

EdiPower® III

HM CRI80 Series

Datasheet



Introduction :

Edison COB is a high uniformity array component which delivers high lumen output with excellent efficacy. Edison COB is optimized to simplify luminaire designs and lower the system cost. In addition, most of the Edison COB has passed the LM-80 verification. Edison COB combines the advantages of performance, reliability and ease-of-use in one LED. As for the applications, Edison COB can be widely used in general lighting such as spot light, down light, high bay, floodlight and PAR lamp.

Description :

- High efficacy chip on board solution with complete product line 5~40W.
- Best luminous and color uniformity
- Enables halogen and CDM replacement
- The article itself presents the actual color.

Feature and Benefits :

- Based on the mirror aluminum MCPCB which excellent 98% reflectivity and High thermal conductivity. ($k=200 \text{ w/mK}$)
- Low R_{th}
- Meet the ErP specification ($CRI>80$ and $R9>0$)
- Pass LM-80 verification
- Excellent reliability
- 3 / 5 – step Macadam

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General Information

Ordering Code Format

$\frac{2}{X1}$ $\frac{P}{X2}$ $\frac{H M}{X3}$ $\frac{x x}{X4}$ $\frac{x W}{X5}$ $\frac{x x}{X6}$ $\frac{P 1 x}{X7}$ $\frac{x x x}{X8}$

X1		X2		X3		X4		X5	
Type		Component		Series		Wattage		Color	
2	Emitter	P	EdiPower®	HM	HM Series	05	5W	CW	Cool White
						09	9W	NW	Neutral White
						13	13W	WW	Warm White
						16	16W		
						24	24W		
						30	30W		
						40	40W		

X6		X7		X8	
Internal code		PCB Board		Serial Number	
-	-	P12	13x13	-	-
		P13	19x19		
		P16	28x28		

Absolute Maximum Ratings

Absolute maximum ratings ($T_c=25^{\circ}\text{C}$)

Parameter	Symbol	Value	Units
Input Power	P_i	2PHM05xW27P12010 : 10.6 2PHM09xW27P12010 : 21.3 2PHM13xW27P12010 : 18.0 2PHM16xW27P13010 : 31.0 2PHM24xW27P13010 : 53.3 2PHM30xW27P13010 : 63.9 2PHM40xW27P16010 : 95.9	W
DC Forward Current ¹	I_F	2PHM05xW27P12010 : 240 2PHM09xW27P12010 : 480 2PHM13xW27P12010 : 500 2PHM16xW27P13010 : 720 2PHM24xW27P13010 : 1200 2PHM30xW27P13010 : 1440 2PHM40xW27P16010 : 2160	mA
Min. Forward Current	Min. I_F	2PHM05xW27P12010 : 5 2PHM09xW27P12010 : 10 2PHM13xW27P12010 : 15 2PHM16xW27P13010 : 15 2PHM24xW27P13010 : 25 2PHM30xW27P13010 : 30 2PHM40xW27P16010 : 45	mA
Reverse Current ²	I_R	1	mA
Operating Temperature	T_{op}	-40 ~ +100	$^{\circ}\text{C}$
Storage Temperature	T_{st}	-40 ~ +100	$^{\circ}\text{C}$
LED junction Temperature ³	T_J	125	$^{\circ}\text{C}$
Case Temperature	T_c	105	$^{\circ}\text{C}$
Thermal Resistance	R_{j-c}	2PHM05xW27P12010 : 4.10 2PHM09xW27P12010 : 2.30 2PHM13xW27P12010 : 1.70 2PHM16xW27P13010 : 1.50 2PHM24xW27P13010 : 1.00 2PHM30xW27P13010 : 0.88 2PHM40xW27P16010 : 0.60	$^{\circ}\text{C/W}$

Notes:

1. DC forward current should not exceed LED's operating current; the current tolerance should be kept within a range of 5%.
2. LEDs are not designed to be driven in reverse bias.
3. Proper current derating must be observed to maintain junction temperature below the maximum at all time.
4. Refer to Outline drawing for T_c measurement point.
5. D.C. Current : $T_J = T_c + R_{j-c} * P_i$

Luminous Flux Characteristic

Order Code	CCT (K)	Luminous Flux(lm) T _c =85°C		Luminous Flux(lm) T _c =25°C		Efficacy (lm/W)	CRI Ra	CRI R9	Forward Voltage V _F (V)			Forward Current (mA)
		Min.	Typ.	Min.	Typ.				Min.	Typ.	Max.	
2PHM05WW27P12010	2700	360	425	410	485	108	80	0	33.6	37.2	38.4	120
	3000	370	440	425	505	113						
	3500	390	465	450	535	120						
2PHM05NW27P12010	4000	380	450	435	515	115						
	5000	395	470	455	540	121						
	5700	390	465	445	530	118						
2PHM05CW27P12010	6500	390	465	445	530	118						
	2700	680	805	780	925	104						
	3000	710	845	815	970	108						
2PHM09WW27P12010	3500	740	880	850	1010	113						
	4000	730	865	835	990	111						
	5000	750	895	865	1025	115						
2PHM09CW27P12010	5700	740	880	850	1010	113						
	6500	735	875	845	1005	113						
2PHM13WW27P12010	2700	915	1090	1050	1250	102	80	0	30.5	34.1	35.3	360
	3000	965	1150	1110	1320	107						
	3500	995	1185	1145	1360	111						
2PHM13NW27P12010	4000	1010	1200	1155	1375	112						
	5000	1010	1200	1155	1375	112						
	5700	1010	1200	1155	1375	112						
2PHM13CW27P12010	6500	985	1170	1130	1345	109						

Notes :

1. Edison Opto Corp. maintains forward voltage $\pm 3\%$, luminous flux $\pm 10\%$, Ra and R9 ± 2 tolerance.
2. Flux values @ 25 °C are calculated and for reference only.

Order Code	CCT (K)	Luminous Flux(lm) T _c =85°C		Luminous Flux(lm) T _c =25°C		Efficacy (lm/W)	CRI Ra	CRI R9	Forward Voltage V _F (V)			Forward Current (mA)
		Min.	Typ.	Min.	Typ.	Typ.	Min.	Min.	Min.	Typ.	Max.	
2PHM16WW27P13010	2700	1020	1215	1175	1395	104	80	0	33.6	37.2	38.4	360
	3000	1125	1340	1295	1540	115						
	3500	1170	1395	1345	1600	119						
2PHM16NW27P13010	4000	1170	1390	1340	1595	119						
	5000	1180	1405	1360	1615	120						
2PHM16CW27P13010	5700	1170	1395	1345	1600	119						
	6500	1170	1395	1345	1600	119						
	2700	1705	2030	1960	2330	104						
2PHM24WW27P13010	3000	1820	2165	2090	2485	111						
	3500	1890	2250	2175	2585	116						
2PHM24NW27P13010	4000	1910	2275	2200	2615	117						
2PHM24CW27P13010	5000	1940	2310	2230	2650	119						
	5700	1890	2250	2175	2585	116						
	6500	1910	2275	2200	2615	117						
2PHM30WW27P13010	2700	1975	2350	2270	2700	101	80	0	33.6	37.2	38.4	720
	3000	2160	2570	2480	2950	110						
	3500	2250	2675	2580	3070	114						
2PHM30NW27P13010	4000	2340	2785	2690	3200	119						
	5000	2325	2765	2670	3175	118						
2PHM30CW27P13010	5700	2275	2710	2620	3115	116						
	6500	2270	2705	2610	3105	116						

Notes :

1. Edison Opto Corp. maintains forward voltage $\pm 3\%$, luminous flux $\pm 10\%$, Ra and R9 ± 2 tolerance.
2. Flux values @ 25 °C are calculated and for reference only.

Order Code	CCT (K)	Luminous Flux(lm) T _c =85°C		Luminous Flux(lm) T _c =25°C		Efficacy (lm/W)	CRI Ra	CRI R9	Forward Voltage V _F (V)			Forward Current (mA)
		Min.	Typ.	Min.	Typ.	Typ.	Min.	Min.	Min.	Typ.	Max.	
2PHM40WW27P16010	2700	3540	4215	4070	4840	120	80	0	33.6	37.2	40.8	1080
	3000	3720	4430	4280	5090	127						
	3500	3905	4650	4490	5345	133						
2PHM40NW27P16010	4000	3850	4585	4425	5265	131						
2PHM40CW27P16010	5000	4000	4760	4595	5470	136						
	5700	3885	4625	4465	5315	132						
	6500	3980	4740	4575	5445	136						

Notes :

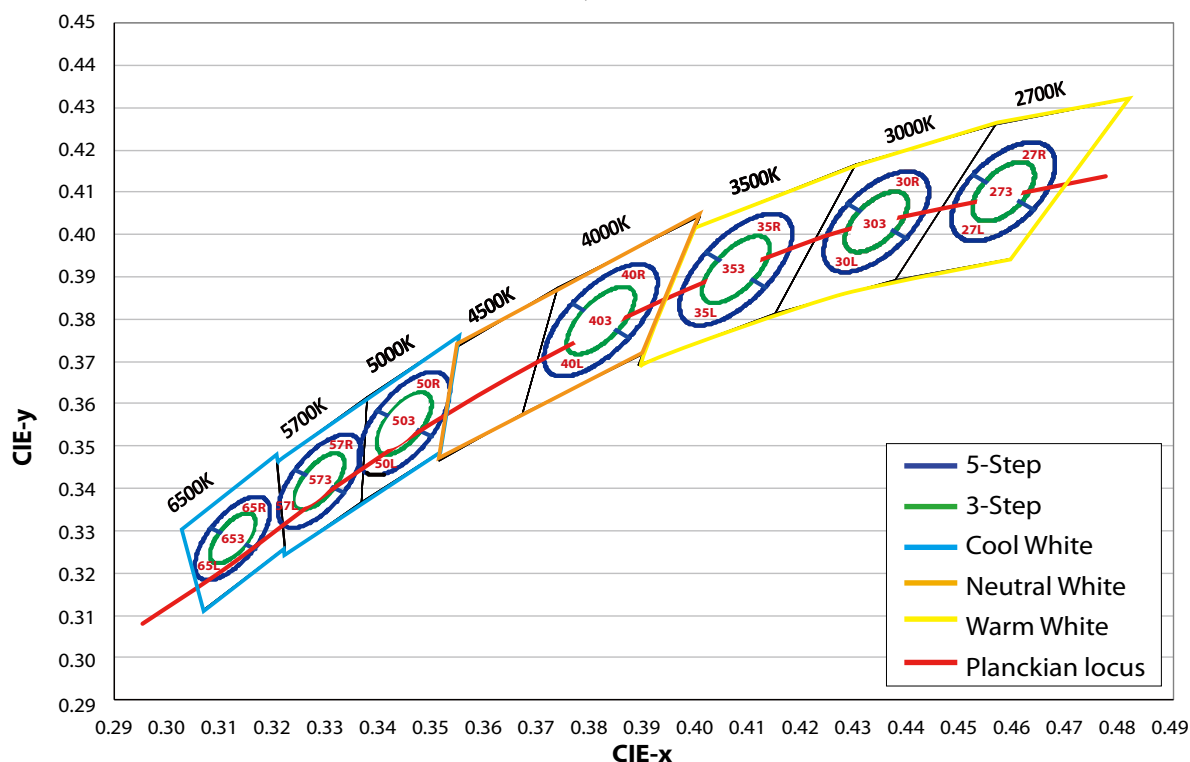
1. Edison Opto Corp. maintains forward voltage $\pm 3\%$, luminous flux $\pm 10\%$, Ra and R9 ± 2 tolerance.
2. Flux values @ 25 °C are calculated and for reference only.

Chromaticity coordinates($T_c=85^\circ\text{C}$)

Color region stay within Macadam "3-Step/5-step" ellipse from the chromaticity center.

The chromaticity center refers to ANSI C78.377:2008.

Please refer to ANSI C78.377 for the chromaticity center.



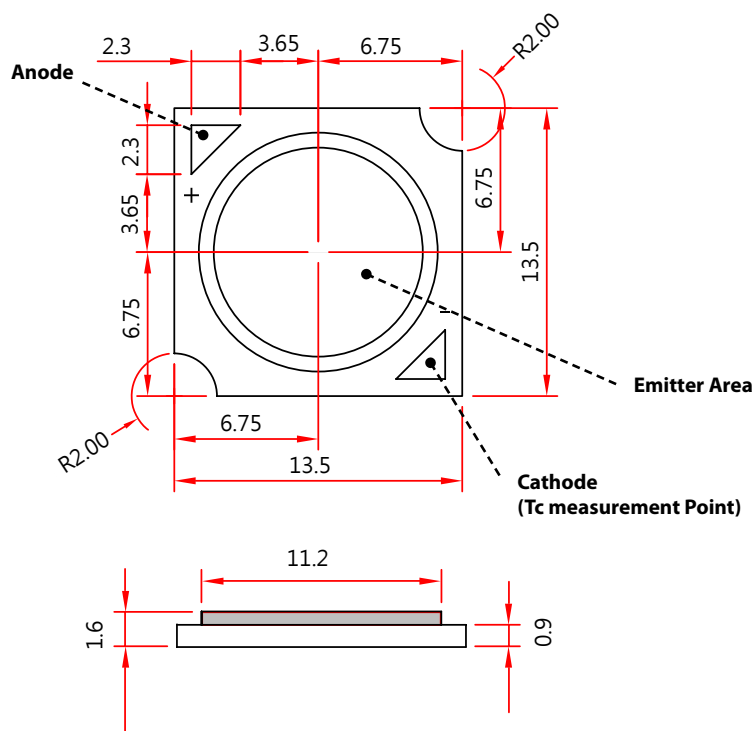
CCT	Steps	Cx	Cy	a	b	theta
2700K	5	0.4578	0.4101	0.01350	0.00700	53.70
3000K	5	0.4338	0.4030	0.01390	0.00680	53.22
3500K	5	0.4073	0.3917	0.01545	0.00690	54.00
4000K	5	0.3818	0.3797	0.01565	0.00670	53.72
5000K	5	0.3447	0.3553	0.01370	0.00590	59.62
5700K	5	0.3287	0.3417	0.01243	0.00533	59.09
6500K	5	0.3123	0.3282	0.01115	0.00475	58.57

CCT	Steps	Cx	Cy	a	b	theta
2700K	3	0.4578	0.4101	0.00810	0.00420	53.70
3000K	3	0.4338	0.4030	0.00834	0.00408	53.22
3500K	3	0.4073	0.3917	0.00927	0.00414	54.00
4000K	3	0.3818	0.3797	0.00939	0.00402	53.72
5000K	3	0.3447	0.3553	0.00822	0.00354	59.62
5700K	3	0.3287	0.3417	0.00746	0.00320	59.09
6500K	3	0.3123	0.3282	0.00669	0.00285	58.57

Note: CIE_{x,y} tolerance: ± 0.005 .

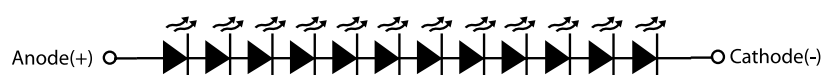
Mechanical Dimensions

5W/ 9W/ 13W Emitter Dimensions

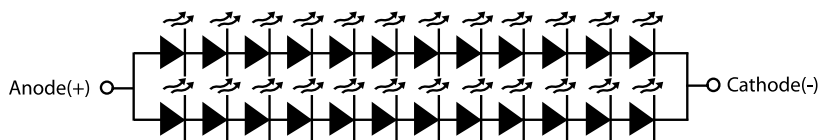


- Notes :
1. Unit : mm
 2. Tolerance : ± 0.2 mm

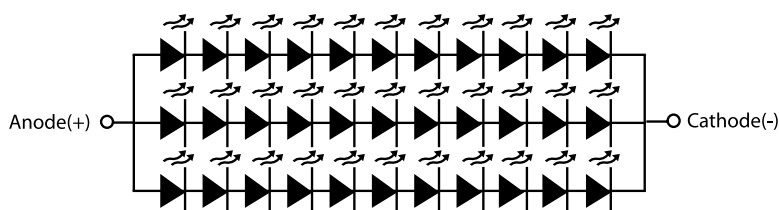
Emitter Circuit Layout



5W EdiPower® III HM Series Circuit Layout

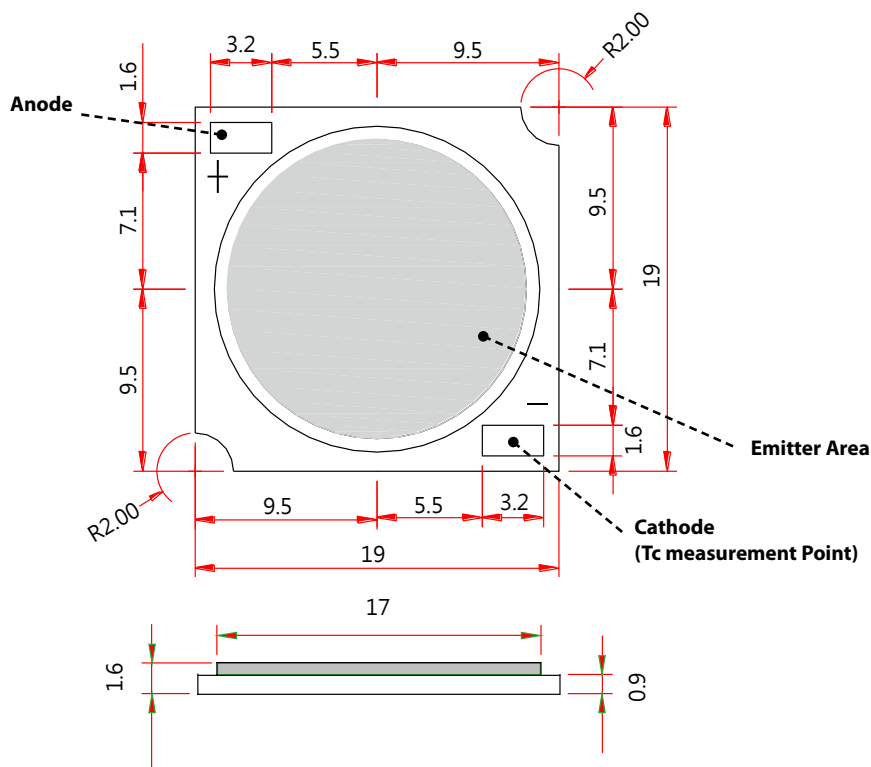


9W EdiPower® III HM Series Circuit Layout



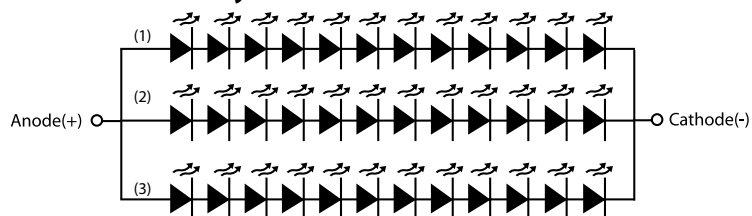
13W EdiPower® III HM Series Circuit Layout

16W/ 24W/ 30W Emitter Dimensions

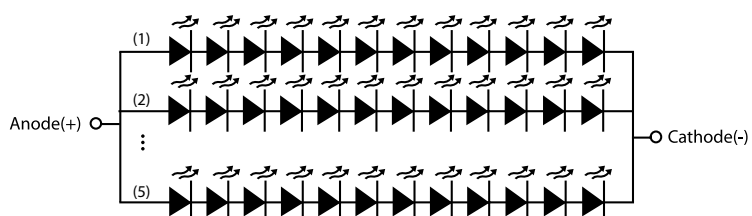


Notes :
1. Unit : mm
2. Tolerance : ± 0.2 mm

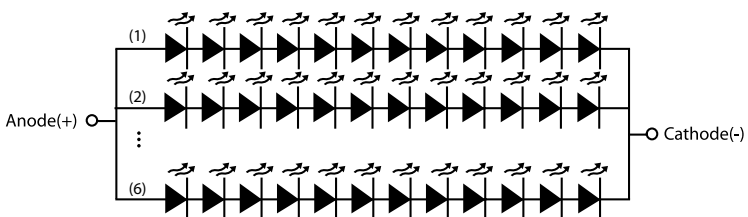
Emitter Circuit Layout



16W EdiPower® III HM Series Circuit Layout

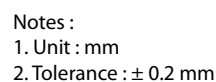


24W EdiPower® III HM Series Circuit Layout

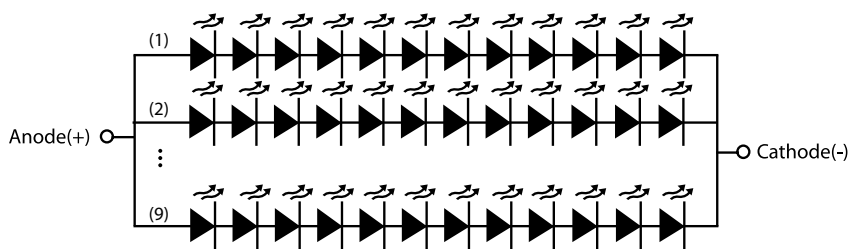


30W EdiPower® III HM Series Circuit Layout

40W Emitter Dimensions



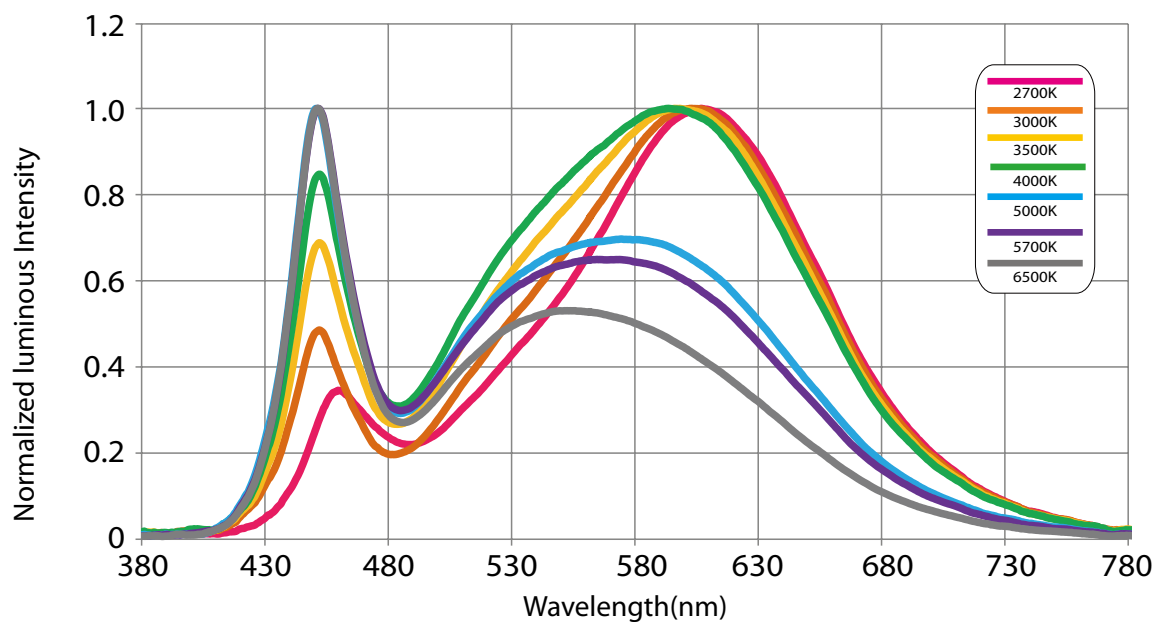
Emitter Circuit Layout



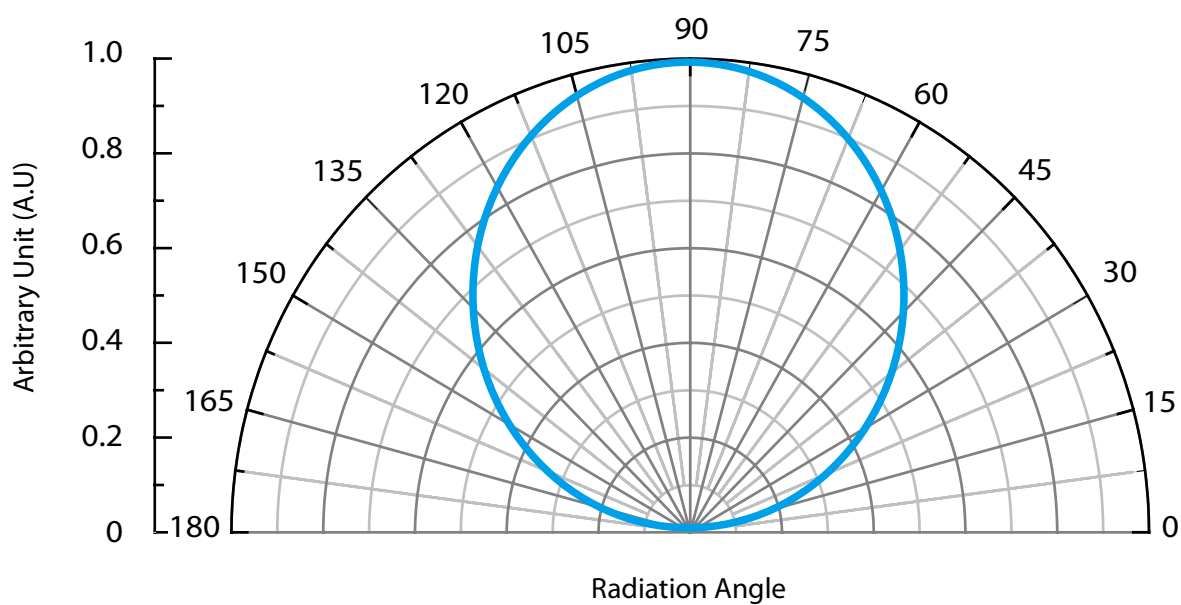
40W EdiPower® III HM Series Circuit Layout

Characteristic curve

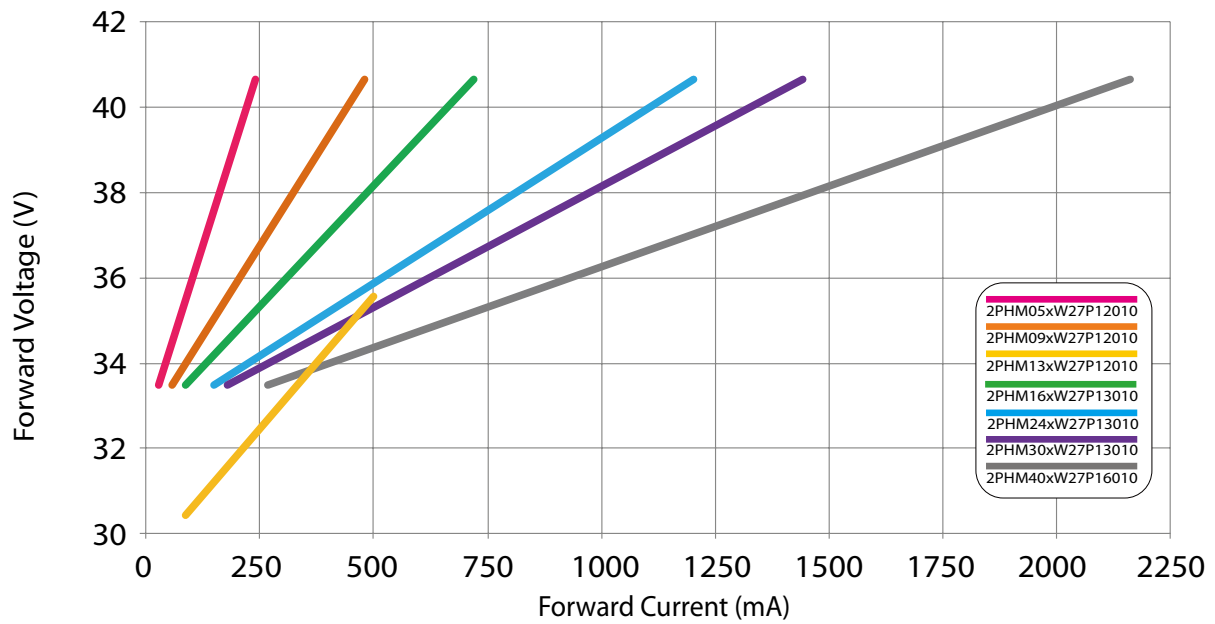
Color Spectrum



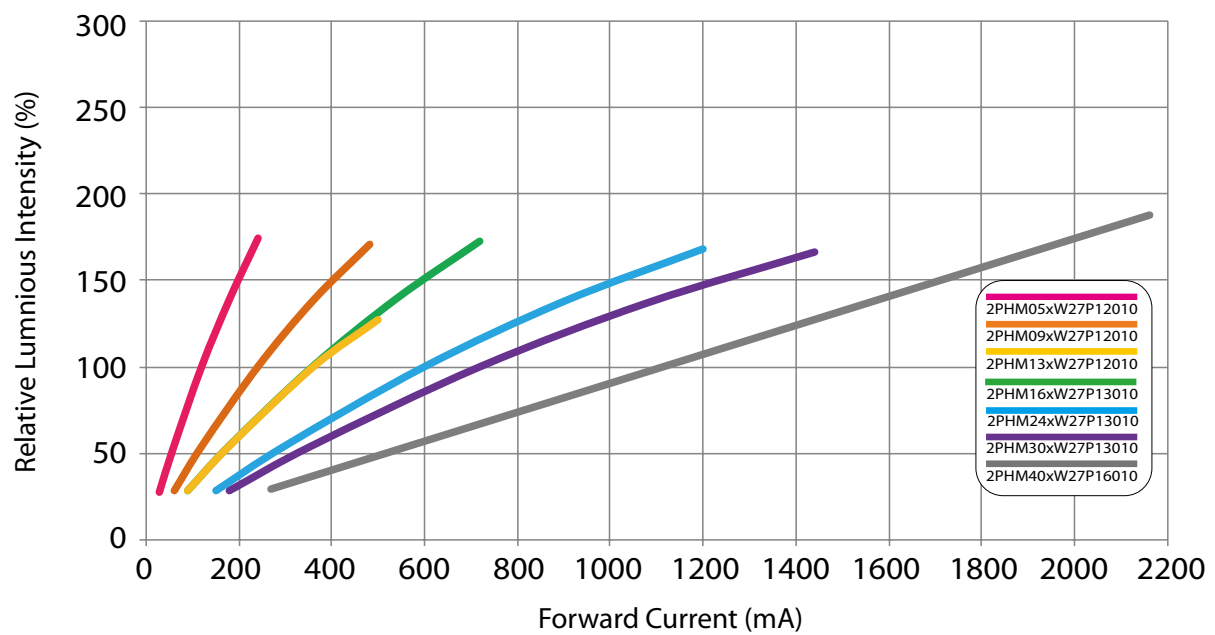
Beam Pattern



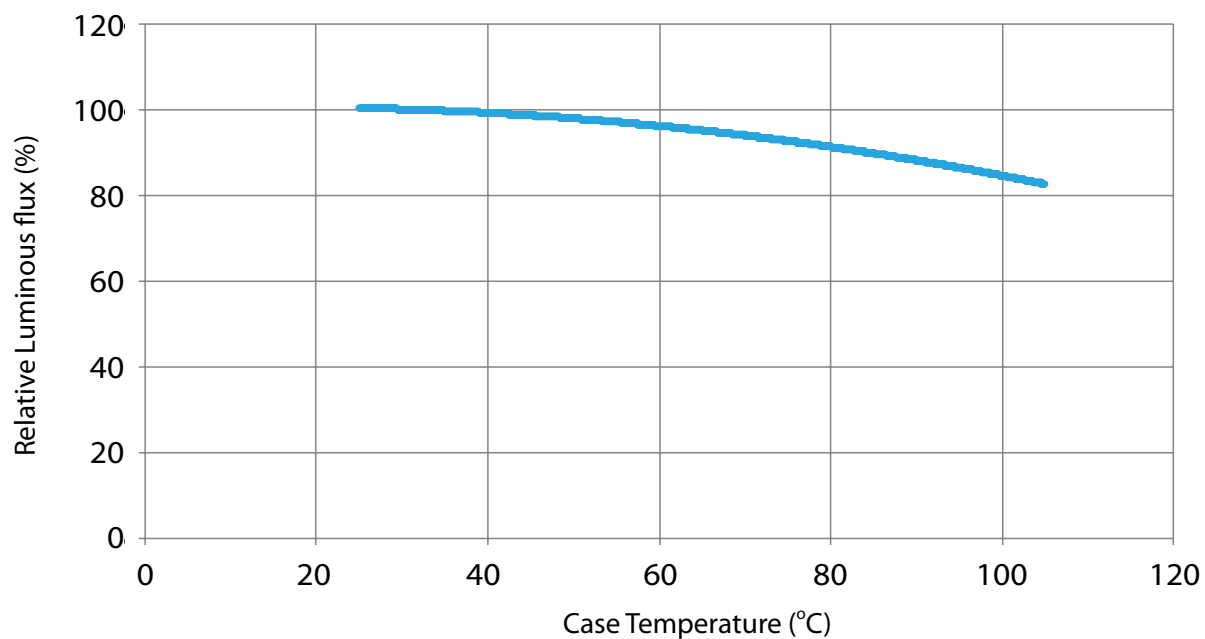
Forward Voltage vs. Forward Current



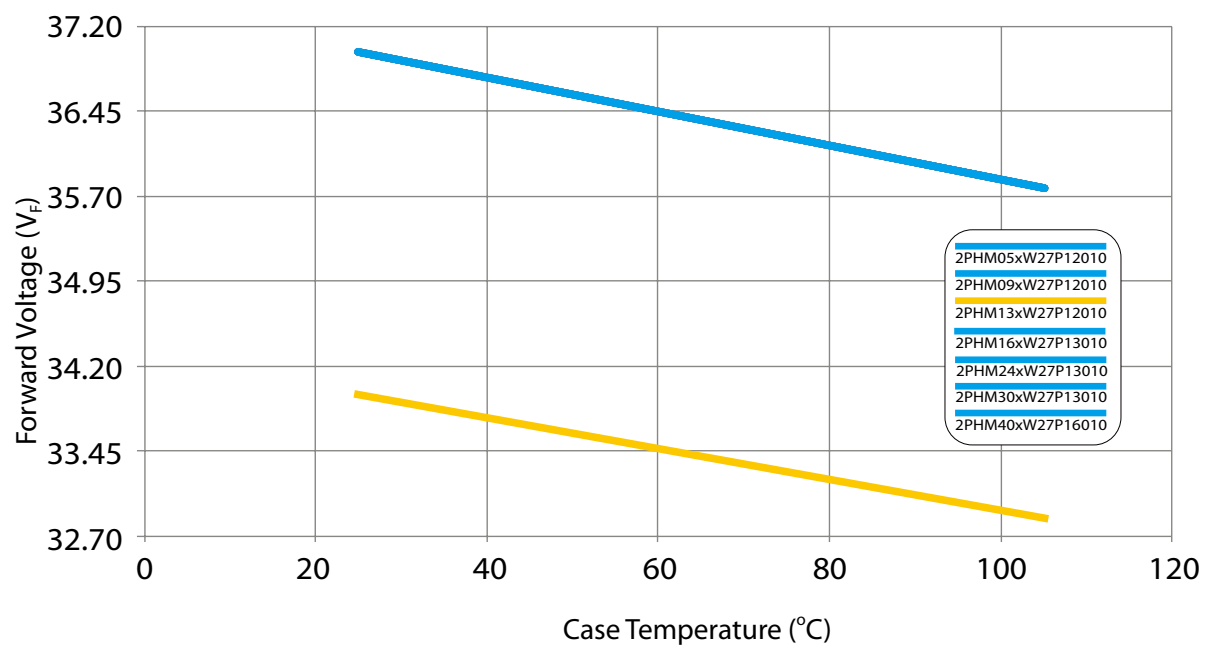
Relative luminous Intensity vs. Forward Current



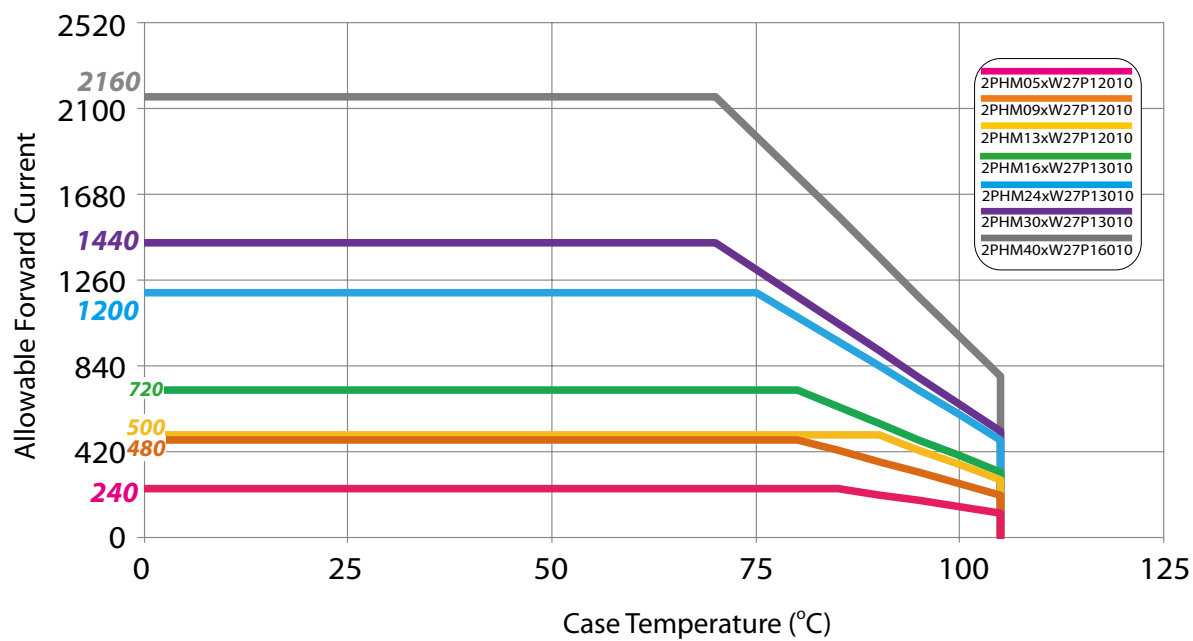
Relative Luminous Flux vs. Case Temperature



Forward Voltage vs. Case Temperature



Allowable Forward Current vs. Case Temperature



Reliability

NO .	Test Item	Test Condition	Remark
1	Temperature Cycle	-40°C~100°C (30 mins / 30 mins)	100 Cycle
2	Thermal Shock	-40°C~100°C (15,min/15 mins 10 sec)	100 Cycle
3	High-Temperature Storage	Ta=100°C	1000 hrs
4	Humidity Heat Storage	Ta=85°C, RH=85%	500 hrs
5	Low-Temperature Storage	Ta= -40°C	1000 hrs
6	Operation Life test	25°C	6000 hrs
7	High Temperature Operation Life test	85°C	1000 hrs
8	ON/OFF Test	30 sec ON, 30 sec OFF	1.5W times

Failure Criteria

Item	Criteria for Judgment	
	Min.	Max.
Lumen Maintenance	85%	-
$\Delta u'v'$	-	0.006
Forward Voltage	-	Initial Data x 1.1
Reverse Current	-	1 μ A
Resistance to Soldering Heat	No dead lamps or visual damage	



Average Lumen Maintenance Characteristics

Lumen maintenance for light sources or luminaires is defined in terms of the change in light output of a light source over operational life, relative to initially measured light output. Edison Opto projects that EdiPower® III HM Series products will deliver, on average, greater than 70% lumen maintenance (L70) after 50,000 hours of operation at the rated forward test current. This performance is based on constant current operation with case temperature maintained at or below 85°C.

These projections are based on a combination of package test data, semiconductor chip reliability data, a fundamental understanding of package related degradation mechanisms, and performance observed from products installed in the field using Edison Opto die technology. Observation of design limits in this datasheet is required in order to achieve this projected lumen maintenance.



Limited Warranty for Edison Opto EdiPower® III HM Series

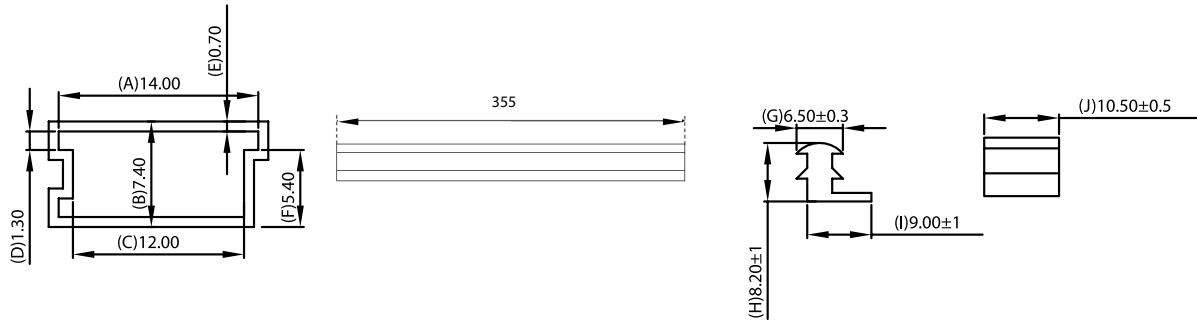
This limited warranty is provided by Edison Opto to the original purchaser of the LED lighting product that is identified on our invoice reflecting its original purchase (the "Product"). We warrant that the Product, under normal operation ($T_c < 85^\circ\text{C}$ $T_j < 125^\circ\text{C}$ and the operation current is lower than maximum forward current which is described in the datasheet), will be free of defects in material and workmanship for a period of **FIVE (5) YEARS** from the date of original purchase.

Notes:

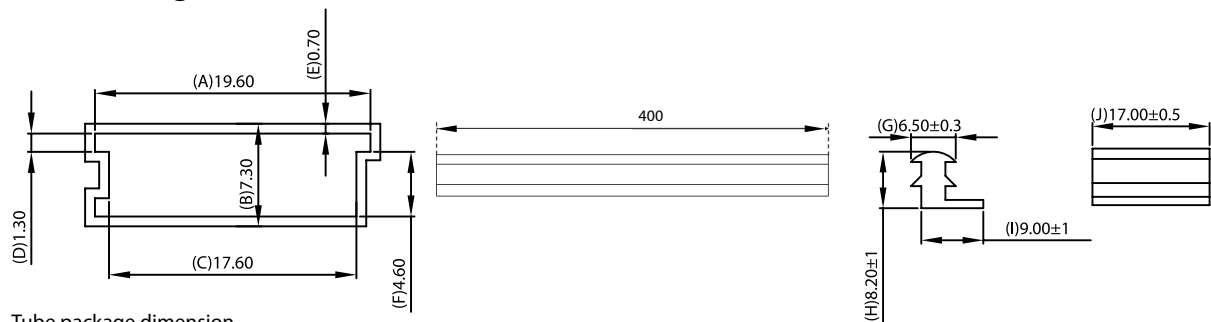
1. This limited warranty cannot be transferred to subsequent purchasers of the Product; even Product is resold in new condition and in its original packaging.
2. The determination of whether the Product is defective shall be made by Edison Opto in our sole discretion with consideration given to the overall performance of the Product.

Product Packaging Information

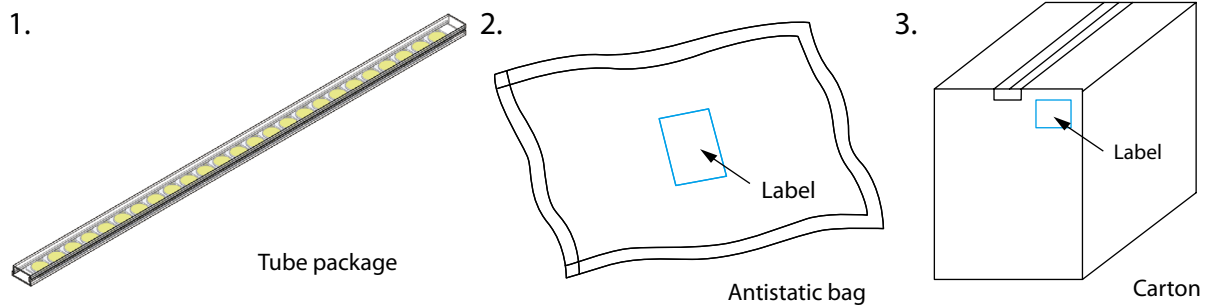
Tube Packing for 5/ 9/ 13 W



Tube Packing for 16/ 24/ 30W



Tube package dimension.

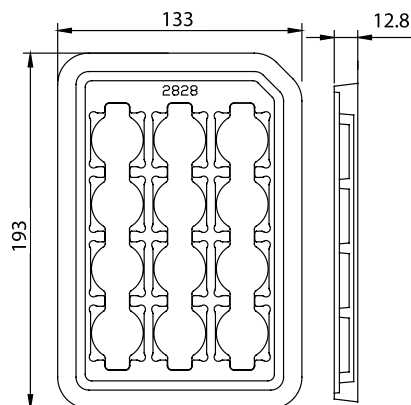


Packaging items for HM Series

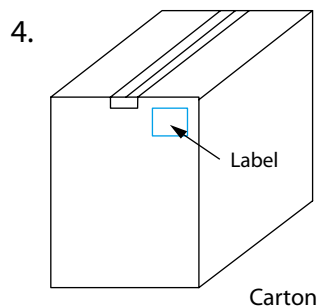
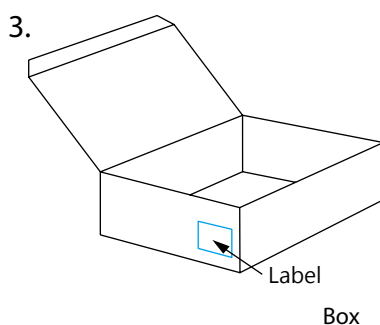
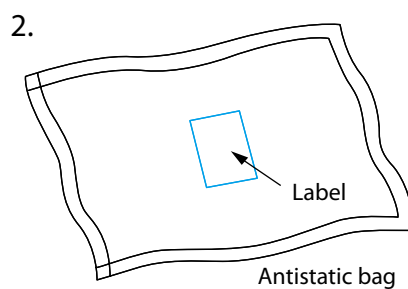
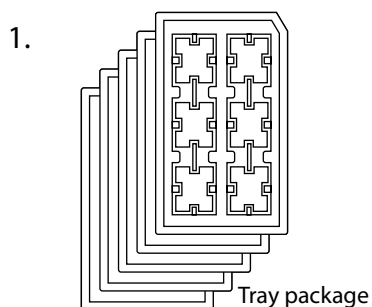
Notes:

1. All dimensions are in mm.
2. 5W/9W/13W: 25pcs emitters in a full tube
16W/24W/30W: 20pcs emitters in a full tube.
3. There are 20 tubes in a bag.
4. 5W/9W/13W: 6 bags in a carton
16W/24W/30W: 4 bags in a carton.
5. A bag contains one humidity indicator card and drying agent.

Tray Packing for 40W



Tray package dimension.



Packaging items for HM Series

Notes:

1. All dimensions are in mm.
2. There are 40W 12pcs emitters in a full tray.
3. There are 5 trays in a bag.
4. There are 10 bags in a box.
5. There are 10 boxes in a carton.
6. A bag contains one humidity indicator card and drying agent.

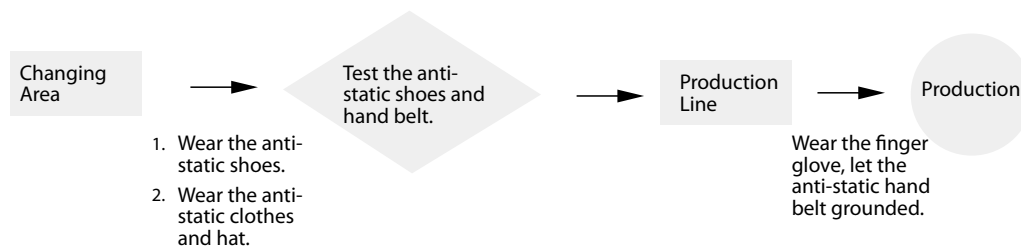
Handling with a EdiPower® III Series

Notification on Anti-static

LED device are combine by many accurate parts which belong to static sensitive device. A human body may aware of the discharge voltage about 2-3KV, which is much larger than an electronic device may bear. Therefore, to keep the LED operation environment away from static and lower the exits static become an important issue in a LED manufacture

1. Anti-Static Steps - All the staffs who has the possibility to contact with the LED components should follow the instructions to eliminate the static:

- Put on the hand or finger gloves before touch a LED device. (Do not use a nylon or rubber Glove)
- Do not do any actions that may generate the static in the protection area. Such as wipe hands or foot, put on/off the clothes.
- Avoid any movement that may cause static damages. When remove a component from the package, please be slow and gentle.
- Do not touch the metal part of a LED component.



2. Environmental anti-static protection

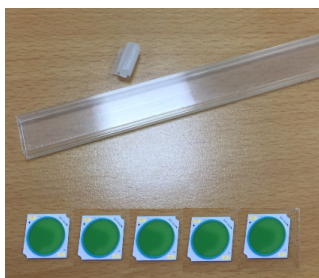
- Use an anti-static floor and make earth. Materials such as plastic or rubber contain carbon or conductive polyester is recommended.
- LEDs should be operated on the desk which is laid by the static discharge material.
- Protection area with a temperature at $22\pm 5^{\circ}\text{C}$ and a relative humidity at $70\pm 10\%\text{RH}$ are recommended.
- Layout an appropriate earth system. All the equipments should earth isolated into the ground or pillar.
- All soldering and testing equipments should also provide earth ability.
- Prevent the accumulation and the fractions between stuffs.

3. Anti-Static steps for package, transportation and storage.

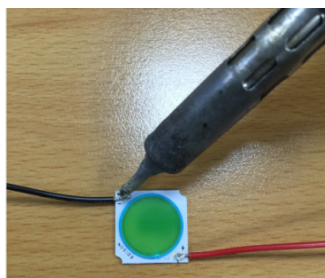
- Package: All the bags must have the ability of anti-static. Do not use any nylon bag, normal plastic bag or polyester bag for package. Do not open the bag if a LED is not ready to be handling. Open the bag at the protection area and put in a conductive case.
- Transportation: The cart should install the conductive wheels. Avoid the mechanical vibration and impacts.
- Storage: Be attention of the temperature and the relative humidity under the suggest condition.

Protector Operation Manual

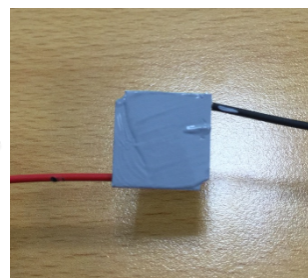
Take out the COB components from the material tube



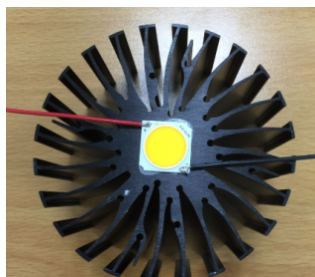
Solder electric wires



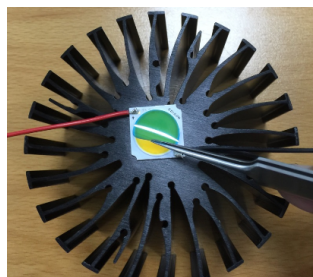
Backside coated with thermal grease



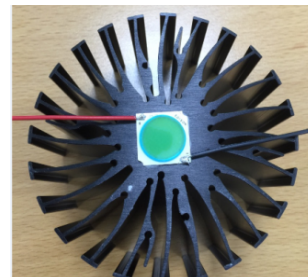
Complete operation process



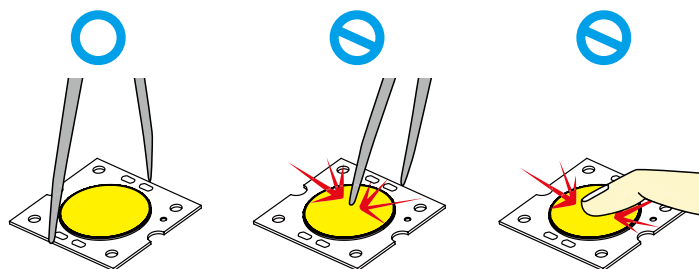
Remove the Blue protective film with tweezers



Mount the COB components to the heatsink modules



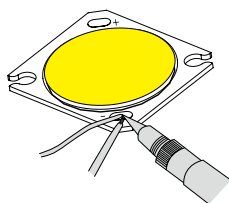
Handling with a EdiPower® III Component



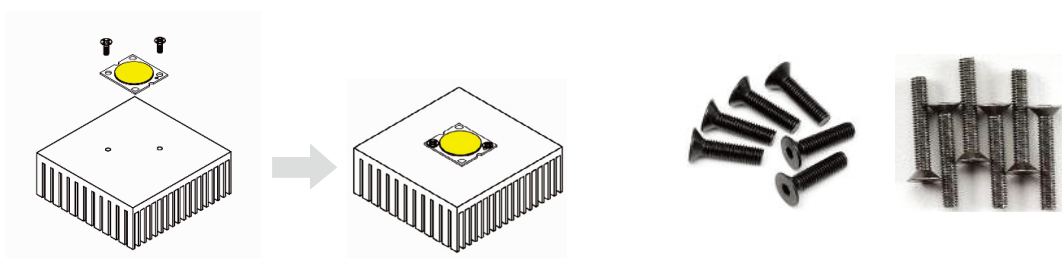
- Proper handling of the EdiPower® III using tweezers or gloved fingers.
- Do not touch the emitting region.
- Use only the IPA and swab to clean the flux/dust of the EdiPower® III surface. Other organic solvent may cause the failure

Notification of Installation.

1. Soldering pads are present for direct electrical wiring. Manual soldering at $360\pm 5^{\circ}\text{C}$, <5 secs are recommended.(No need with IR reflow process)



EdiPower® III can be secured with M2/M3 screws. To ensure optimal usage.



Recommendations:

Flat screws or countersunk screws are recommended.

Avoid the screw head touching the pad to prevent from the electric leakage.

Screw Torque Specification

Size	Tightening Torque (N·m)
M2	0.25~1
M3	1~1.25

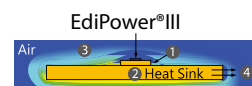
Thermal Management

About 80% of input power of a LED transform into heat. A high temperature operation condition always easily causes the LEDs to decrease of flux and the life decay of LED dies. The highest operation temperature of a component is able to be found in its datasheet which is indicated as T_j .

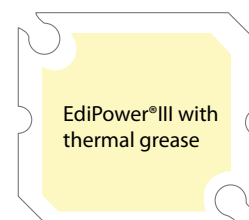
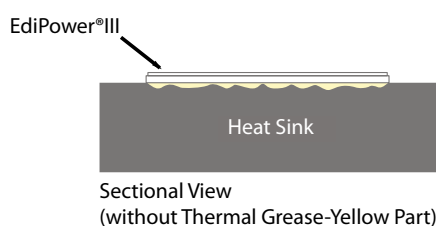
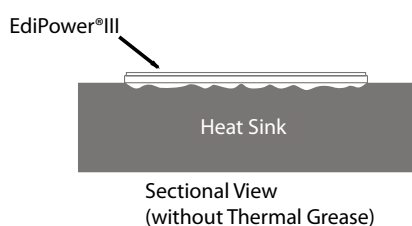
The power dissipation ability, the ambient temperature between the LED junction, environment, thermal path and its thermal resistance are the mean parameters which affect the performance of a LED device. Therefore, the limitation of the junction temperature has become an important issue when designing a LED product.

For LEDs, choose an appropriate operation environment and conduct the heat to the air after light on LEDs may maintain the better performance and lifetime. Four major thermal path are as follow:

- (1) From heat source (component) to heat sink. (By conduction)
- (2) Conduction from within the heat sink to its surface. (By conduction)
- (3) Transfer from the surface to the surrounding air. (By convection)
- (4) Emit heat from the heat sink surface. (By Radiation)



Path(1): The contact surface of the component and heat sink are not perfectly flat, they are not able to meet each other completely. Air between these two materials will result high thermal resistance and reduce the effect of heat transfer. To enhance the ability of thermal conduction, one common method is applying thermal grease between the two interfaces and use the screws to enforce the adhesion between two surface.



Recommended thermal Grease Parameters

Characteristics	Value	Unit
Thermal Conductivity (K)	>3.0	W/m ² K
Thickness	≤0.1	mm

Revision History

Versions	Description	Release Date
1	Establish order code information	2015/03/02
2	Update characteristic curve	2015/04/10
3	Update luminous flux characteristic	2015/10/07
4	Add Protector Operation Manual	2015/10/29

About Edison Opto

Edison Opto is a leading manufacturer of high power LED and a solution provider experienced in LDMS. LDMS is an integrated program derived from the four essential technologies in LED lighting applications- Thermal Management, Electrical Scheme, Mechanical Refinement, Optical Optimization, to provide customer with various LED components and modules. More Information about the company and our products can be found at www.edison-opto.com

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