Edixeon® 1NA5 Series

Edixeon® 1NA5 series emitters are one of the highest flux LEDs in the world by Edison Opto. Edixeon® 1NA5 series emitters are designed to satisfy more and more Solid-State lighting High Power LED applications for brilliant world such as flash light, indoor and outdoor decoration light. Edixeon® 1NA5 series emitters are designed by particular package for High Power LED. 1W Edixeon® white has typical 90 lumens @350mA. Unlike most fluorescent sources, Edixeon® contains no mercury and has more energy efficient than other incandescent light source.

Features

- More energy efficient than incandescent and most halogen lamps
- Low voltage operation
- Instant light
- Long operating life

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Product Nomenclature

The following table describes the available color, power, and lens type. For more flux and forward voltage information, please consult the Bin Group document.

< Table 1 Edixeon® series nomenclature >

E	D	E	W	-	1	N	A	5	-	B	1	-	A	B	16
X1		X2	X3		X4	X5	X6	X7		X8	X9		X10	X11	X12

X1 LED Item

Code	Type
ED	Edixeon®

X2 Module

Code	Type
E	Emitter
S	Star

X3 Emitting Color

Code	Type
W	Cool White
H	Neutral White
X	Warm White

X4 Power

Code	Type
1	1W

X5 Lens Item

Code	Type
N	New Focusing

X6 Serial NO.1

X7 Serial NO.2

X8 Serial NO.3

X9 Testing Current

Code	Type
1	350mA

X10 Shape Item

Code	Type
A	Star
B	Square(25*25mm)
C	Square(30*30mm)

X11 AI PCB Color

Code	Type
W	White
B	Black

X12 Thickness

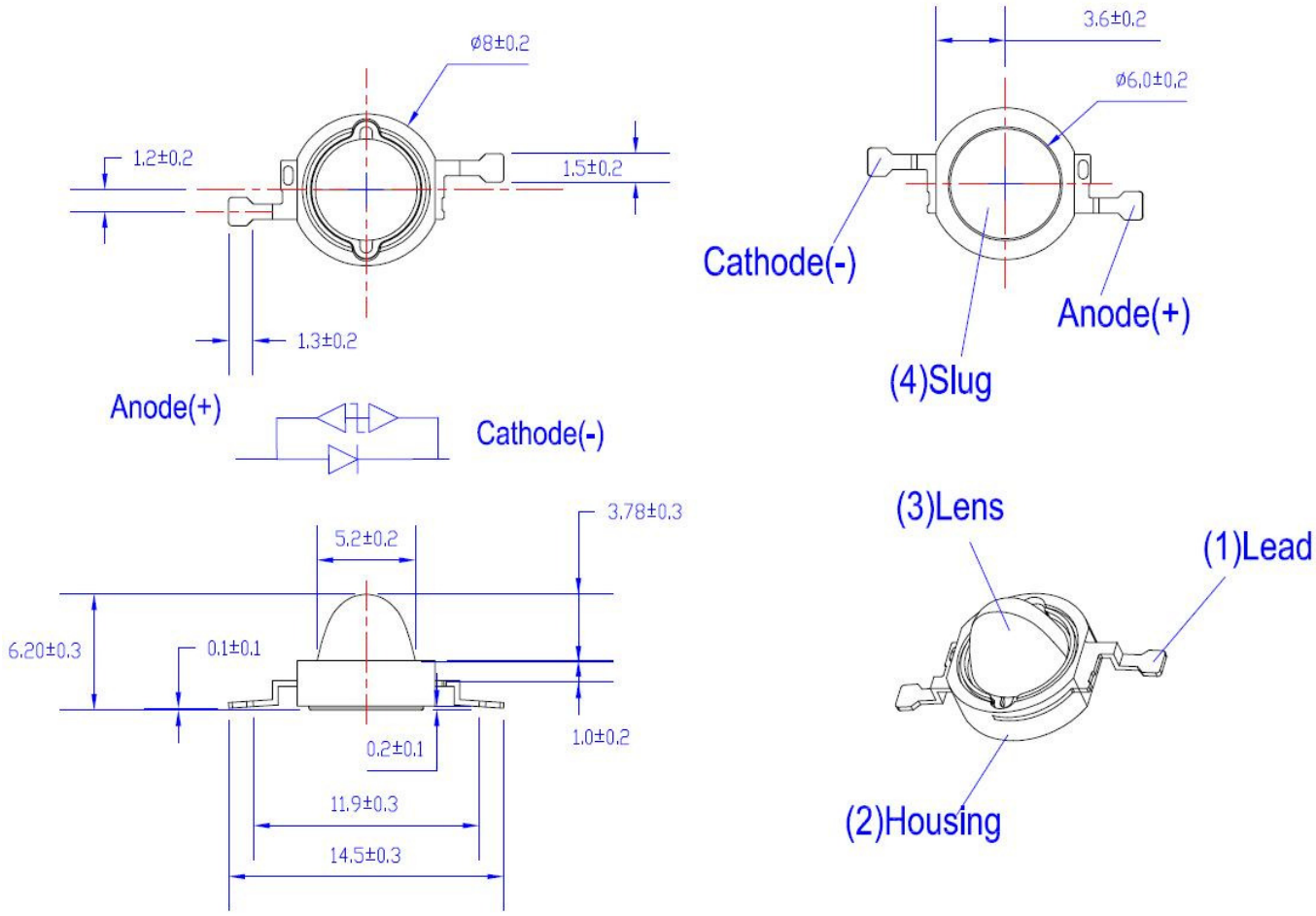
Code	Type
16	1.6mm
20	2.0mm

Environmental Compliance

Edixeon® 1NA5 series are compliant to the Restriction of Hazardous Substances Directive or RoHS. The restricted materials including lead, mercury cadmium hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ether (PBDE) are not used in Edixeon® series to provide an environmentally friendly product to the customers.

LED Package Dimensions and Polarity

Edixeon® 1NA5 Series



< Figure 1 Edixeon® 1NA5 series dimensions >

Notes:

1. All dimensions are in mm.
2. It is strongly recommended that the temperature of lead dose exceed 55℃.
3. Lambertian and side emitting series slug has polarity as anode.
4. It is important that the slug can't contact aluminum surface, It is strongly recommended that there should coat a uniform electrically isolated heat dissipation film on the aluminum surface.

Absolute Maximum Ratings

The following tables describe characteristics of Edixeon® 1NA5 series under various current.

< Table 2 Absolute maximum ratings for Edixeon® 1NA5 series >

Notes:

Parameter	Rating(1W)	Unit	Symbol
DC Forward Current	350	mA	I_F
Peak pulse current;(tp≦100μs, Duty cycle=0.25)	500	mA	
Reverse Voltage	5	V	V_R
Forward Voltage	5	V	V_F
LED junction Temperature (at DC Forward Current)	125	℃	T_J
Operating Temperature	-30 ~ +110	℃	
Storage Temperature	-40 ~ +120	℃	
ESD Sensitivity (Lambertian & Side Emitting)	4,000	V	
ESD Sensitivity (Batwing & Focusing)	500	V	
Manual Soldering Time at 260℃(Max.)	5	Sec.	

1. Proper current derating must be observed to maintain junction temperature below the maximum at all time.
2. LEDs are not designed to be driven in reverse bias.
3. tp: Pulse width time

Luminous Flux Characteristics

The following tables describe flux of Edixeon® 1NA5 series under various current and different colors

< Table 3 Luminous flux characteristic at I_F=350mA and T_J=25℃ : for 1W Edixeon® series >

Lens Item	Part Name	Color	Flux			Unit
			Min.	Typ.	Max.	
New Focusing	EDEW-1NA5-B1	Cool White	70.0	90.0	--	lm
	EDEH-1NA5-E1	Neutral White	60.0	75.0	--	lm
	EDEX-1NA5-E1	Warm White	51.2	60.0	--	lm

Notes:

1. Flux is measured with an accuracy of ± 10%
2. All cool white, neutral white, warm white, emitters are built with InGaN

Forward Voltage Characteristics

The following tables describe forward voltage of Edixeon® series under various current.

< Table 4 Forward voltage characteristics at I_F=350mA and T_J =25℃ for 1W Edixeon® series>

Lens Item	Part Name	Color	V_F		Unit
			Min.	Max.	
New Focusing	EDEW-1NA5-B1	Cool White	3.1	4.0	V
	EDEH-1NA5-E1	Neutral White	3.1	4.0	V
	EDEX-1NA5-E1	Warm White	3.1	4.0	V

Note:

1. Forward voltage is measured with an accuracy of ± 0.1V

JEDEC Information

JEDEC is used to determine what classification level should be used for initial reliability qualification. Once identified, the LEDs can be properly packaged, stored and handled to avoid subsequent thermal and mechanical damage during the assembly solder attachment and/or repair operation. The present moisture sensitivity standard contains six levels, the lower the level, the longer the devices floor life. Edixeon® 1NA5 series are certified at level 4. This means Edixeon® 1NA5 series have a floor life of 72 hours before Edixeon® 1NA5 series need to re-baked.

< Table 5 JEDEC characteristics at T_J=25℃ for Edixeon® 1NA5 series >

Level	Floor Life		Soak Requirements			
			Standard		Accelerated Environment	
	Time	Conditions	Time (hours)	Conditions	Time (hours)	Conditions
4	72hours	≦30℃ / 60% RH	96[1] +5/-0	30℃ / 60% RH	20 +0.5/-0	60℃ / 60% RH

Level	Floor Life		Soak Requirements			
			Standard		Accelerated Equivalent	
	Time	Condition	Time(hours)	Condition	Time(hours)	Condition
1	Unlimited	≦30℃/85% RH	168 +5/-0	85℃/85% RH		
2	1 year	≦30℃/60% RH	168 +5/-0	85℃/60% RH		
2a	4 weeks	≦30℃/60% RH	696[1] +5/-0	30℃/60% RH	120 +1/-0	60℃/60% RH
3	168 hours	≦30℃/60% RH	192[1] +5/-0	30℃/60% RH	40 +5/-0	60℃/60% RH
4	72 hours	≦30℃/60% RH	96[1] +5/-0	30℃/60% RH	20 +5/-0	60℃/60% RH
5	48 hours	≦30℃/60% RH	72[1] +5/-0	30℃/60% RH	15 +5/-0	60℃/60% RH
5a	24 hours	≦30℃/60% RH	48[1] +5/-0	30℃/60% RH	10 +5/-0	60℃/60% RH
6	Time on tabel (TOL)	≦30℃/60% RH	TOL	30℃/60% RH		

Note:

1. The standard soak time includes a default value of 24 hours for semiconductor manufacturer's exposure time (MET) between bake and bag, and includes the maximum time allowed out of the bag at the distributor's facility.

Reliability Items and Failure Measures

Reliability test

The following table describes operating life, mechanical, and environmental tests performed on Edixeon® series package.

< Table 6 Operating life, mechanical, and environmental characteristics and T_J=25℃ for Edixeon® 1NA5 series >

Stress Test	Stress Conditions	Stress Duration	Failure Criteria
Room Temperature Operating Life	25℃, I_F = I_F Max DC (Note 1)	1,000 hours	Note 2
High Temperature High Humidity	85℃ / 85%RH	1,000 hours	Note 2
Temperature Cycle	-40℃/100℃ ,30 min dwell /＜5min transfer	500 cycles	Note 2
High Temperature Storage Life	110℃	1,000 hours	Note 2
Low Temperature Storage Life	-40℃	1,000 hours	Note 2
Thermal Shock	-40 / 125℃, 15 min dwell＜10 sec transfer	200 cycles	No catastrophics
Mechanical Shock	1500 G, 0.5 msec pulse, 5 shocks, each of 6 axis		No catastrophics
Natural Drop	On concrete from 1.2 m, 3X		No catastrophics
Variable Vibration Frequency	10-2000-10 Hz, log or linear sweep rate, 20 G about 1 min, 1.5 mm, 3X/axis		No catastrophics
Solder Heat Resistance (SHR)	260℃ ± 5℃, 10 sec		No catastrophics

Notes:

1. Depending on the maximum derating curve.
2. Failure Criteria:
   Electrical failures
   V_F shift >=10%
   Light Output Degradation
   % Iv shift >= 30% @1,000hrs or 200cycle
   Visual failures
   Broken or damaged package or lead
   Solderability < 95% wetting
   Dimensions out of tolerance

Failure Types

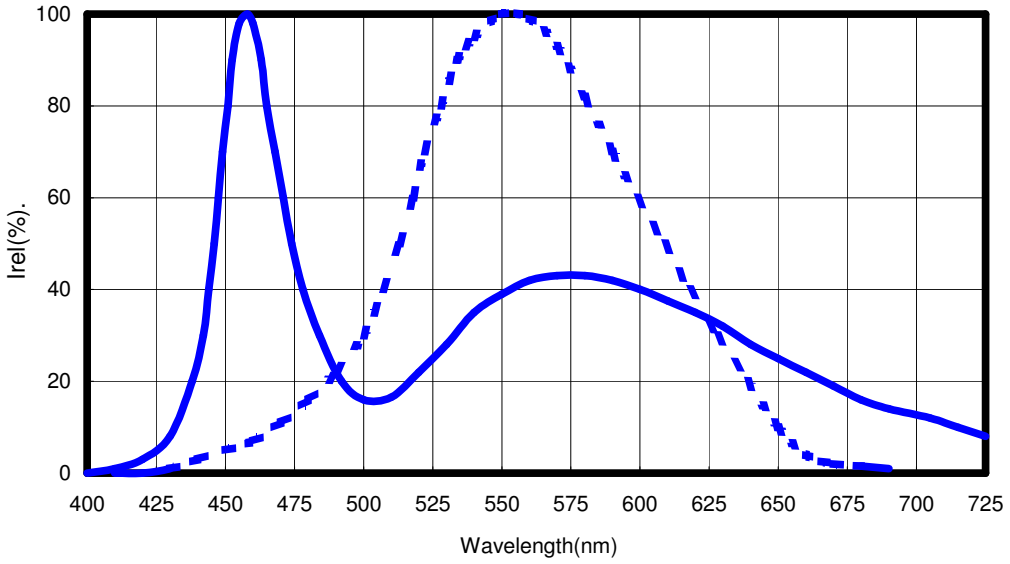
Catastrophic failures are failures that result in the LED emitting no light or very little light at normal current levels (e.g. 350 mA). Catastrophic failures are not expected for Edixeon® 1NA5 series that are handled and operated within the limits specified in Edixeon® documentation. Please refer to Absolute Maximum Ratings for more information on design limits.

Parametric failures are failures that cause key characteristics to shift outside of acceptable bounds. The most common parametric failure, for a high-power LED, is permanent light output degradation over operating life. Most other light sources experience catastrophic failure at the end of their useful life, providing a clear indication that the light source must be replaced. For instance, the filament of an incandescent light bulb breaks and the bulb ceases to create light. In contrast, high-power LEDs generally do not experience catastrophic failure but simply become too dim to be useful in the intended application. Further discussion of this matter can be found in the Long-Term Lumen Maintenance Testing section of this document.

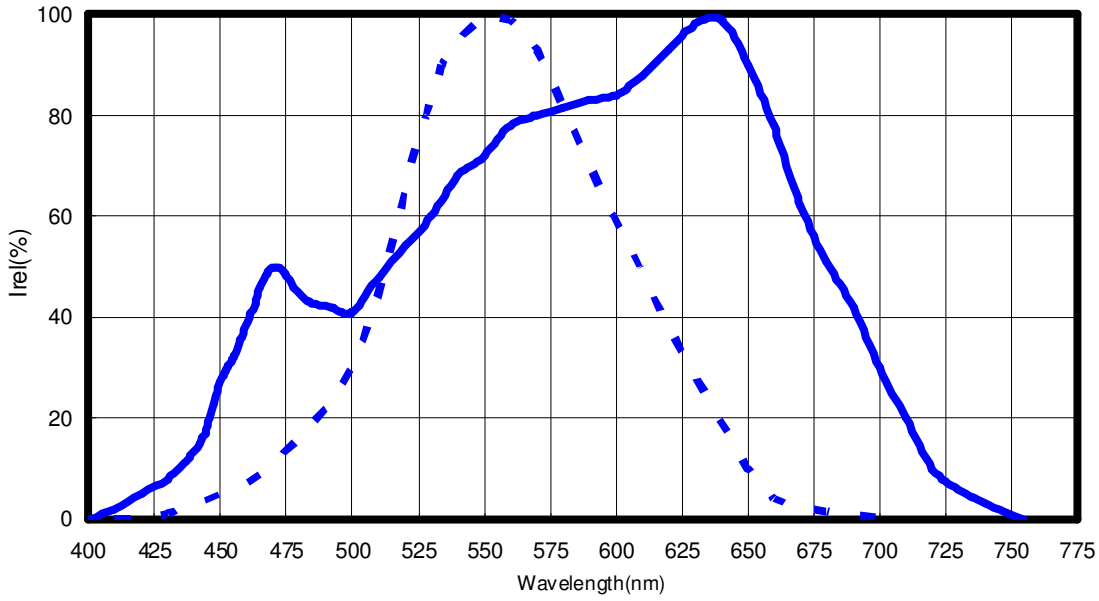
Another parametric failure common to white LEDs is a large and permanent shift in the exact color of white light output, called the white point or color point. A shift in white point may not be detectable in one LED by itself, but would be obvious in a side-by-side comparison of multiple LEDs. Since each lighting installation commonly uses many high-power LEDs, white point stability is a point of concern for lighting designers. Typically, white high-power LEDs, created by combining blue LEDs with yellow (and sometimes red) phosphor, will shift towards blue over operational life. This shift can be accelerated by high temperatures and high drive currents. For example, a cool white (e.g., 6500K CCT) LED with a white point failure will typically appear light blue instead of white. In some high-power LEDs, this failure mode can occur after just 1,000 hours of operational life.

Just as with fluorescent light sources, all white high-power LEDs will experience shifts in white point over their operating lives. It is possible for the design of the phosphor and packaging systems to minimize these shifts and contain the shifts to be less than what is detectable by the human eye. As with catastrophic failures, parametric failures can be minimized by adhering to limits specified in Edixeon® documentation.

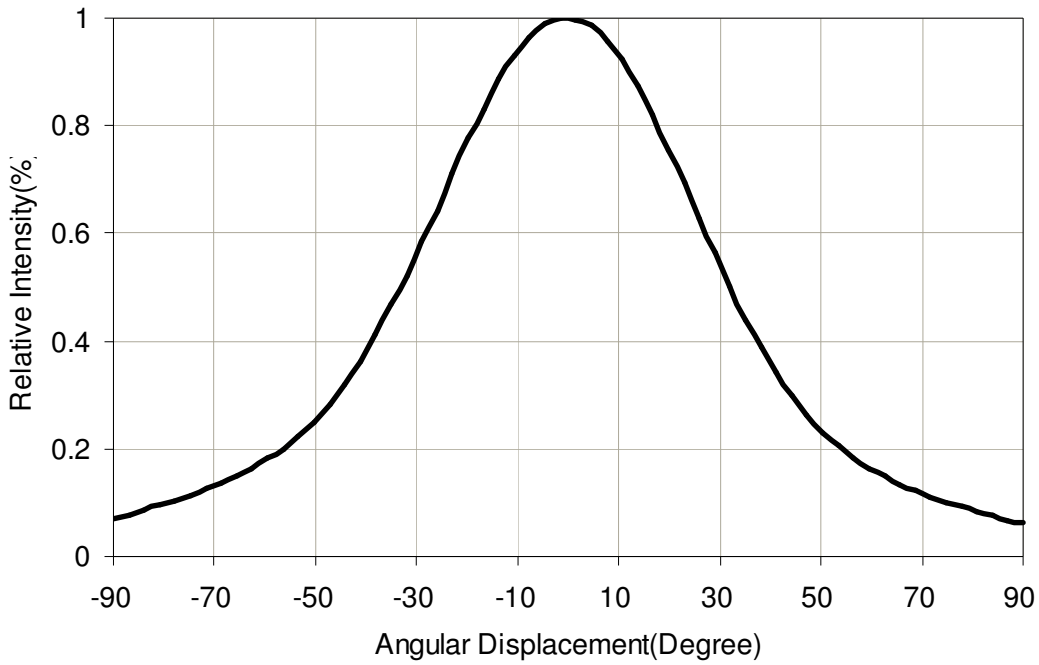
Color Spectrum and Radiation Pattern



<Figure 2 Cool white color spectrum at T_J =25℃.for Edixeon® series >



< Figure 3 Neutral white and warm white color spectrum at T_J =25℃.
for Edixeon® 1NA5 series >



< Figure 4.Lambertain at T_J=25℃ for cool white, neutral white, and warm white >

Color Temperature or Dominant Wavelength Characteristics T_J=25℃

< Table 7 Dominant wavelength or color temperature characteristics at T_J=25℃ for 1W Edixeon® 1NA5 series >

Lens Item	Part Name	Color	CCT		Unit
			Min.	Max.	
New Focusing	EDEW-1NA5-B1	Cool White	5,000	10,000	K
	EDEH-1NA5-E1	Neutral White	3,800	5,000	K
	EDEX-1NA5-E1	Warm White	2,670	3,800	K

Notes:

1. Wavelength is measured with an accuracy of ± 0.5nm
2. CCT is measured with an accuracy of ± 200K

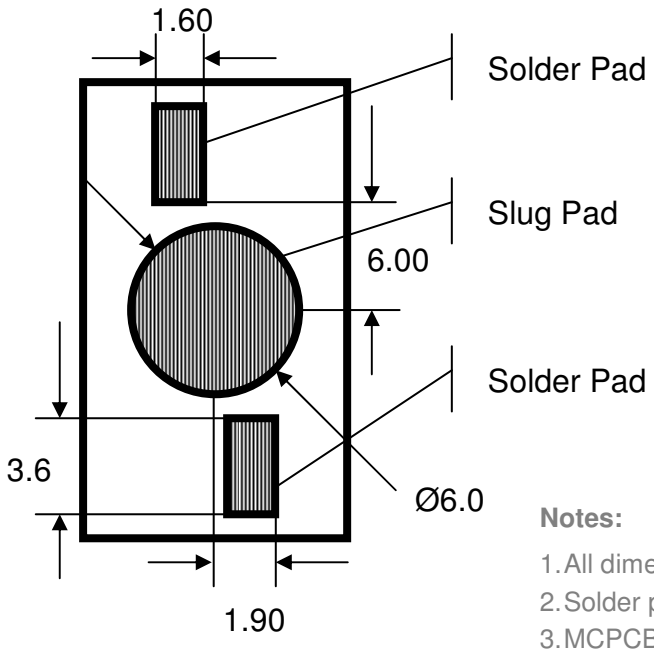
Emission Angle Characteristics

< Table 8 Emission angle characteristics at T_J =25℃ for 1W Edixeon® 1NA5 series >

Part Name	Color	2Θ½(Typ.) New Focusing	Unit
EDEW-1NA5-B1	Cool White	70	Deg.
EDEH-1NA5-E1	Neutral White	70	Deg.
EDEX-1NA5-E1	Warm White	70	Deg.

Product Soldering Instructions

The central circle pad at the bottom face of the package provides the main path for heat dissipation from the LED to the heat sink (heat sink contact).



< Figure 5 Pad dimensions >

Notes:

1. All dimensions are measured in mm.
2. Solder pad cannot be connected to slug pad.
3. MCPCB material with a thermal conductivity greater than 3.0 W/mK.
4. Please avoid touching the Edixeon® lens during assembly processes .This may cause pollution or scratch on the surface of lens.
5. Edixeon® 1NA5 series can not be heated over 150ºC.

The choice of solder and the application method will dictate the specific amount of solder. For most consistent results, an automated dispensing system or a solder stencil printer is recommended.

Positive results will be used solder thickness that results in 50μm. The lamp can be placed on the PCB simultaneously with any other required SMD devices and reflow completed in a single step. Automated pick-and-place tools are recommended.

The central slug at the bottom face of the package provides the main path for heat dissipation from the LED to the heat sink (heat sink contact). A key feature of Edixeon® 1NA5 series is an electrically neutral heat path that is separate from the LED's electrical contacts. This electrically isolated thermal pad makes Edixeon® 1NA5 series perfect for use with either FR4 circuit boards with thermal via or with metal-core printed circuit boards (MCPCB).

Recommend Solder Steps

To prevent mechanical failure of LEDs in the soldering process, a carefully controlled pre-heat and post-cooling sequence is necessary. The heating rate in an IR furnace depends on the absorption coefficients of the material surfaces and on the ratio of the component's mass to its irradiated surface. The temperature of parts in an IR furnace, with a mixture of radiation and convection, cannot be determined in advance. Temperature measurement may be performed by measuring the temperature of a specific component while it is being transported through the furnace. Influencing parameters on the internal temperature of the component are as follows:

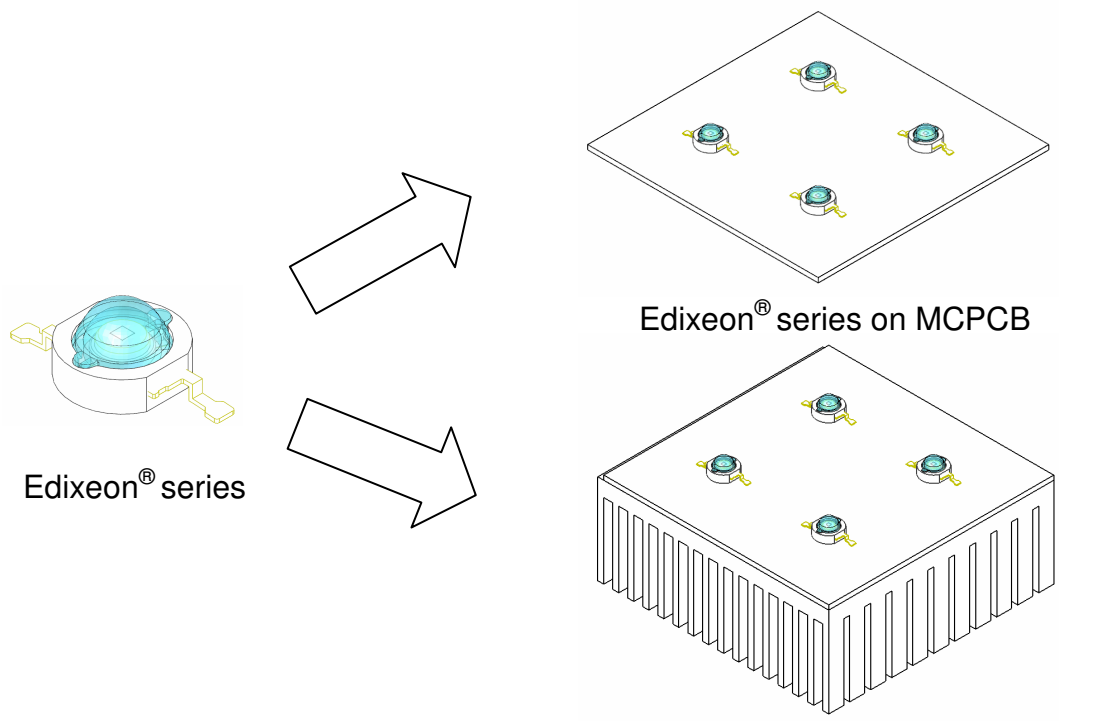
• Time and power
• Mass of the component (for Edixeon® 1NA5 series on MCPCB)
• Size of the component
• Size of the printed circuit board
• Absorption coefficient of the surfaces and MCPCB
• Packing density

Peak temperatures can vary greatly across the PC board during IR processes. The variables that contribute to this wide temperature range include the furnace type and the size, mass and relative location of the components on the board. Profiles must be carefully tested to determine the hottest and coolest points on the board. The hottest and coolest points should fall within the recommended temperatures. The profile of the reflow system should be based on design needs, the selected solder system and the solder-paste manufacturer's recommended reflow profile.

Product Thermal Application Information

Thermal grease should be evenly speeded with a thickness <100um.

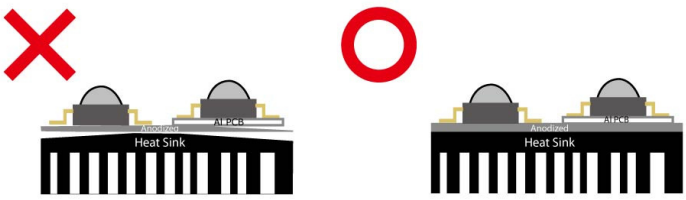
When assembling on MCPCB or heat sink carrier.



< Figure 6 Edixeon® series heat sink application >

—It is strongly recommanded the heat sink should be anodized.

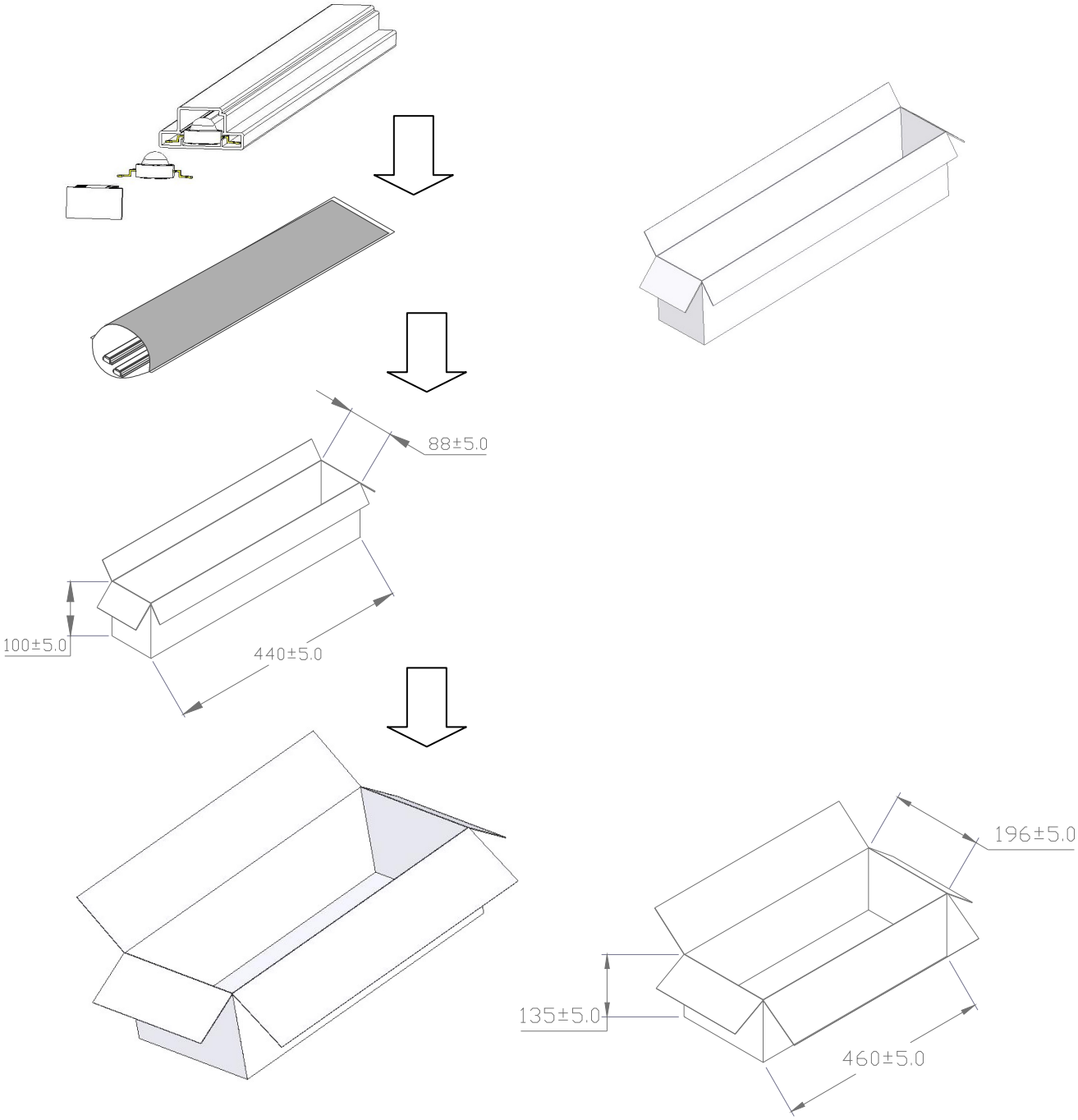
—Please ensure the heat sink is flat enough to prevent the bad heat conductivity.



< Figure 7.Edixeon® series assemble with heat sink >

Product Packaging Information

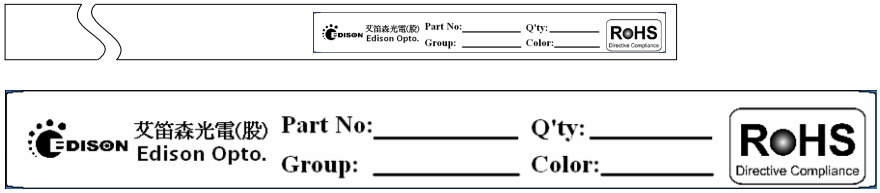
Package Specifications



< Figure 8 Package steps and dimensions >

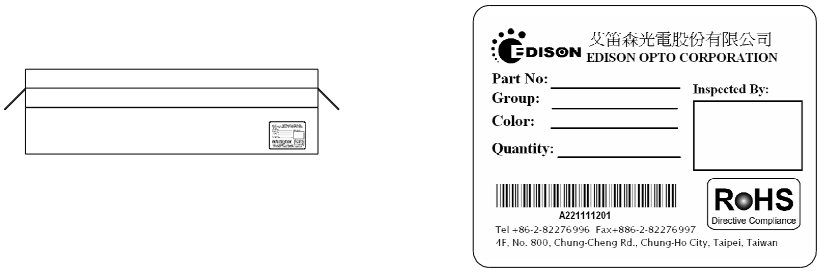
Label

Label on tube：



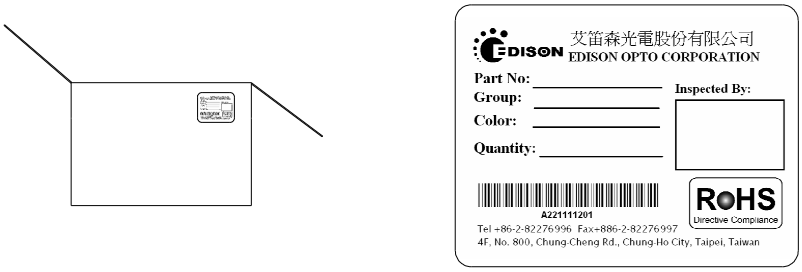
< Figure 9 Label on tube >

Label on inner box：



< Figure 10 Label on inner box >

Label on outer box：



< Figure 11 Label on outer box >

Notes:

1. All dimensions are in mm.
2. There are 50 emitters in a tube
3. There are 20 tubes in a bag.
4. There are 2 bags in a inner box
5. A bag contains one humidity indicator card and drying agent