iPAR3827160

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1342 S. Powerline Rd
Deerfield Beach, FL 33442
Tel: 1-888-778-9864 (Customer Service)
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iPAR-38™

LED Par 38 Intelligent Replacement Bulb
WITH **POWERBAND**™ TECHNOLOGY

MSi

Features

3 color temperatures 3 beam spreads
POWERBAND™ variable wattage
PIC DATA PRO™ intelligent communication
Fully Dimmable
CREE inside
5 year warranty
Cypress Power PSoC® technology
Custom Optics
Proprietary CrimpFin™ heat sink
50,000 hour life
UL listed & FCC compliant
Lighting Facts Official Partner
Light weight design
Managed Drive Current

Technical Specifications

Watts: 10W - 12W - 16W
Lumen Output: 550 - 650 - 800
Power Factor: Greater than 95
Lamp Voltage: 120Volts

CBCP	10W	12W	16W
10.0°	14,500+	16,500+	19,500+
16.0°	5,750+	6,750+	8,000+
22.5°	3,900+	4,500+	5,300+

Color Temp: 2700K, 3000K, 4500K
Beam Angle: 10.0° 16.0° 22.5°
CRI: Greater than 81
Life: 50,000 hours
Dimmable: YES
Warranty: Five (5) years
Approvals: UL, ROHS, FCC
Bulb Type: Par 38

iPAR3827160
Power Setting #1:
10W

MSISSL

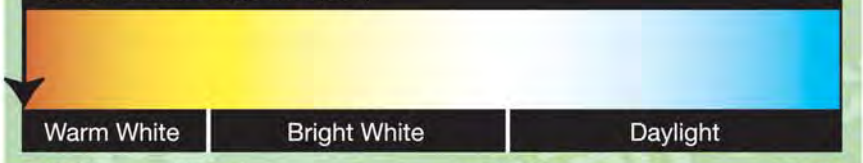
lighting facts[CM]

A Program of the U.S. DOE

Light Output (Lumens)	**581**
Watts	**10**
Lumens per Watt (Efficacy)	**55**

Color Accuracy
Color Rendering Index (CRI) **81**

Light Color
Correlated Color Temperature (CCT) **2700 (Warm White)**



Warm White | Bright White | Daylight

2700K 3000K 4500K 6500K

All results are according to IESNA LM-79-2008: *Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.* The U.S. Department of Energy (DOE) verifies product test data and results.

Visit www.lightingfacts.com for the *Label Reference Guide*.

Registration Number: A3TX-NAH17C

Model Number: iPAR3827160(10)

Type: Replacement lamps

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iPAR3827160
Power Setting #2:
12W

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Light Output (Lumens)	**663**
Watts	**12**
Lumens per Watt (Efficacy)	**53**
Color Accuracy Color Rendering Index (CRI)	**81**

Light Color — **2700 (Warm White)**

Correlated Color Temperature (CCT)

Warm White	Bright White	Daylight
2700K 3000K	4500K	6500K

All results are according to IESNA LM-79-2008: *Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.* The U.S. Department of Energy (DOE) verifies product test data and results.

Visit www.lightingfacts.com for the *Label Reference Guide.*

Registration Number: A3TX-QF6KMX

Model Number: iPAR3827160(12)

Type: Replacement lamps

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iPAR3827160
Power Setting #3:
16W

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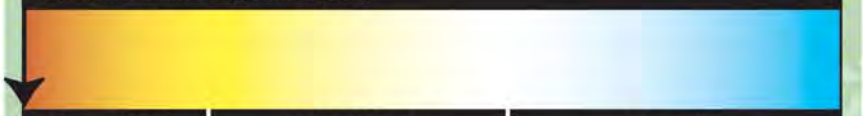
lighting facts[CM]

A Program of the U.S. DOE

Light Output (Lumens)	**789**
Watts	**16**
Lumens per Watt (Efficacy)	**48**

Color Accuracy
Color Rendering Index (CRI) **81**

Light Color
Correlated Color Temperature (CCT) **2700 (Warm White)**



Warm White | Bright White | Daylight

2700K 3000K 4500K 6500K

All results are according to IESNA LM-79-2008: *Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.* The U.S. Department of Energy (DOE) verifies product test data and results.

Visit www.lightingfacts.com for the *Label Reference Guide*.

Registration Number: A3TX-11TAVR

Model Number: iPAR3827160(16)

Type: Replacement lamps

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UL
Certification

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ONLINE CERTIFICATIONS DIRECTORY

OOLV.E327648
Lamps, Self-ballasted, Light-emitting-diode Type

Page Bottom

Lamps, Self-ballasted, Light-emitting-diode Type

See General Information for Lamps, Self-ballasted, Light-emitting-diode Type

MSI L L C
1342 S POWERLINE RD
DEERFIELD BEACH, FL 33442 USA

E327648

LED lamp, for 120 V ac, medium (E26) base, LED iPAR38xxxx. Where XXXX denotes Color Temperature and reflector angle.

Last Updated on 2010-01-30

Questions? Notice of Disclaimer Page Top

ONLINE CERTIFICATIONS DIRECTORY

OOLV7.E327648
Lamps, Self-ballasted, Light-emitting-diode Type Certified for Canada

Page Bottom

Lamps, Self-ballasted, Light-emitting-diode Type Certified for Canada

See General Information for Lamps, Self-ballasted, Light-emitting-diode Type Certified for Canada

MSI L L C E327648
1342 S POWERLINE RD
DEERFIELD BEACH, FL 33442 USA

LED lamp, for 120 V ac, medium (E26) base, LED iPAR38xxxx. Where XXXX denotes Color Temperature and reflector angle.

Last Updated on 2010-01-30

Questions? Notice of Disclaimer Page Top

SETTING #1
10W
LM-79

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LTL LUMINAIRE TESTING LABORATORY, INC.

SUSTAINING MEMBER of the IESNA

905 Harrison Street · Allentown, PA 18103 · 610-770-1044 · Fax 610-770-8912 · www.LuminaireTesting.com

LTL Number: 17254 Date: 11-19-2009

Prepared For: MSI, LLC.

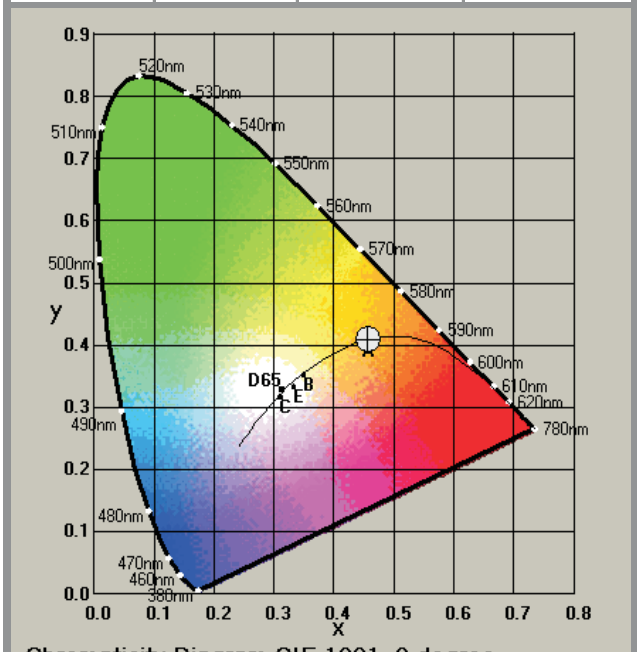
Catalog Number: I-PAR38 2700K 16 Degree (#1 Setting)

Lamp: One VBU PAR38 LED Replacement Lamp with 9 White LEDs with clear plastic optics below each.

LED Power Supply: Integral

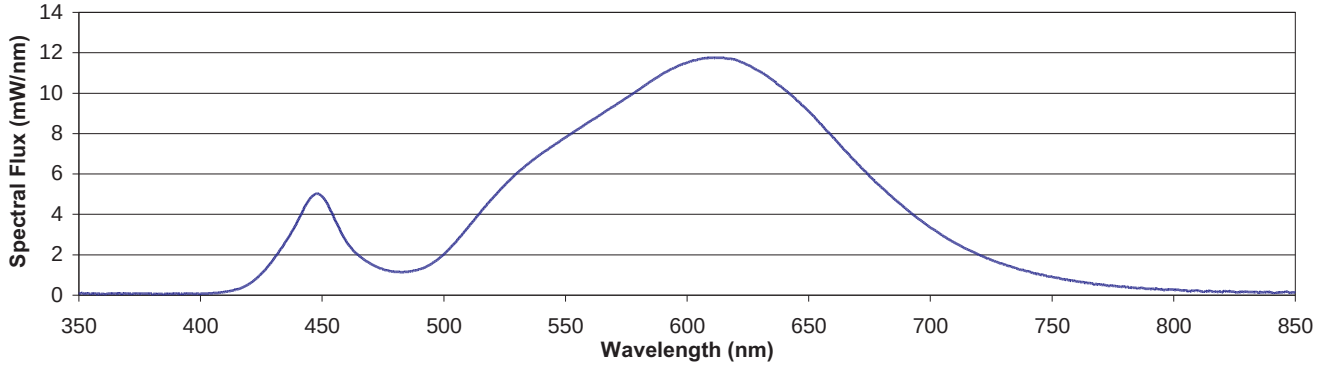
System Efficacy: 55.4 Lumens/Watt

System Input Voltage	System Current	System Watts	Power Factor
120.0VAC	0.0917A	10.50W	0.954
Radiant Flux mW	**Luminous Flux lumen**	**Corr.Color Temperature K**	**Color Rend. Index Ra**
1918.732	581.593	2747	80.2
Chroma x	**Chroma y**	**Chroma u**	**Chroma v**
0.4559	0.4095	0.2604	0.3509



Chromaticity Diagram CIE 1931, 2 degree

Wavelength in nm	Spectral Flux in mW/nm	Wavelength in nm	Spectral Flux in mW/nm
350	0.0618	610	11.7590
360	0.0619	620	11.6520
370	0.0745	630	11.0680
380	0.0571	640	10.1850
390	0.0714	650	9.1069
400	0.0770	660	7.8163
410	0.1572	670	6.5134
420	0.5604	680	5.3238
430	1.7779	690	4.2738
440	3.6907	700	3.3464
450	4.8918	710	2.6005
460	2.6455	720	2.0018
470	1.5525	730	1.5334
480	1.1587	740	1.1728
490	1.2778	750	0.9013
500	2.0266	760	0.6897
510	3.3603	770	0.5176
520	4.7983	780	0.4146
530	6.0377	790	0.3222
540	6.9999	800	0.2838
550	7.8111	810	0.2058
560	8.6018	820	0.1638
570	9.3660	830	0.1677
580	10.1600	840	0.1292
590	10.9670	850	0.1229
600	11.5120		



TESTING WAS PERFORMED IN ACCORDANCE WITH IES LM-79-08. Approved By: MG

LTL LUMINAIRE TESTING LABORATORY, INC.

SUSTAINING MEMBER of the IESNA

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LTL NUMBER: 17236 DATE: 11-19-2009
PREPARED FOR: MSI, LLC.
CATALOG NUMBER: I-PAR 38 2700K 16 DEGREE (#1 SETTING)
LUMINAIRE: EXTRUDED ALUMINUM AND PLASTIC HOUSING, SEMI-SPECULAR UPPER REFLECTOR, CLEAR AND PATTERNED PLASTIC ENCLOSURE.
LAMP: ONE PAR 38 LED REPLACEMENT LAMP CONTAINING NINE WHITE LEDS WITH CLEAR PLASTIC OPTICS BELOW EACH LED.
LED POWER SUPPLY: INTEGRAL
ELECTRICAL VALUES: 120.0VAC, 0.0918A, 10.51W, PF=0.954
NOTE: THIS TEST WAS PERFORMED USING THE CALIBRATED PHOTODETECTOR METHOD OF ABSOLUTE PHOTOMETRY.*

Candela Distribution

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	Flux
0	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	
5	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	274.4
15	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	131.7
25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	48.9
35	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	23.8
45	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	21.7
55	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	20.7
65	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	18.7
75	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16.9
85	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.9
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Zonal Lumen Summary

Zone	Lumens	% of Lamp	% of Luminaire
0-30	455.0	N/A	81.0%
0-40	478.8	N/A	85.2%
0-60	521.2	N/A	92.8%
0-90	561.7	N/A	100.0%
90-180	0.0	N/A	0.0%
0-180	561.7	N/A	100.0%

Total lumen Output 561.7 Lumens
Luminaire efficacy: 53.4 Lumens per Watt
CIE Type: Direct
Spacing Criterion: 0.21

Luminaire

Approved By: MG

*DATA WAS ACQUIRED USING THE CALIBRATED PHOTODETECTOR METHOD OF ABSOLUTE PHOTOMETRY. A UDT MODEL #211 PHOTODETECTOR AND UDT MODEL #S370 OPTOMETER COMBINATION WERE USED AS A STANDARD. A SPECTRAL MISMATCH CORRECTION FACTOR WAS EMPLOYED BASED ON THE SPECTRAL RESPONSIVITY OF THE PHOTODETECTOR AND THE SPECTRAL POWER DISTRIBUTION OF THE TEST SUBJECT.

TESTING WAS PERFORMED IN ACCORDANCE WITH IES LM-79-08.
TEST ANGULAR INCREMENTS AND REPORT FORMATTING WAS BASED ON IES LM-41-98 AND LM-46-04.

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Candela Tabulation (5 degree Vertical Increments)

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057	6057
5	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716	3716
10	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260
15	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416
20	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211
25	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
30	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
35	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
40	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
45	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
50	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
55	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
60	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
65	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
70	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
75	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
80	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
85	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Zonal Lumen Tabulation (5 degree zones)

Zone	Lumens		Zone	Lumens		Zone	Lumens		Zone	Lumens
0-5	116.3		45-50	10.8		90-95	0.0		135-140	0.0
5-10	158.1		50-55	10.5		95-100	0.0		140-145	0.0
10-15	83.3		55-60	10.2		100-105	0.0		145-150	0.0
15-20	48.4		60-65	9.6		105-110	0.0		150-155	0.0
20-25	31.2		65-70	9.2		110-115	0.0		155-160	0.0
25-30	17.8		70-75	9.0		115-120	0.0		160-165	0.0
30-35	12.5		75-80	7.8		120-125	0.0		165-170	0.0
35-40	11.3		80-85	4.4		125-130	0.0		170-175	0.0
40-45	10.9		85-90	0.5		130-135	0.0		175-180	0.0

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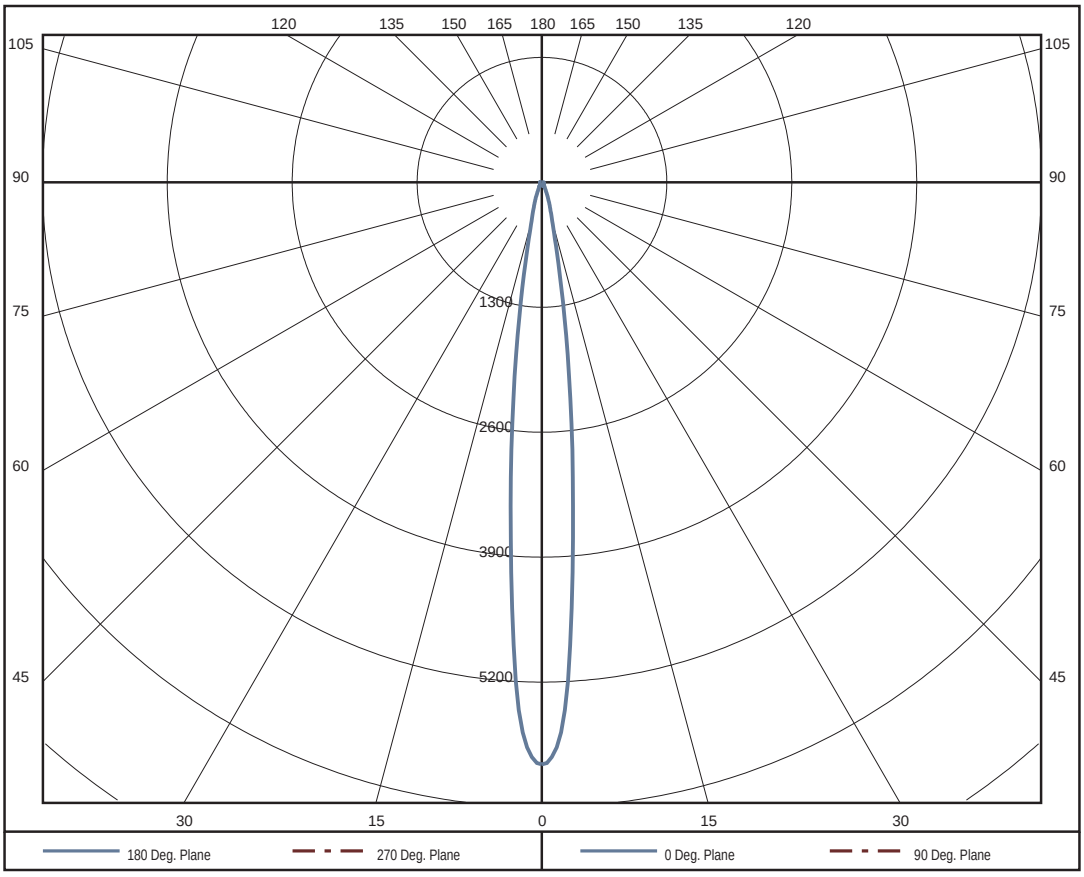
Utilization of Lumens - Zonal Cavity Method												
Effective Floor Cavity Reflectance 20%												
Ceiling Cavity Reflectance	90				80				70			
Wall Reflectance	70	50	30	10	70	50	30	10	70	50	30	10
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **											
0	685	685	685	685	668.7	668.7	668.7	668.7	653.2	653.2	653.2	653.2
1	653.1	636.1	621	607.4	638.6	623.4	609.8	597.6	624.8	611.3	599.1	588.1
2	624.6	596.4	573.4	554.2	611.7	586.5	565.6	548	599.6	576.9	558	541.9
3	599.7	564.6	537.8	516.7	588.4	556.6	532.1	512.5	577.7	549	526.5	508.4
4	577.9	538.6	510.3	488.9	568	532.2	506	486	558.6	526.1	501.9	483.2
5	558.7	516.9	488.3	467.4	550	511.8	485.1	465.4	541.8	506.8	482	463.4
6	541.6	498.6	470.3	450.3	533.9	494.4	467.8	448.8	526.7	490.3	465.4	447.3
7	526.2	482.8	455.2	436.2	519.5	479.3	453.3	435.1	513.1	475.9	451.4	434
8	512.4	469.1	442.4	424.3	506.4	466.1	440.8	423.4	500.7	463.3	439.3	422.6
9	499.8	456.9	431.2	414	494.5	454.5	429.9	413.4	489.4	452.1	428.7	412.8
10	488.3	446.1	421.3	405	483.6	444	420.3	404.5	479.1	442	419.3	404.1

Ceiling Cavity Reflectance	50				30			10			0
Wall Reflectance	70	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **										
0	624.1	624.1	624.1	624.1	597.6	597.6	597.6	573.2	573.2	573.2	561.7
1	599.2	588.6	578.9	570	567.8	560.1	553.1	548.6	542.6	537.1	527.2
2	577.1	559	543.5	530.1	542.4	529.9	518.8	527.1	517.1	508.1	499.2
3	558	534.7	515.9	500.4	521.4	505.8	492.7	509.1	496.3	485.3	477.1
4	541.4	514.5	493.9	477.6	503.8	486.4	472.2	493.8	479.1	467	459.4
5	526.7	497.4	475.9	459.4	488.7	470.1	455.5	480.5	464.6	451.8	444.7
6	513.4	482.6	460.7	444.5	475.4	456.2	441.6	468.6	451.9	438.9	432.3
7	501.3	469.5	447.7	431.9	463.5	444.2	429.8	457.9	440.8	427.7	421.5
8	490.3	457.9	436.4	421	452.9	433.5	419.4	448.1	430.8	417.9	412
9	480.2	447.5	426.4	411.5	443.2	424.1	410.3	439.2	421.8	409.1	403.5
10	470.8	438.1	417.4	403.1	434.4	415.5	402.2	431	413.7	401.2	395.9

Average Luminance Table (cd/m²)

	0	45	90
0	1131696	1131696	1131696
45	7363	7363	7363
55	7542	7542	7542
65	8191	8191	8191
75	11818	11818	11818
85	8089	8089	8089

THIS TEST WAS CONDUCTED USING PHOTOMETRY TECHNIQUES ACCORDING TO STANDARD IES PROCEDURES. THE USER MUST THEREFORE USE CAUTION IN THE FOLLOWING SITUATIONS: 1) THIS TEST WAS PERFORMED USING A SPECIFIC BALLAST/LAMP COMBINATION. EXTRAPOLATION OF THESE DATA FOR OTHER BALLAST/LAMP COMBINATIONS MAY PRODUCE ERRONEOUS RESULTS. 2) THIS TEST WAS CONDUCTED IN A CONTROLLED LABORATORY ENVIRONMENT WHERE THE AMBIENT TEMPERATURE WAS HELD AT 25°C ±1°C. FIELD PERFORMANCE MAY DIFFER PARTICULARLY IN REGARDS TO CHANGE IN LUMINOUS OUTPUT AS A RESULT OF DIFFERENCE IN AMBIENT TEMPERATURE AND METHOD OF MOUNTING THE LUMINAIRE.


120
135
150
165
180
165
150
135
120
105
90
75
60
45
1300
2600
3900
5200
30
15
0
15
30
180 Deg. Plane
270 Deg. Plane
0 Deg. Plane
90 Deg. Plane

SETTING #2
12W
LM-79

1342 S. Powerline Rd
Deerfield Beach, FL 33442
Tel: 1-888-778-9864 (Customer Service)
954-363-1085 (Local)
954-971-3725 (Fax)

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SUSTAINING MEMBER of the IESNA
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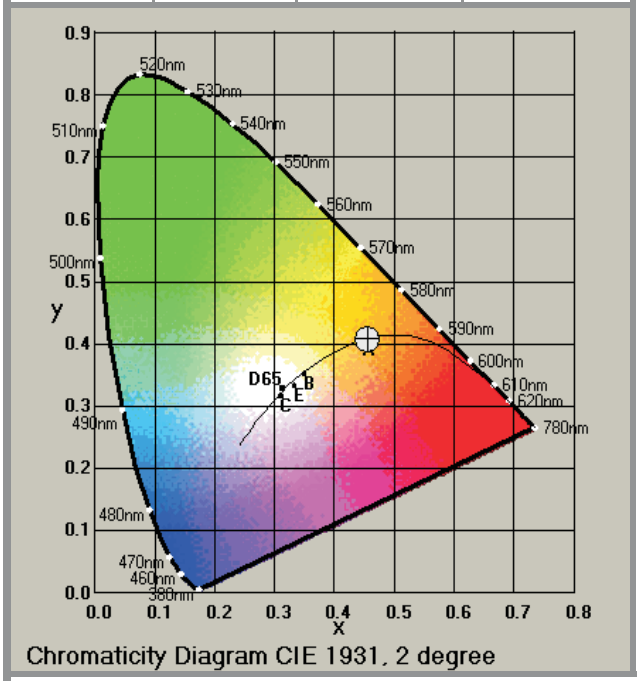
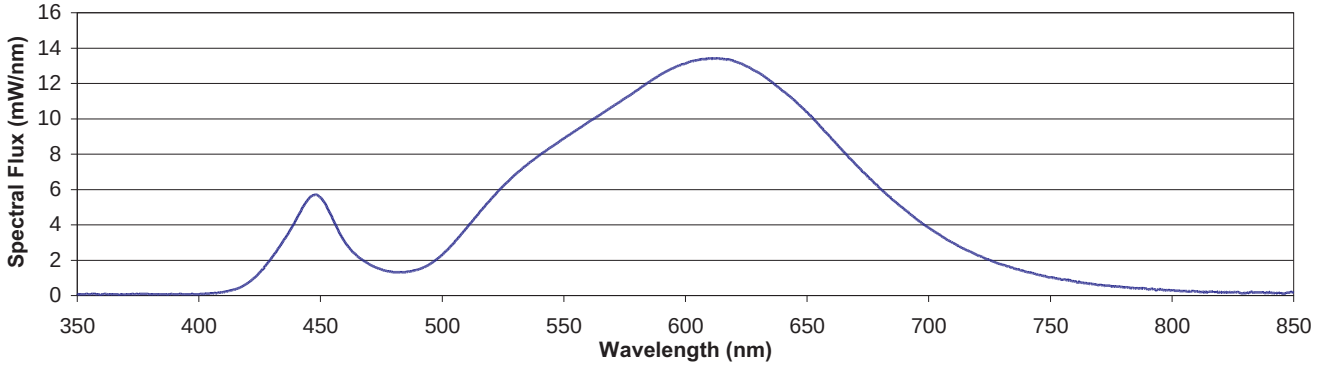
LTL Number: 17255 Date: 11-19-2009
Prepared For: MSI, LLC.
Catalog Number: I-PAR38 2700K 16 Degree (#2 Setting)
Lamp: One VBU PAR38 LED Replacement Lamp with 9 White LEDs with clear plastic optics below each.
LED Power Supply: Integral
System Efficacy: 52.9 Lumens/Watt

System Input Voltage	System Current	System Watts	Power Factor
120.0VAC	0.1079A	12.52W	0.967
Radiant Flux mW	**Luminous Flux lumen**	**Corr.Color Temperature K**	**Color Rend. Index Ra**
2189.163	662.602	2745	80.2
Chroma x	**Chroma y**	**Chroma u**	**Chroma v**
0.4555	0.4086	0.2606	0.3506



Chromaticity Diagram CIE 1931, 2 degree

Wavelength in nm	Spectral Flux in mW/nm	Wavelength in nm	Spectral Flux in mW/nm
350	0.1029	610	13.4060
360	0.0791	620	13.2620
370	0.0576	630	12.6150
380	0.0768	640	11.5730
390	0.0724	650	10.3600
400	0.0775	660	8.8891
410	0.1886	670	7.4141
420	0.6946	680	6.0570
430	2.1561	690	4.8821
440	4.2977	700	3.8326
450	5.5509	710	2.9719
460	3.0327	720	2.2741
470	1.7799	730	1.7657
480	1.3237	740	1.3404
490	1.4642	750	1.0343
500	2.3100	760	0.7879
510	3.8162	770	0.5865
520	5.4392	780	0.4543
530	6.8450	790	0.3506
540	7.9388	800	0.3225
550	8.8892	810	0.2350
560	9.8044	820	0.1589
570	10.6930	830	0.1486
580	11.6050	840	0.1827
590	12.5260	850	0.1404
600	13.1300		



TESTING WAS PERFORMED IN ACCORDANCE WITH IES LM-79-08. Approved By: MG

LTL LUMINAIRE TESTING LABORATORY, INC.

SUSTAINING MEMBER of the IESNA

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LTL NUMBER: 17237 DATE: 11-19-2009
PREPARED FOR: MSI, LLC.
CATALOG NUMBER: I-PAR 38 2700K 16 DEGREE (#2 SETTING)
LUMINAIRE: EXTRUDED ALUMINUM AND PLASTIC HOUSING, SEMI-SPECULAR UPPER REFLECTOR, CLEAR AND PATTERNED PLASTIC ENCLOSURE.
LAMP: ONE PAR 38 LED REPLACEMENT LAMP CONTAINING NINE WHITE LEDS WITH CLEAR PLASTIC OPTICS BELOW EACH LED.
LED POWER SUPPLY: INTEGRAL
ELECTRICAL VALUES: 120.0VAC, 0.1080A, 12.52W, PF=0.966
NOTE: THIS TEST WAS PERFORMED USING THE CALIBRATED PHOTODETECTOR METHOD OF ABSOLUTE PHOTOMETRY.*

Candela Distribution

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	Flux
0	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	
5	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	313.7
15	477	477	477	477	477	477	477	477	477	477	477	477	477	477	477	477	150.8
25	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	55.9
35	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	27.1
45	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	24.7
55	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	23.6
65	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21.3
75	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19.2
85	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5.6
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Zonal Lumen Summary

Zone	Lumens	% of Lamp	% of Luminaire
0-30	520.4	N/A	81.1%
0-40	547.5	N/A	85.3%
0-60	595.7	N/A	92.8%
0-90	641.7	N/A	100.0%
90-180	0.0	N/A	0.0%
0-180	641.7	N/A	100.0%

Total lumen Output 641.7 Lumens
Luminaire efficacy: 51.3 Lumens per Watt
CIE Type: Direct
Spacing Criterion: 0.21

Luminaire

Approved By: MG

*DATA WAS ACQUIRED USING THE CALIBRATED PHOTODETECTOR METHOD OF ABSOLUTE PHOTOMETRY. A UDT MODEL #211 PHOTODETECTOR AND UDT MODEL #S370 OPTOMETER COMBINATION WERE USED AS A STANDARD. A SPECTRAL MISMATCH CORRECTION FACTOR WAS EMPLOYED BASED ON THE SPECTRAL RESPONSIVITY OF THE PHOTODETECTOR AND THE SPECTRAL POWER DISTRIBUTION OF THE TEST SUBJECT.

TESTING WAS PERFORMED IN ACCORDANCE WITH IES LM-79-08.
TEST ANGULAR INCREMENTS AND REPORT FORMATTING WAS BASED ON IES LM-41-98 AND LM-46-04.

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Candela Tabulation (5 degree Vertical Increments)

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893	6893
5	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249	4249
10	1443	1443	1443	1443	1443	1443	1443	1443	1443	1443	1443	1443	1443	1443	1443	1443
15	477	477	477	477	477	477	477	477	477	477	477	477	477	477	477	477
20	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242
25	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114
30	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
35	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
40	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
45	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
50	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
55	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
60	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
65	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
70	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
75	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
80	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
85	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Zonal Lumen Tabulation (5 degree zones)

Zone	Lumens		Zone	Lumens		Zone	Lumens		Zone	Lumens
0-5	132.9		45-50	12.3		90-95	0.0		135-140	0.0
5-10	180.9		50-55	12.0		95-100	0.0		140-145	0.0
10-15	95.4		55-60	11.6		100-105	0.0		145-150	0.0
15-20	55.4		60-65	10.9		105-110	0.0		150-155	0.0
20-25	35.7		65-70	10.4		110-115	0.0		155-160	0.0
25-30	20.2		70-75	10.3		115-120	0.0		160-165	0.0
30-35	14.2		75-80	8.9		120-125	0.0		165-170	0.0
35-40	12.9		80-85	5.0		125-130	0.0		170-175	0.0
40-45	12.4		85-90	0.6		130-135	0.0		175-180	0.0

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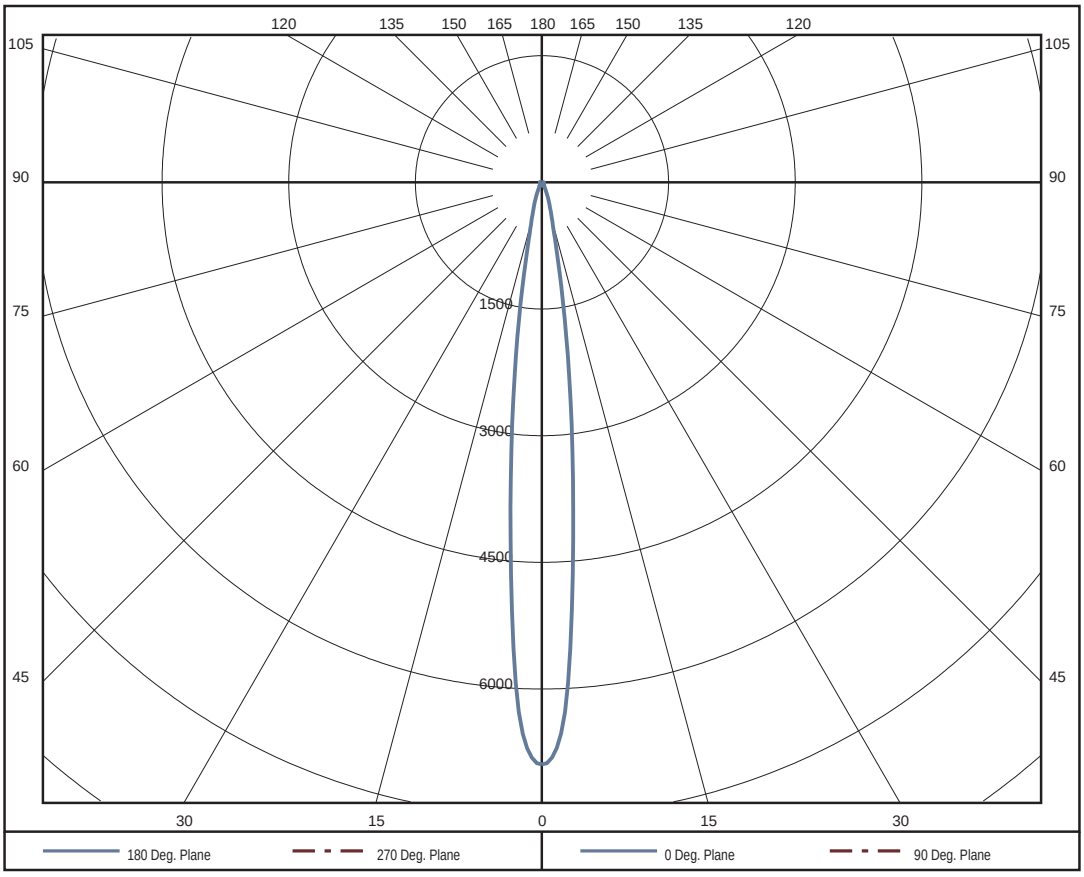
Utilization of Lumens - Zonal Cavity Method												
Effective Floor Cavity Reflectance 20%												
Ceiling Cavity Reflectance	90				80				70			
Wall Reflectance	70	50	30	10	70	50	30	10	70	50	30	10
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **											
0	782.6	782.6	782.6	782.6	764	764	764	764	746.2	746.2	746.2	746.2
1	746.2	726.8	709.6	694.1	729.6	712.3	696.9	682.9	713.9	698.5	684.6	672.1
2	713.7	681.6	655.3	633.5	699	670.2	646.4	626.3	685.1	659.3	637.7	619.3
3	685.3	645.2	614.7	590.7	672.4	636.2	608.2	585.9	660.2	627.5	601.9	581.2
4	660.5	615.6	583.3	558.9	649.1	608.3	578.4	555.6	638.4	601.3	573.7	552.4
5	638.5	590.9	558.2	534.4	628.6	585	554.5	532.1	619.2	579.3	551	529.8
6	619	570	537.7	514.8	610.2	565.1	534.9	513.2	602	560.5	532.1	511.5
7	601.5	552	520.5	498.7	593.7	548	518.3	497.5	586.5	544.1	516.1	496.3
8	585.7	536.2	505.8	485.1	578.8	532.9	504	484.2	572.4	529.7	502.3	483.3
9	571.3	522.4	493	473.4	565.2	519.6	491.6	472.7	559.5	516.9	490.2	472
10	558.2	510	481.8	463.2	552.8	507.6	480.6	462.6	547.7	505.3	479.5	462.1

Ceiling Cavity Reflectance	50				30			10			0
Wall Reflectance	70	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **										
0	713	713	713	713	682.7	682.7	682.7	654.8	654.8	654.8	641.7
1	684.7	672.6	661.5	651.4	648.8	640.1	632	626.8	620.1	613.8	602.4
2	659.5	638.8	621.1	605.9	619.9	605.6	593	602.4	591	580.7	570.5
3	637.7	611.1	589.7	572.1	596	578.2	563.2	581.9	567.3	554.7	545.4
4	618.7	588.1	564.6	546	575.9	556	539.8	564.5	547.7	533.8	525.2
5	601.9	568.6	544.1	525.3	558.6	537.5	520.8	549.3	531.1	516.5	508.5
6	586.8	551.7	526.8	508.2	543.4	521.6	505	535.7	516.7	501.8	494.3
7	573	536.8	511.9	493.8	529.9	507.9	491.4	523.5	504	489	481.9
8	560.5	523.5	499	481.4	517.8	495.7	479.6	512.3	492.6	477.8	471.1
9	548.9	511.7	487.5	470.6	506.8	484.9	469.2	502.1	482.3	467.8	461.4
10	538.2	500.9	477.3	461	496.7	475.1	459.9	492.8	473.1	458.8	452.7

Average Luminance Table (cd/m²)

	0	45	90
0	1287962	1287962	1287962
45	8377	8377	8377
55	8603	8603	8603
65	9337	9337	9337
75	13441	13441	13441
85	9245	9245	9245

THIS TEST WAS CONDUCTED USING PHOTOMETRY TECHNIQUES ACCORDING TO STANDARD IES PROCEDURES. THE USER MUST THEREFORE USE CAUTION IN THE FOLLOWING SITUATIONS: 1) THIS TEST WAS PERFORMED USING A SPECIFIC BALLAST/LAMP COMBINATION. EXTRAPOLATION OF THESE DATA FOR OTHER BALLAST/LAMP COMBINATIONS MAY PRODUCE ERRONEOUS RESULTS. 2) THIS TEST WAS CONDUCTED IN A CONTROLLED LABORATORY ENVIRONMENT WHERE THE AMBIENT TEMPERATURE WAS HELD AT 25°C ±1°C. FIELD PERFORMANCE MAY DIFFER PARTICULARLY IN REGARDS TO CHANGE IN LUMINOUS OUTPUT AS A RESULT OF DIFFERENCE IN AMBIENT TEMPERATURE AND METHOD OF MOUNTING THE LUMINAIRE.


120
135
150
165
180
165
150
135
120
105
90
75
60
45
1500
3000
4500
6000
30
15
0
15
30
180 Deg. Plane
270 Deg. Plane
0 Deg. Plane
90 Deg. Plane

SETTING #3
16W
LM-79

1342 S. Powerline Rd
Deerfield Beach, FL 33442
Tel: 1-888-778-9864 (Customer Service)
954-363-1085 (Local)
954-971-3725 (Fax)

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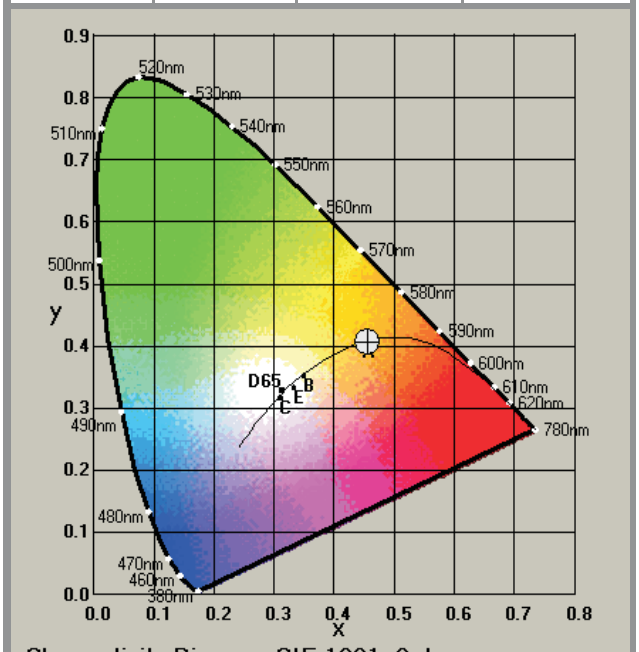
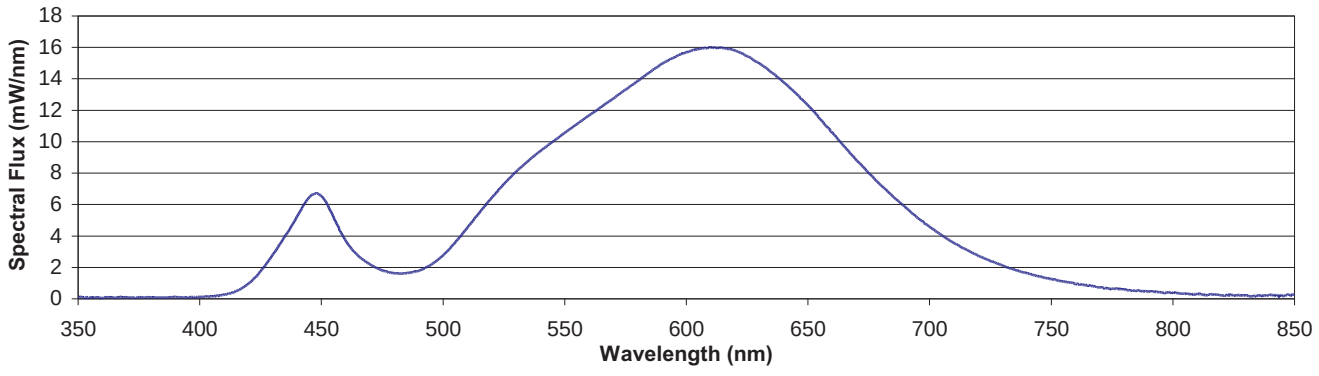
LTL Number: 17256 Date: 11-19-2009
Prepared For: MSI, LLC.
Catalog Number: I-PAR38 2700K 16 Degree (#3 Setting)
Lamp: One VBU PAR38 LED Replacement Lamp with 9 White LEDs with clear plastic optics below each.
LED Power Supply: Integral
System Efficacy: 48.3 Lumens/Watt

System Input Voltage	System Current	System Watts	Power Factor
120.0VAC	0.1391A	16.33W	0.978
Radiant Flux mW	**Luminous Flux lumen**	**Corr.Color Temperature K**	**Color Rend. Index Ra**
2616.686	789.020	2744	80.1
Chroma x	**Chroma y**	**Chroma u**	**Chroma v**
0.4547	0.4071	0.2608	0.3502



Chromaticity Diagram CIE 1931, 2 degree

Wavelength in nm	Spectral Flux in mW/nm	Wavelength in nm	Spectral Flux in mW/nm
350	0.1030	610	15.9960
360	0.0840	620	15.8080
370	0.0881	630	14.9850
380	0.0912	640	13.7780
390	0.1130	650	12.3190
400	0.1183	660	10.5800
410	0.2564	670	8.8232
420	0.9696	680	7.2229
430	2.8004	690	5.8357
440	5.2307	700	4.5874
450	6.5430	710	3.5542
460	3.6991	720	2.7447
470	2.1921	730	2.1204
480	1.6308	740	1.6277
490	1.7843	750	1.2636
500	2.7750	760	0.9443
510	4.5249	770	0.7376
520	6.4243	780	0.5907
530	8.0851	790	0.4477
540	9.4124	800	0.3850
550	10.5650	810	0.3190
560	11.6740	820	0.2283
570	12.7470	830	0.2317
580	13.8620	840	0.2504
590	14.9670	850	0.2571
600	15.6850		



TESTING WAS PERFORMED IN ACCORDANCE WITH IES LM-79-08. Approved By: MG

LTL LUMINAIRE TESTING LABORATORY, INC.

SUSTAINING MEMBER of the IESNA

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LTL NUMBER: 17238 DATE: 11-19-2009
PREPARED FOR: MSI, LLC.
CATALOG NUMBER: I-PAR 38 2700K 16 DEGREE (#3 SETTING)
LUMINAIRE: EXTRUDED ALUMINUM AND PLASTIC HOUSING, SEMI-SPECULAR UPPER REFLECTOR, CLEAR AND PATTERNED PLASTIC ENCLOSURE.
LAMP: ONE PAR 38 LED REPLACEMENT LAMP CONTAINING NINE WHITE LEDS WITH CLEAR PLASTIC OPTICS BELOW EACH LED.
LED POWER SUPPLY: INTEGRAL
ELECTRICAL VALUES: 120.0VAC, 0.1391A, 16.33W, PF=0.978
NOTE: THIS TEST WAS PERFORMED USING THE CALIBRATED PHOTODETECTOR METHOD OF ABSOLUTE PHOTOMETRY.*

Candela Distribution

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	Flux
0	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	
5	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	369.8
15	565	565	565	565	565	565	565	565	565	565	565	565	565	565	565	565	178.1
25	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	66.2
35	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	32.1
45	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	29.4
55	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	28.1
65	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25.3
75	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22.7
85	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6.5
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Zonal Lumen Summary

Zone	Lumens	% of Lamp	% of Luminaire
0-30	614.2	N/A	81.0%
0-40	646.3	N/A	85.2%
0-60	703.7	N/A	92.8%
0-90	758.2	N/A	100.0%
90-180	0.0	N/A	0.0%
0-180	758.2	N/A	100.0%

Total lumen Output 758.2 Lumens
Luminaire efficacy: 46.4 Lumens per Watt
CIE Type: Direct
Spacing Criterion: 0.21

Luminaire

Approved By: MG

*DATA WAS ACQUIRED USING THE CALIBRATED PHOTODETECTOR METHOD OF ABSOLUTE PHOTOMETRY. A UDT MODEL #211 PHOTODETECTOR AND UDT MODEL #S370 OPTOMETER COMBINATION WERE USED AS A STANDARD. A SPECTRAL MISMATCH CORRECTION FACTOR WAS EMPLOYED BASED ON THE SPECTRAL RESPONSIVITY OF THE PHOTODETECTOR AND THE SPECTRAL POWER DISTRIBUTION OF THE TEST SUBJECT.

TESTING WAS PERFORMED IN ACCORDANCE WITH IES LM-79-08.
TEST ANGULAR INCREMENTS AND REPORT FORMATTING WAS BASED ON IES LM-41-98 AND LM-46-04.

LTL LUMINAIRE TESTING LABORATORY, INC.
SUSTAINING MEMBER of the IESNA
905 Harrison Street · Allentown, PA 18103 · 610-770-1044 · Fax 610-770-8912 · www.LuminaireTesting.com

Candela Tabulation (5 degree Vertical Increments)

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174	8174
5	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013	5013
10	1692	1692	1692	1692	1692	1692	1692	1692	1692	1692	1692	1692	1692	1692	1692	1692
15	565	565	565	565	565	565	565	565	565	565	565	565	565	565	565	565
20	288	288	288	288	288	288	288	288	288	288	288	288	288	288	288	288
25	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135
30	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
35	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
40	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
45	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
50	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
55	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
60	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
65	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
70	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
75	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
80	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
85	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Zonal Lumen Tabulation (5 degree zones)

Zone	Lumens		Zone	Lumens		Zone	Lumens		Zone	Lumens
0-5	157.0		45-50	14.6		90-95	0.0		135-140	0.0
5-10	212.9		50-55	14.3		95-100	0.0		140-145	0.0
10-15	112.2		55-60	13.8		100-105	0.0		145-150	0.0
15-20	65.9		60-65	12.9		105-110	0.0		150-155	0.0
20-25	42.4		65-70	12.3		110-115	0.0		155-160	0.0
25-30	23.8		70-75	12.2		115-120	0.0		160-165	0.0
30-35	16.8		75-80	10.5		120-125	0.0		165-170	0.0
35-40	15.3		80-85	5.8		125-130	0.0		170-175	0.0
40-45	14.8		85-90	0.7		130-135	0.0		175-180	0.0

LTL LUMINAIRE TESTING LABORATORY, INC.

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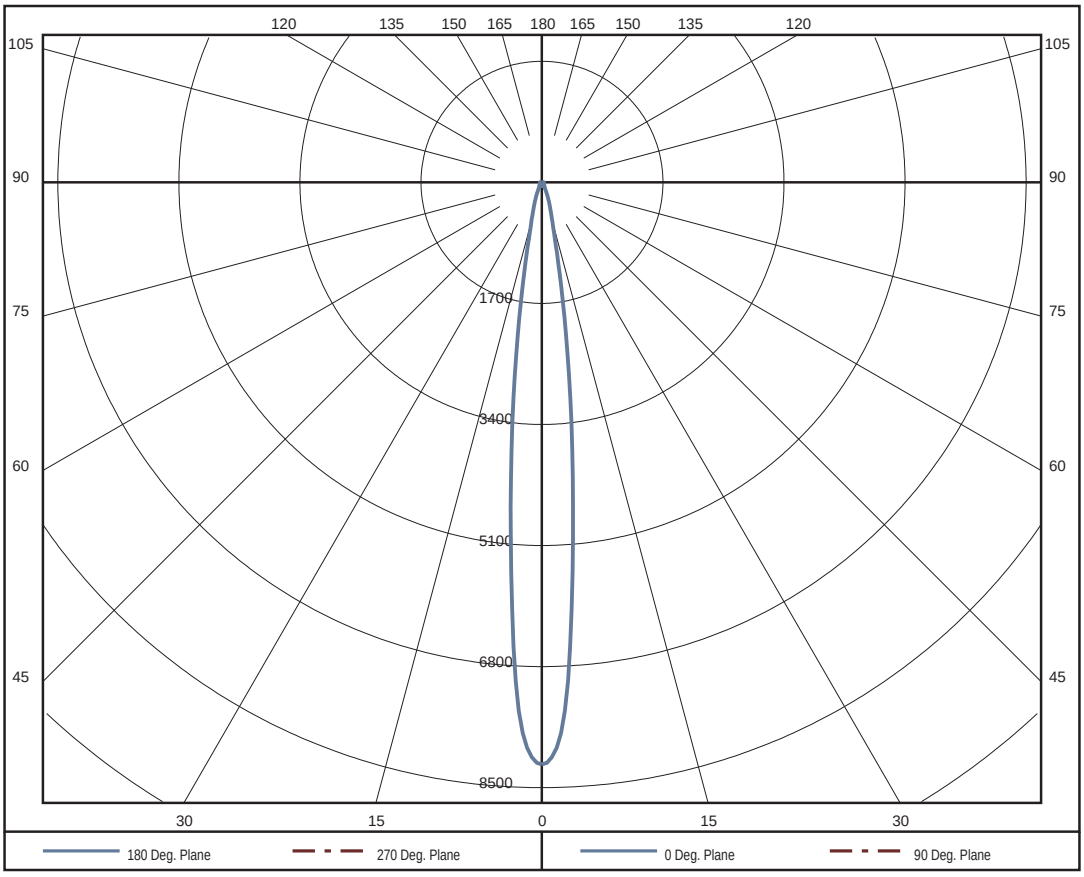
Utilization of Lumens - Zonal Cavity Method												
Effective Floor Cavity Reflectance 20%												
Ceiling Cavity Reflectance	90				80				70			
Wall Reflectance	70	50	30	10	70	50	30	10	70	50	30	10
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **											
0	924.6	924.6	924.6	924.6	902.6	902.6	902.6	902.6	881.6	881.6	881.6	881.6
1	881.5	858.6	838.3	820	861.9	841.5	823.2	806.7	843.4	825.2	808.8	793.9
2	843.1	805.1	774	748.2	825.7	791.6	763.4	739.7	809.3	778.8	753.2	731.5
3	809.4	762.1	726	697.5	794.2	751.4	718.2	691.9	779.8	741.1	710.8	686.3
4	780	727	688.7	659.9	766.6	718.4	683	656	754	710.1	677.4	652.2
5	754.1	697.7	659	630.9	742.3	690.8	654.7	628.1	731.2	684.1	650.5	625.4
6	731	672.9	634.7	607.7	720.6	667.2	631.4	605.7	710.8	661.7	628.2	603.7
7	710.2	651.6	614.4	588.7	701.1	646.9	611.8	587.2	692.5	642.3	609.2	585.7
8	691.5	633	597	572.5	683.4	629.1	594.9	571.4	675.8	625.3	592.9	570.3
9	674.5	616.6	581.9	558.7	667.3	613.3	580.2	557.8	660.5	610.1	578.6	557
10	659	602	568.5	546.5	652.6	599.2	567.2	545.9	646.6	596.4	565.8	545.2

Ceiling Cavity Reflectance	50				30			10			0
Wall Reflectance	70	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **										
0	842.4	842.4	842.4	842.4	806.6	806.6	806.6	773.7	773.7	773.7	758.2
1	808.9	794.6	781.5	769.5	766.4	756.1	746.6	740.5	732.5	725.1	711.7
2	779	754.5	733.6	715.6	732.2	715.3	700.4	711.6	698	685.9	673.8
3	753.2	721.8	696.4	675.5	703.9	682.8	665.1	687.3	669.9	655.1	644.1
4	730.7	694.5	666.7	644.7	680	656.5	637.4	666.6	646.7	630.3	620.1
5	710.8	671.4	642.3	620.1	659.6	634.5	614.9	648.5	627	609.8	600.3
6	692.9	651.3	621.8	599.9	641.6	615.8	596.1	632.5	609.9	592.3	583.4
7	676.6	633.7	604.3	582.8	625.6	599.5	580	617.9	594.8	577.2	568.8
8	661.7	618	588.9	568.2	611.2	585.1	566	604.8	581.4	563.9	555.9
9	648	603.9	575.4	555.3	598.1	572.3	553.7	592.7	569.3	552.1	544.5
10	635.4	591.2	563.2	544	586.2	560.7	542.7	581.6	558.2	541.4	534.2

Average Luminance Table (cd/m²)

	0	45	90
0	1527278	1527278	1527278
45	9997	9997	9997
55	10205	10205	10205
65	11086	11086	11086
75	15988	15988	15988
85	10597	10597	10597

THIS TEST WAS CONDUCTED USING PHOTOMETRY TECHNIQUES ACCORDING TO STANDARD IES PROCEDURES. THE USER MUST THEREFORE USE CAUTION IN THE FOLLOWING SITUATIONS: 1) THIS TEST WAS PERFORMED USING A SPECIFIC BALLAST/LAMP COMBINATION. EXTRAPOLATION OF THESE DATA FOR OTHER BALLAST/LAMP COMBINATIONS MAY PRODUCE ERRONEOUS RESULTS. 2) THIS TEST WAS CONDUCTED IN A CONTROLLED LABORATORY ENVIRONMENT WHERE THE AMBIENT TEMPERATURE WAS HELD AT 25°C ±1°C. FIELD PERFORMANCE MAY DIFFER PARTICULARLY IN REGARDS TO CHANGE IN LUMINOUS OUTPUT AS A RESULT OF DIFFERENCE IN AMBIENT TEMPERATURE AND METHOD OF MOUNTING THE LUMINAIRE.


120
135
150
165
180
165
150
135
120
105
90
75
60
45
1700
3400
5100
6800
8500
30
15
0
15
30
180 Deg. Plane
270 Deg. Plane
0 Deg. Plane
90 Deg. Plane

CREE
XPE
LM-80

1342 S. Powerline Rd
Deerfield Beach, FL 33442
Tel: 1-888-778-9864 (Customer Service)
954-363-1085 (Local)
954-971-3725 (Fax)

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703

IES LM-80-08 Data Summary
Cree XP-E White XLamp

1. Number of LED Sources Tested	See Table 1	
2. Description of LED light sources	Cree XP-E XLamp LED's	
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter	
4. Operating Cycle	>6000 hours	
5. Ambient Contitions	for 45°C Test:	Tair = 45°C, RH < 45%, air flow = 800CFM
	for 55°C Test:	Tair = 55°C, RH ≤ 45%, air flow = 800CFM
	for 85°C Test:	Tair = 85°C, RH < 45%, air flow = 800CFM
6. Case Temperature	for 45°C Test:	45°C
	for 55°C Test:	55°C
	for 85°C Test:	85°C
7. Drive Current During Test	See Table 1	
8. Initial LF and Vf	See Table 1	
9. Lumen Maintenance	See individual worksheets	
10. LED failures	NONE	
11. LED monitoring interval	See individual worksheets	
12. Photometric uncertainty	±2.0%	
13. Chromaticity shift	See individual worksheets	

14. Projected L70*

product	test conditions	total test time	% LF at time	L70
XP-E Cool White	700mA @ 45C	7,536 hours	94.89	51,245 hours
XP-E Cool White	350mA @ 55C	6,552 hours	97.17	81,403 hours
XP-E Cool White	700mA @ 55C	6,552 hours	95.86	55,271 hours
XP-E Cool White	350mA @ 85C	6,552 hours	95.64	52,422 hours
XP-E Cool White	700mA @ 85C	6,048 hours	92.92	29,378 hours

TABLE 1

Board ID #	Ambient Temp	Drive Current	# of LED's	Initial Ave. Vf (volts)	Initial Ave. LF (Lum.)
630B129700-RTOL-01	45°C	700mA	10	3.349	132.05
DUR019K	55°C	350mA	10	3.153	120.40
DUR019L	55°C	350mA	10	3.161	117.54
DUR02JM	55°C	350mA	10	3.153	120.95
DUR019M	55°C	700mA	10	3.152	120.59
DUR019N	55°C	700mA	10	3.180	120.32
DUR019R	85°C	350mA	10	3.078	98.97
DUR019S	85°C	350mA	10	3.097	97.12
DUR02JP	85°C	350mA	10	3.055	98.27
DUR019U	85°C	700mA	10	3.089	97.29
DUR019V	85°C	700mA	10	3.061	98.86
XPECWPOR4509-HTOL-01	85°C	700mA	10	3.164	112.17

* Using the Energy Star Exponential Curve Fit Projection Method
and the maximum test time as shown on individual worksheets

PLEASE SEE ATTACHED FILES FOR THE COMPLETE REPORT

IN-SITU TEMPERATURE TESTING

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Cree, Inc
4600 Silicon Dr
Durham, NC 27703 USA
(919) 313-5300

Fixture Evaluation Form

Information				
	Date Received:	8-27-09	**Cree Sales Director:**	Scott White
	Customer Name:	MSI	**Distributor:**	Arrow
	Contract Manufacturer:		**Customer Contact:**	Billy Weiss
	Quantity:	1	**Date Tested:**	8-27-09
	FEN:	090827-1	**Tested By:**	Robert Higley / Josh Markle

Fixture Information				
	Fixture Type:	Par 38	**Number LEDs Used:**	9
	Type of LEDs:	XPEWHT-L1-0000-0009E8/E7	**Drive Current:**	3 settings
	Driver Manufacturer:	Custom (Cypress)	**PCB Type:**	MCPCB
	Wattage:	9.88 / 11.89 / 15.84	**Lumens:**	541 / 616 / 735
	PF:	.98	**CCT / CRI:**	3063 K / 82

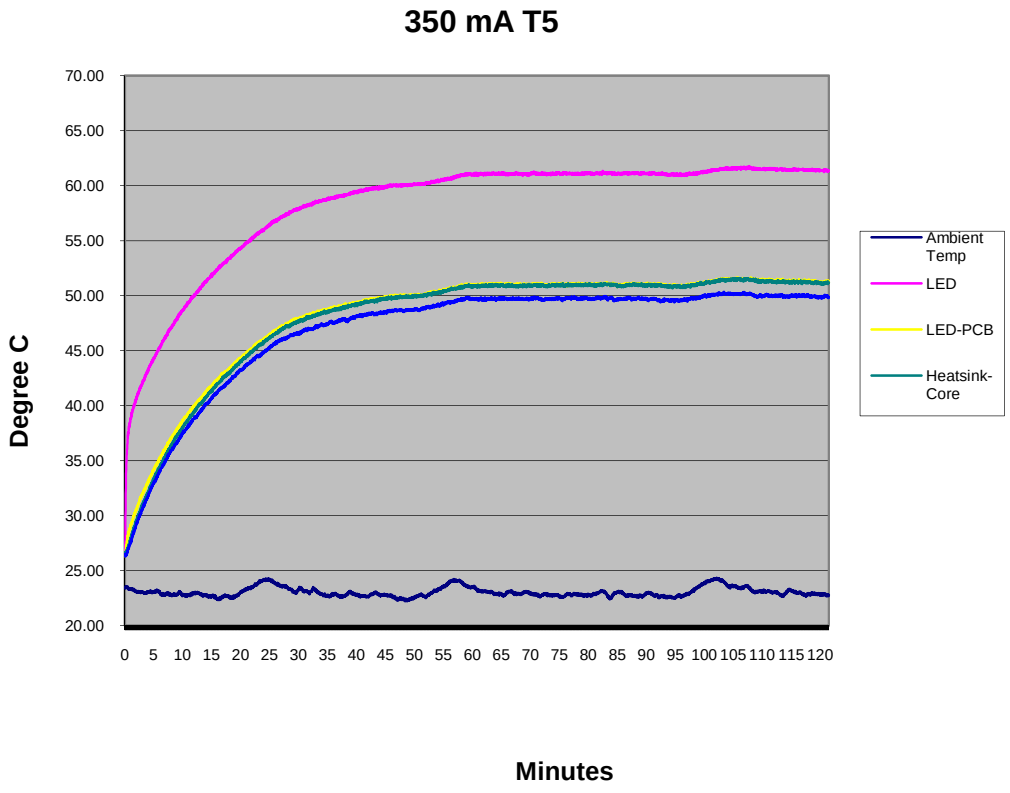
1. Fixture Pictures ()

Cree, Inc
4600 Silicon Dr
Durham, NC 27703 USA
(919) 313-5300

Fixture Evaluation Form

2. Thermal Test

Solder point Temp 350mA:	51ºC	**~Tj 350mA:**	62ºC
Solder point Temp 500mA:	61ºC	**~Tj 500mA:**	74ºC



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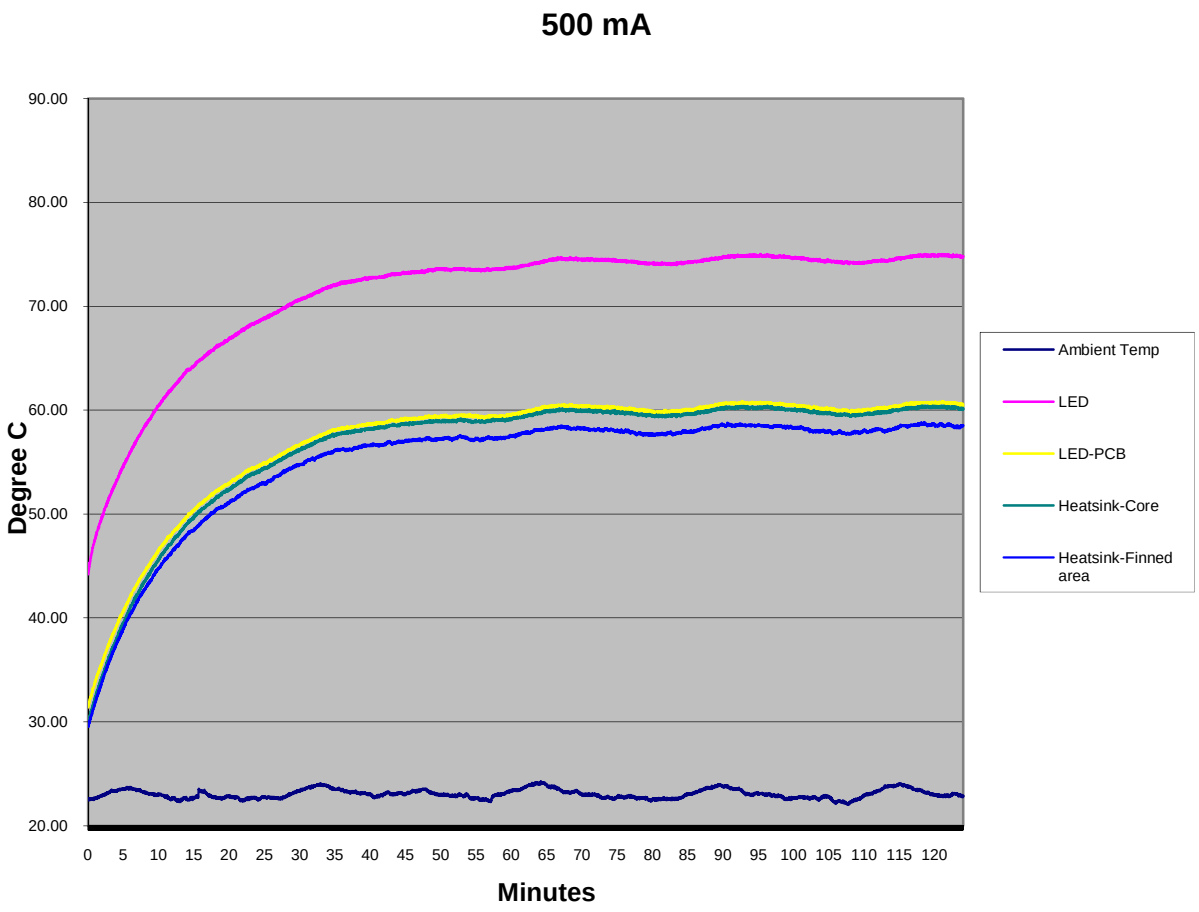
Fixture Evaluation Form



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Fixture Evaluation Form

3. Driver Test **(turn on spike, hot plugging, etc)**

Max Current:	525mA	**Spike width:**	n/a

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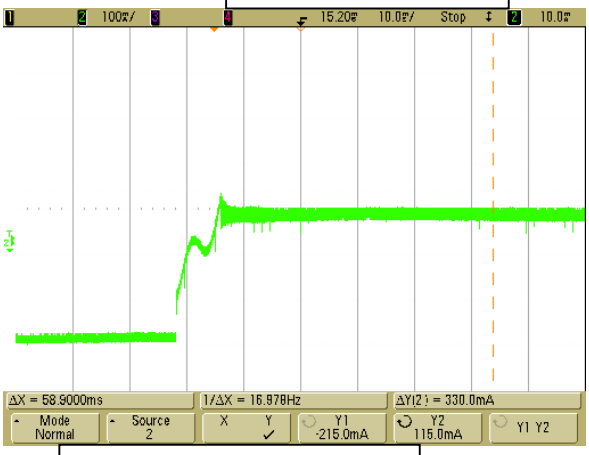
4600 Silicon Dr
Durham, NC 27703 USA
(919) 313-5300

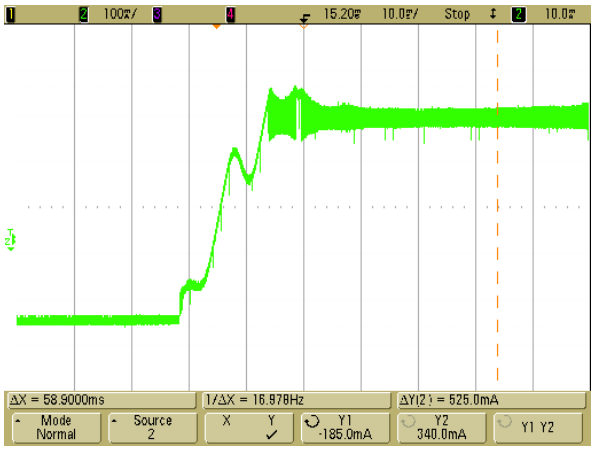
Fixture Evaluation Form

Curve picture

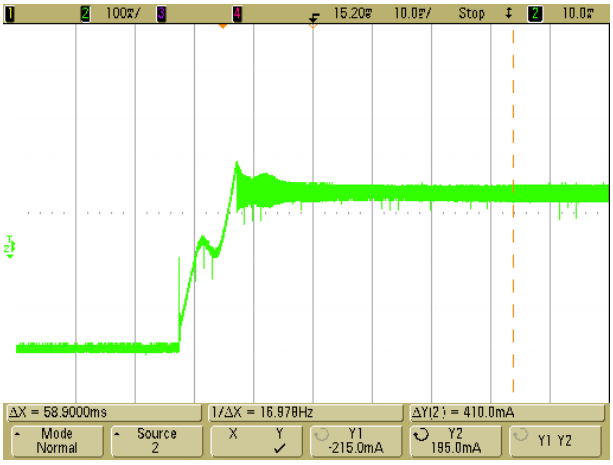
Mode 1



Mode 3



Mode 2



4. Chemicals Used (Thermal grease, glue, etc)

Cree, Inc
4600 Silicon Dr
Durham, NC 27703 USA
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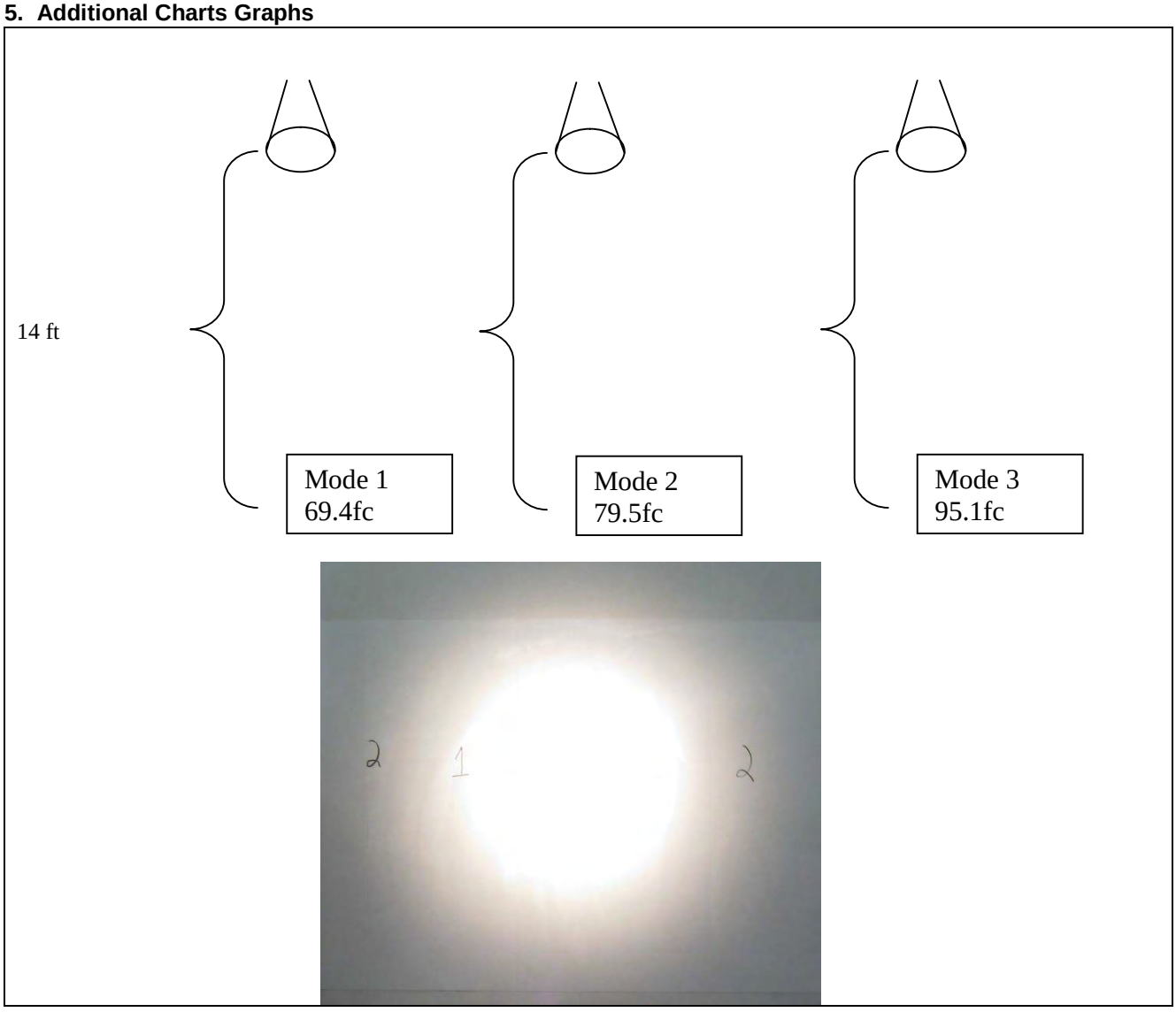
Fixture Evaluation Form

Chemicals Used						
	n/a					

5. Additional Charts Graphs



Cree, Inc
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Durham, NC 27703 USA
(919) 313-5300

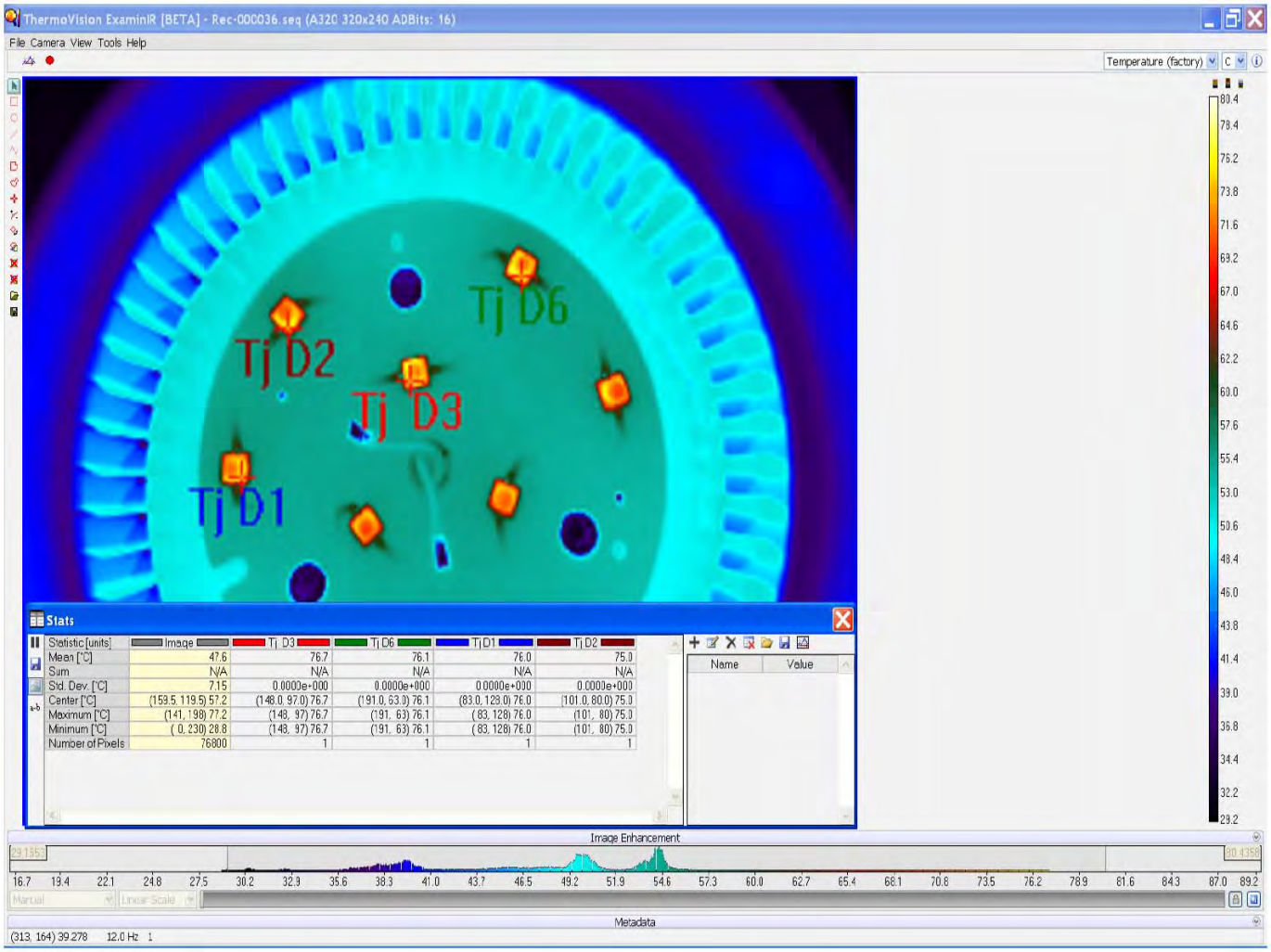
Fixture Evaluation Form

6. Additional Information (LED condition, etc)

	No problems		
This fixture meets or exceeds the operating parameters For the Cree XLamp LEDs.			

Customer Response	**Date Sent to Customer:**	9-2-09
	Sent By:	Robert Higley, Application Engineer, Cree, Inc.

Thermal Imaging
iPAR38 #3 16W
@ Thermal
Equilibrium



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L70
Determination

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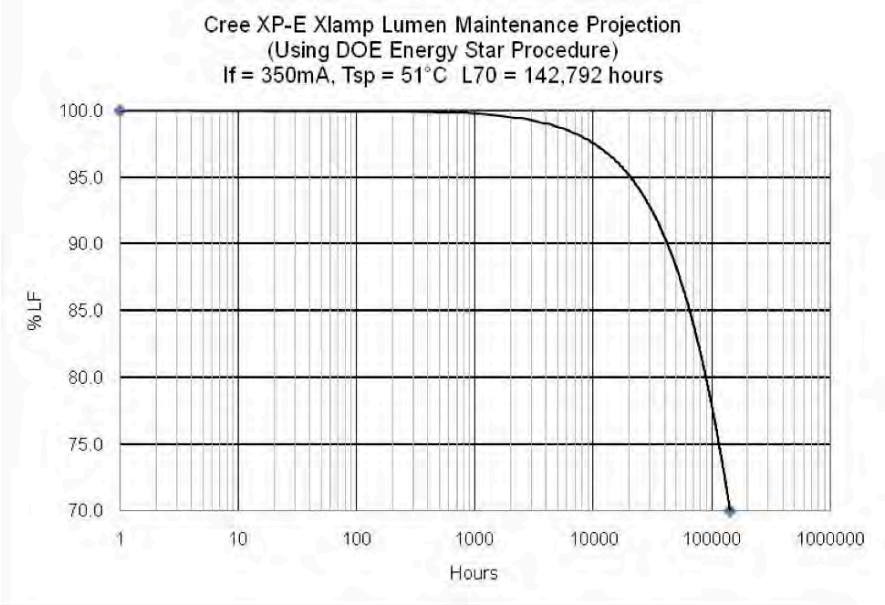
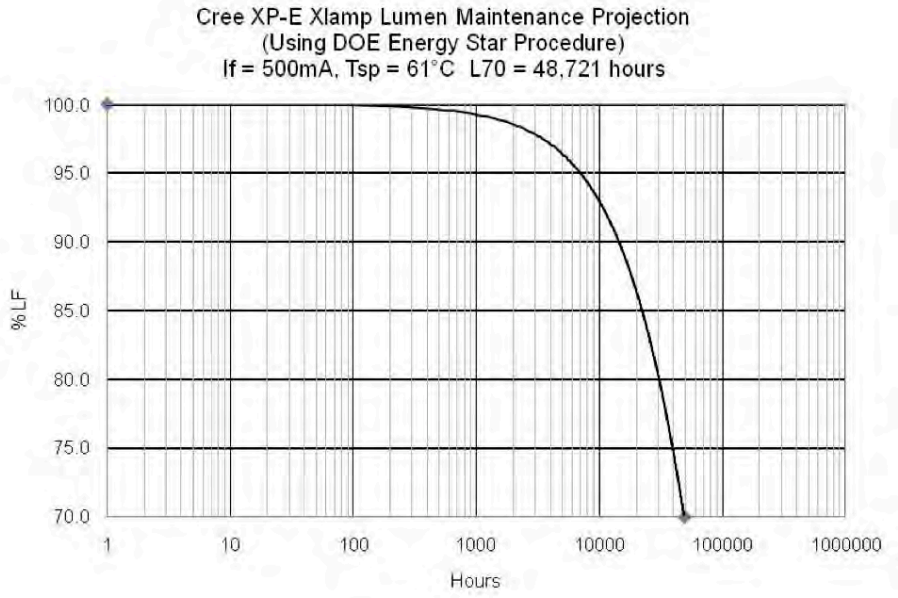
The DOE LM-80 process takes into account the operation of the LED's at 350mA as well as 700mA this being the maximum drive current.
The DOE LM-80 data is also taken at 3 ambient temperatures 45˚C, 55˚C and 85˚C.
This is done to make sure that the test is standardized across all of the LED products that are tested.
The MSI iPAR38 product will run at TSP of 51˚C at 12Watts and TSP of 61˚C at 16W
The MSI iPAR38 product will run at 350mA for 12W and 500mA for 16W.
The explanation below takes the temperatures as well as the drive currents into account.
By extrapolating the data we can determine the expected L70 life for the actual product.

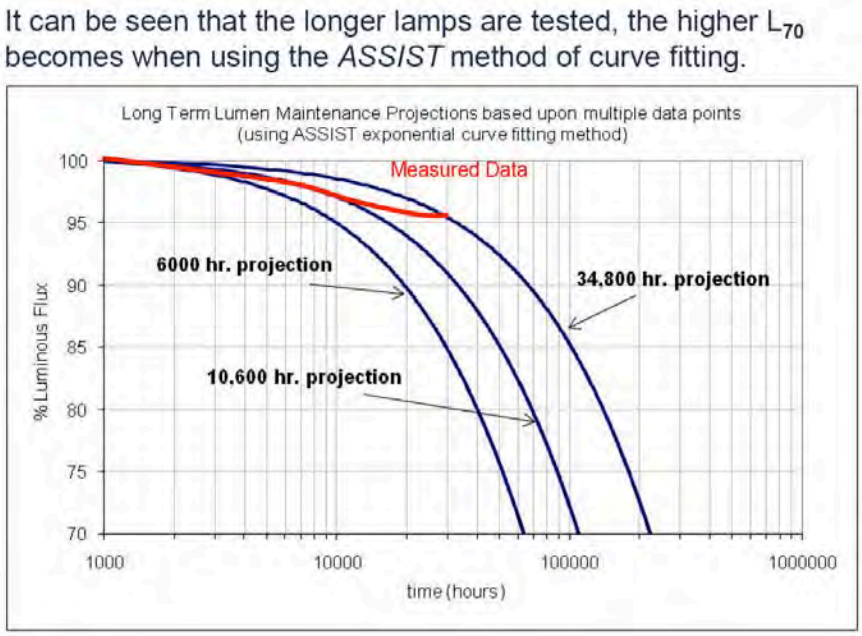
1. As define in the Department of Energy Draft 3 September 18, 2009 of the energy star eligibility criteria for Integral LED lamps the lumen maintenance must exceed 70% (L70) at 25000 hours of operation. The L70 curve must be based on 6000hrs of LM80-08 data at elevated temperatures of 45˚C and 85˚C and maintain a minimum flux of 91.8%. Attached is the LM80-08 data for 700mA drive current as supplied by CREE.
   File: (LM-80 XPE data for MSI.XLS)
2. The graphs below shows lumen maintenance projection based on the DOE IESNA LM80-08 ASSIST procedure using thermals and drive current as tested on the iPAR38 running at 12W.



3. The graphs below shows lumen maintenance based on the DOE IESNA LM80-08 ASSIST procedure using thermals and drive current as tested on the iPAR38 running at 16W.

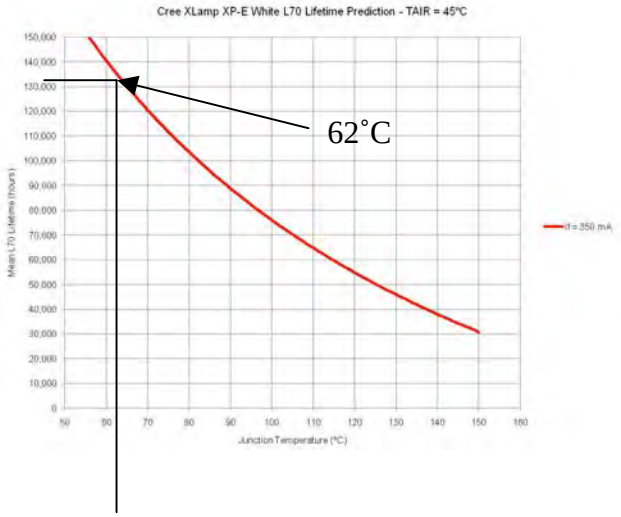


4. The graph below is based on actual long term data applied to the L70 curve using the ASSIST method. The IESNA SSL committee is now working to develop an accurate algorithm for modeling long-term lamp behavior.

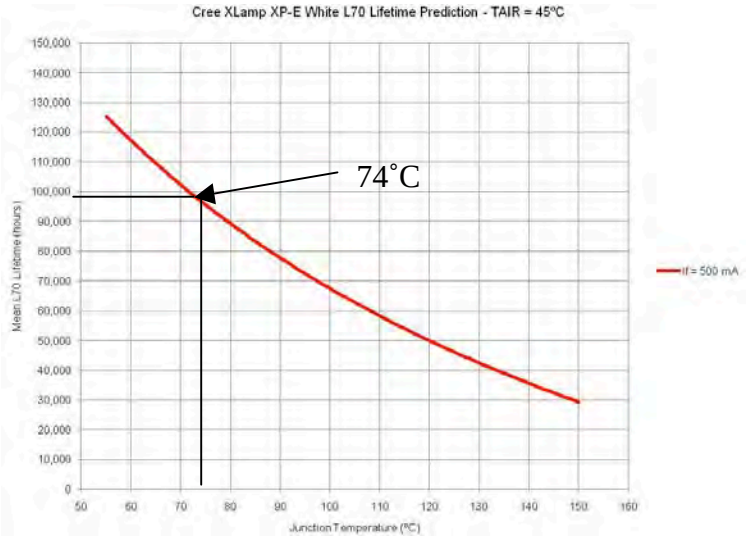


a. Based on internal long-term reliability testing, Cree projects that white XLamp XP-E LEDs will deliver median 70%lumen maintenance after 50,000 hours of operation at a forward current of 700 mA. This projection is based on constant current operation with junction temperature maintained at or below 135°C and ambient air temperature maintained at or below 25°C.

b. The graphs below shows lumen maintenance projection based on actual data and the Cree “best fit” algorithm applied to the L70 curve using thermals and drive current as tested on the iPAR38 running at 12W.



c. The graphs below shows lumen maintenance projection based on actual data and the Cree “best fit” algorithm applied to the L70 curve using thermals and drive current as tested on the iPAR38 running at 16W.



iPAR38
Warranty
Statement

1342 S. Powerline Rd
Deerfield Beach, FL 33442
Tel: 1-888-778-9864 (Customer Service)
954-363-1085 (Local)
954-971-3725 (Fax)

MSI, LLC Limited Warranty

The *Limited Warranty* set forth below is given by MSI, LLC with respect to the lighting product packaged with this *limited warranty* (the "Product"). The *Limited Warranty* is extended to the original purchaser of the Product, manufactured by MSI, LLC, 1342 South Powerline Road, Deerfield Beach, Florida 33442.

The Product, when delivered to you in new condition, in its original packaging, including all parts and components thereof, is warranted against defects in materials or workmanship for a period of five (5) years from the date of original purchase.

The *Limited Warranty* covers units that have completely failed and does not apply if the failure is caused or contributed by any of the following:

a) Improper installation storage or failure to follow operating instructions
b) Improper maintenance
c) Repairs or alterations not authorized or performed by MSI
d) Accident, damage, abuse or misuse including environmental applications
e) Abnormal or unusual operating conditions or applications
f) Electrical current surges caused by lightning or other catastrophic acts of God or occurrences.
g) A purpose or application in any way different from that for which the product was designed. Products are designed for indoor dry listed environments.
h) MSi shall have no liability of any kind for failure of any equipment or other items in which the products are incorporated.
i) Improper transportation or poor packing/packaging when returning the product to MSi.
j) Installations where ambient temperatures exceeds 130 degrees Fahrenheit (54C).
k) Installations in fully enclosed cans or sealed fixtures.

Lumen degradation will be warranted for any bulb that exceeds a 30% lumen depreciation over a five year operating time period. Lumen depreciation will be determined by measuring the bulbs current Lumen output and comparing it to a stated Lumen output (+/- 10%) established and recorded by serial number at the time of manufacture.

Color shift will be warranted for any bulb that exceeds a color shift of more than +/- 175 Kelvin over a five year period. Color shift will be determined by measuring the bulbs current Color Temperature (CCT) and comparing it to a stated Color Temperature (+/- 2%) established and recorded by serial number at the time of manufacture.

MSI. LLC or its authorized service provider will repair or replace, at its option, a unit proved to be defective and non functional within the warranty period and under the conditions of the warranty.

MSI, LLC is not responsible for the cost of removal of the unit, damages due to removal or installation, any shipping charges to or from the factory, or the installation of a repaired or replacement unit.

Implied Warranties, when applicable, shall commence upon the same date as the *Express Warranty* provided above, and shall, except for warranties of title extended only for the duration of the *Express Warranty*. Some states do not allow limitations on how long an implied warranty lasts. So the above limitation may not apply to you. The only remedy provided to you under an applicable implied warranty and the *Express Warranty* shall be the remedy provided under the *Express Warranty*. Subject

to the terms and conditions contained therein, MSI, shall not be liable for incidental and consequential losses and damages under the *Express Warranty*, and applicable *implied warranty*, or claims for negligence, except to the extent that this limitation is found to be unenforceable under the applicable state law. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you. The Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

NOTE THAT THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS UNDER APPLICABLE LAW THAT WILL VARY FROM STATE TO STATE. EXCEPT TO THE EXTENT LIMITED BY ANY APPLICABLE LAW, THE FOREGOING WARRANTY PROVISIONS ARE EXCLUSIVE AND ARE GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.