425 413 401 395 389 384 376 371 364 358 352 346 339 334 332 330 327 325 329 347 369 376 388 398 414 425 432 432
65	402 394 389 378 376 369 370 366 365 359 358 352 348 343 336 333 330 329 329 329 336 341 355 358 365 372 379 392 406 410

	0	5	15	25	35	45	55	60	62.5	65	67.5	70	72.5	75	77.5	80	82.5	85	87.5	90	95	105	115	125	135	145	155	165	175	180	
67.5	352	348	339	338	340	338	343	343	340	343	342	343	342	341	338	339	343	348	351	352	352	335	334	335	334	339	342	352	355	356	
70	351	343	333	309	303	302	306	314	318	321	325	333	339	344	350	355	360	368	371	371	367	332	314	302	299	298	305	334	352	356	
72.5	283	282	278	285	277	270	279	290	297	304	315	327	339	347	353	361	368	375	377	375	365	332	298	273	266	273	287	298	296	291	
75	279	276	275	254	253	248	259	277	287	297	308	320	329	338	343	350	356	360	363	363	350	322	286	255	243	252	257	275	286	284	
77.5	231	231	239	241	238	241	254	268	274	281	289	296	302	310	317	324	330	336	338	334	323	298	273	253	241	238	237	237	236	231	
80	213	215	211	214	228	240	246	253	257	261	265	269	272	277	285	289	294	301	300	298	285	269	255	254	249	231	214	215	212	212	
82.5	203	197	212	210	207	223	236	240	243	245	243	243	243	245	248	252	254	260	256	252	242	239	238	244	233	216	214	214	207	204	
85	192	168	179	184	195	202	214	217	221	223	223	220	218	216	216	213	213	215	212	208	206	212	218	220	210	194	185	177	176	170	
87.5	188	186	190	181	174	180	177	178	182	184	187	187	185	184	184	182	182	182	181	179	177	187	187	187	184	169	171	170	172	172	
90	153	151	150	156	164	159	151	148	147	147	146	148	147	149	151	154	155	158	160	160	158	154	151	155	159	152	155	149	145	140	
92.5	144	139	139	136	134	138	133	128	127	126	125	126	127	129	131	132	134	137	137	137	139	130	130	132	132	132	138	140	140	138	
95	104	102	105	108	115	121	115	111	110	110	111	112	112	114	117	117	118	118	117	116	114	113	111	114	116	114	113	110	114	108	
97.5	91	90	88	88	92	97	99	99	99	99	99	99	99	100	100	100	99	98	96	96	96	96	97	97	97	92	92	91	90	89	
100	71	69	71	72	77	78	81	81	81	82	83	83	84	84	83	82	83	83	83	82	82	79	79	80	80	77	77	77	75	72	
102.5	56	54	55	56	60	62	62	64	64	65	66	66	66	66	66	66	66	66	66	66	66	65	64	65	65	64	64	63	60	58	
105	38	37	38	39	43	45	46	46	46	46	47	47	48	49	49	50	50	50	50	50	51	50	50	51	50	48	46	44	44	42	
107.5	29	29	28	28	31	30	31	31	32	32	32	32	33	33	34	35	35	35	35	35	36	36	36	35	35	33	32	32	32	31	
110	23	22	22	22	22	22	21	21	22	22	21	21	22	22	22	22	22	23	23	23	23	24	25	25	25	25	24	24	24	24	
112.5	18	17	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	17	18	18	19	18	19	19	19	
115	14	13	13	13	13	12	12	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	14	14	14	14	14	14	15	15	
117.5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	11	11	
120	8	8	7	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9	9	8	9	8	
122.5	6	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	7	6	7	6	6	6	6	
125	4	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	
127.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	2	
130	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
132.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
135	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
137.5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
140	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
142.5	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
145	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1
147.5	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1

	0	5	15	25	35	45	55	60	62.5	65	67.5	70	72.5	75	77.5	80	82.5	85	87.5	90	95	105	115	125	135	145	155	165	175	180	
150	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
152.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
155	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
157.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
160	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2
162.5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
165	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
167.5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
170	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5
172.5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
175	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
177.5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
180	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	0

SPECTRUM LIGHTING HMI1707LED-42W-5K-EX/SM/BZ

Color Spatial Uniformity: Note all deviations from average values < 0.006 per Energy Star Requirements for Integral LED Lamps, Version 1.2, 7C.

Horizontal	Vertical	Average Weighted u', v'		Σu'v'
		0.213	0.490	
		Spatial u', v'		
90	0	0.213	0.494	0.004
90	10	0.213	0.492	0.002
90	20	0.213	0.492	0.002
90	30	0.213	0.490	0.000
90	40	0.213	0.489	0.000
90	50	0.213	0.489	0.001
90	60	0.213	0.489	0.001
90	70	0.213	0.489	0.001
90	80	0.213	0.489	0.001
90	90	0.213	0.489	0.001
0	0	0.214	0.495	0.005
0	10	0.214	0.492	0.003
0	20	0.212	0.490	0.001
0	30	0.212	0.489	0.001
0	40	0.213	0.488	0.001
0	50	0.213	0.488	0.002
0	60	0.213	0.489	0.001
0	70	0.213	0.489	0.000
0	80	0.213	0.489	0.001
0	90	0.212	0.489	0.001

