Edixeon® Series

Edixeon® series emitters are one of the highest flux LEDs in the world by Edison Opto. Edixeon® 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® series emitters are designed by particular package for High Power LED. 1W Edixeon® white has typical 95 lumens @350mA. Unlike most fluorescent sources, Edixeon® contains no mercury and has more energy efficient than other incandescent light source.

Features

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

Table of Contents

Product Nomenclature 2
Environmental Compliance 3
LED Package Dimensions and Polarity 4
LED Package with Star Dimensions and Polarity 5
Absolute Maximum Ratings 6
Luminous Flux Characteristics 8
Forward Voltage Characteristics 10
JEDEC Information 11
Reliability Items and Failure Measures 12
Color Spectrum and Radiation Pattern 16
Optical & Electrical Characteristics 23
Product Soldering Instructions 31
Product Thermal Application Information 33
Product Electrical Application Information 38
Product Packaging Information 39
Star Product Packaging Information 41

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 >

ED	E	X	-	1	L	A	5	-	E	1	-	A	B	16
X1	X2	X3		X4	X5	X6	X7		X8	X9		X10	X11	X12

X1 LED Item		X2 Module		X3 Emitting Color		X4 Power		X5 Lens Item		X6 Housing Item	
Code	Type	Code	Type	Code	Type	Code	Type	Code	Type	Code	Type
ED	Edixeon®	E	Emitter	W	Cool White	1	1 W	L	Lambertian (140°)	A	White
		S	Star	H	Neutral White	3	3 W	B	Batwing (±40°)		
				X	Warm White			S	Side Emitting (±80°)		
				R	Red			F	Focusing (80°)		
				A	Amber						
				T	True Green						
				B	Blue						

X7 Material	X8 Phosphor Item	X9 Testing Current		X10 Shape Item		X11 Al PCB Color		X12 Thickness	
		Code	Type	Code	Type	Code	Type	Code	Type
		1	350mA	A	Star	W	White	10	1.0mm
		3	700mA	B	Square(25*25mm)	G	Green	16	1.6mm
				C	Square(30*30mm)	B	Black	20	2.0mm

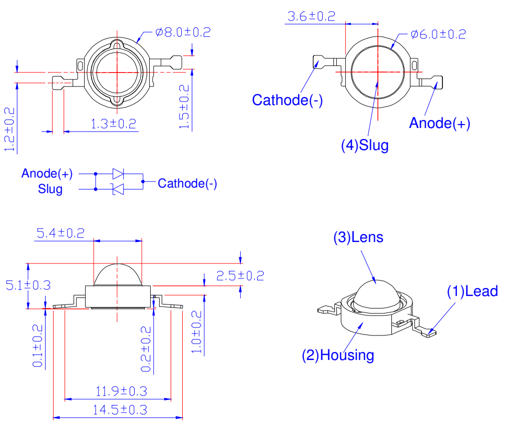
Environmental Compliance

Edixeon® 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.

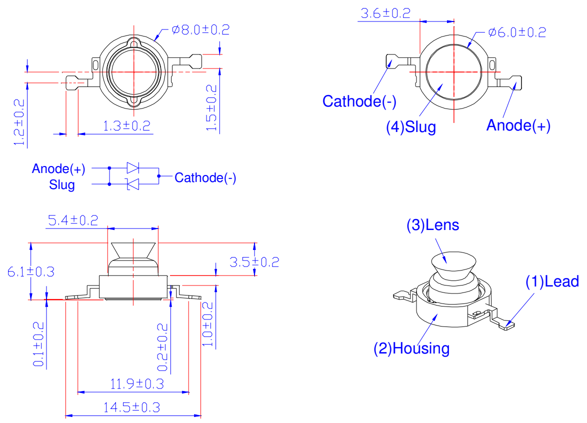
LED Package Dimensions and Polarity

Lambertian, Side Emitting, Batwing, and Focusing Emitter Type

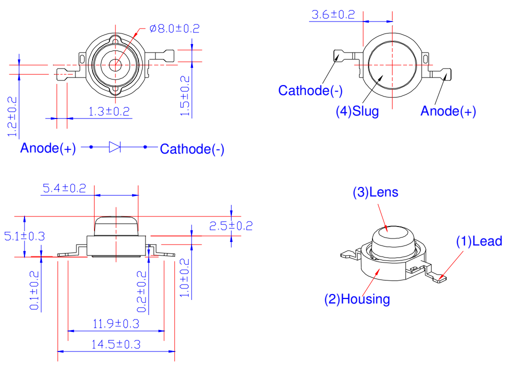
Lambertian



Side Emitting



Batwing



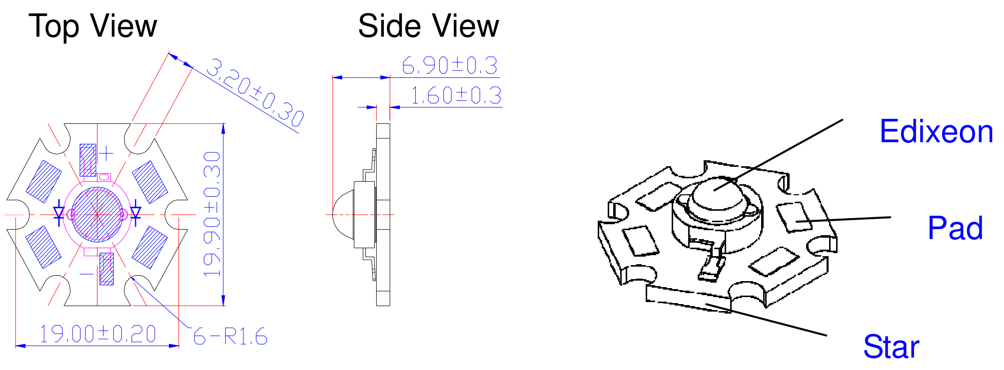
< Figure 1 Edixeon® series dimensions >

Notes:

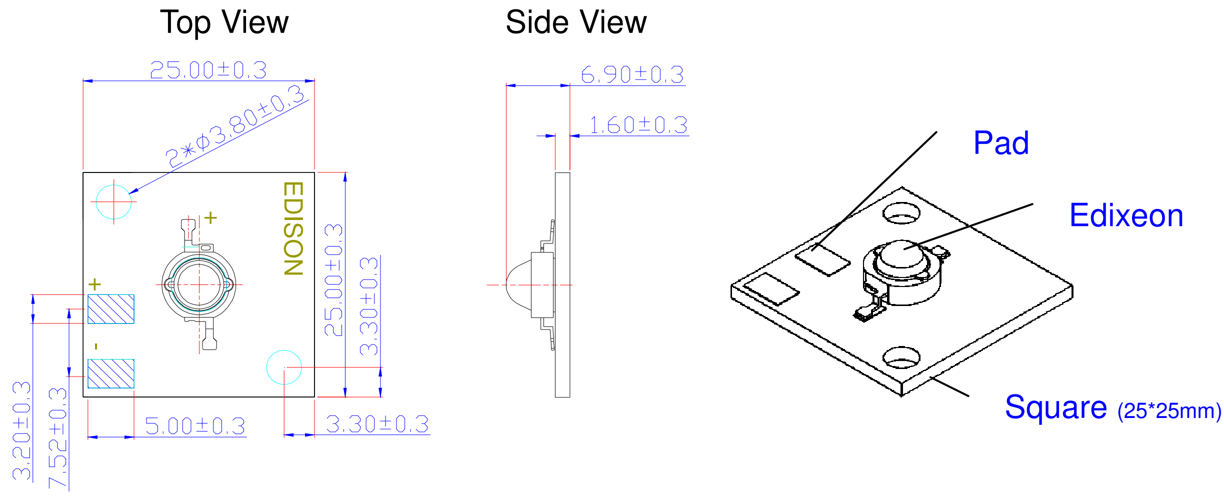
1. All dimensions are in mm.
2. It is strongly recommended that the temperature of lead dose exceed 55℃.
3. Lambertian and side emitting series slug has polarity as anode.
4. It is important that the slug can't contact aluminum surface, It is strongly recommended that there should coat a uniform electrically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

LED Package with Star Dimensions and Polarity

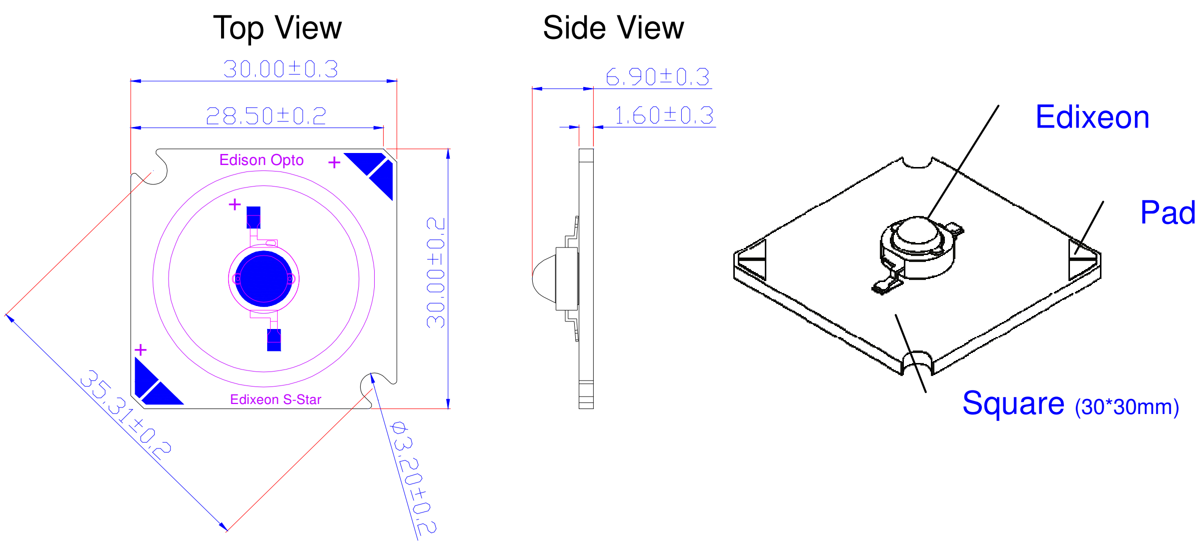
EDSx-xxxx-xx-Ax16



EDSx-xxxx-xx-Bx16



EDSx-xxxx-xx-Cx16



<Figure 2 Edixeon® star dimensions>

Notes:

1.All Dimensions are in mm.

Absolute Maximum Ratings

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

< Table 2 Absolute maximum ratings for Edixeon® series>

Parameter	Rating(1W)	Rating(3W)	Unit	Symbol
DC Forward Current	350	700	mA	I_F
Peak pulse current;(tp≦100μs, Duty cycle=0.25)	700	1,000	mA	
Reverse Voltage	5	5	V	V_R
Forward Voltage	5	5	V	V_F
LED junction Temperature (at DC Forward Current)	125	125	℃	T_J
Operating Temperature	-30 ~ +110	-30 ~ +110	℃	
Storage Temperature	-40 ~ +120	-40 ~ +120	℃	
ESD Sensitivity (Lambertian & Side Emitting)	4,000	4,000	V	
ESD Sensitivity (Amber)	--	500	V	
ESD Sensitivity (Batwing & Focusing)	500	--	V	
Manual Soldering Time at 260℃(Max.)	5	5	Sec.	

Notes:

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

The following tables describe thermal resistance of Edixeon® series under various current and different colors

< Table 3 Temperature Coefficient of Forward Voltage & Thermal Resistance Junction to Case Characteristics at T_J=25℃ for 1W Edixeon® series>

Lens Item	Part Name	Color	△V_F/△T		$R\theta_{J-B}$	
			Typ.	Unit	Typ.	Unit
Lambertian	EDEW-1LAx	Cool White	-2	mV/℃	15	℃/W
	EDEH-1LAx-E1	Neutral White	-2	mV/℃	15	℃/W
	EDEX-1LAx-E1	Warm White	-2	mV/℃	15	℃/W
	EDER-1LA3	Red	-2	mV/℃	15	℃/W
	EDEA-1LA3	Amber	-2	mV/℃	15	℃/W
	EDET-1LA2	True Green	-2	mV/℃	15	℃/W
	EDEB-1LA5	Blue	-2	mV/℃	15	℃/W
Lens Item	**Part Name**	**Color**	**△V_F/△T**		**$R\theta_{J-B}$**	
			Typ.	**Unit**	**Typ.**	**Unit**
Side Emitting Batwing Focusing	EDEW-1xA5	Cool White	-2	mV/℃	15	℃/W

< Table 4 Temperature Coefficient of Forward Voltage & Thermal Resistance Junction to Case Characteristics at Tj=25℃ for 3W Edixeon® series>

Lens Item	Part Name	Color	△V_F/△T		$R\theta_{J-B}$	
			Typ.	Unit	Typ.	Unit
Lambertian	EDEW-3LA1-1	Cool White	-2	mV/℃	15	℃/W
	EDEH-3LA1-E3	Neutral White	-2	mV/℃	15	℃/W
	EDEX-3LA1-E3	Warm White	-2	mV/℃	15	℃/W
	EDER-3LA3-1	Red	-2	mV/℃	15	℃/W
	EDEA-3LA3	Amber	-2	mV/℃	15	℃/W
	EDET-3LA1-1	True Green	-2	mV/℃	15	℃/W
	EDEB-3LA1-1	Blue	-2	mV/℃	15	℃/W

Luminous Flux Characteristics

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

< Table 5 Luminous flux characteristics at I_F=350mA and T_J=25℃ : for 1W Edixeon® series >

Lens Item	Part Name	Color	Flux			Unit
			Min.	Typ.	Max.	
Lambertian	EDEW-1LA5	Cool White	66.5	95.0	--	lm
	EDEH-1LA5-E1	Neutral White	51.2	75.0	--	lm
	EDEX-1LA5-E1	Warm White	39.4	65.0	--	lm
	EDEW-1LA5-D1	Cool White	39.4	50.0	--	lm
	EDEH-1LA5-D1	Neutral White	23.3	40.0	--	lm
	EDEX-1LA5-D1	Warm White	23.3	35.0	--	lm
	EDER-1LA3	Red	23.3	45.0	--	lm
	EDEA-1LA3	Amber	23.3	45.0	--	lm
	EDET-1LA2	True Green	39.4	70.0	--	lm
	EDEB-1LA5	Blue	8.2	20.0	--	lm

Lens Item	Part Name	Color	Flux			Unit
			Min.	Typ.	Max.	
Side emitting Batwing Focusing	EDEW-1xA5	Cool White	51.2	75.0	--	lm

< Table 6 Luminous flux characteristics at I_F=700mA and T_J=25℃: for 3W Edixeon® series >

Lens Item	Part Name	Color	Flux			Unit
			Min.	Typ.	Max.	
Lambertian	EDEW-3LA1-1	Cool White	86.5	150.0	--	lm
	EDEH-3LA1-E3	Neutral White	66.5	125.0	--	lm
	EDEX-3LA1-E3	Warm White	51.2	105.0	--	lm
	EDEW-3LA1-D3	Cool White	51.2	75.0	--	lm
	EDEH-3LA1-D3	Neutral White	39.4	65.0	--	lm
	EDEX-3LA1-D3	Warm White	39.4	60.0	--	lm
	EDER-3LA3-1	Red	66.5	80.0	--	lm
	EDEA-3LA3	Amber	66.5	85.0	--	lm
	EDET-3LA1-1	True Green	86.5	120.0	--	lm
	EDEB-3LA1-1	Blue	17.9	30.0	--	lm

Notes:

1. Flux is measured with an accuracy of ± 10%
2. All cool white, neutral white, warm white, true green and blue emitters are built with InGaN
3. All red and amber emitters are built with AlGaInP
4. Blue power light source represented here is IEC60825 class 2 for eye safety.
5. Red and true green light source represented here are IEC60825 class 1 for eye safety.

Forward Voltage Characteristics

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

< Table 7 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.	
Lambertian	EDEW-1LA5	Cool White	3.1	4.0	V
	EDEW-1LA5-x1	Cool White	3.1	4.0	V
	EDEH-1LA5-x1	Neutral White	3.1	4.0	V
	EDEX-1LA5-x1	Warm White	3.1	4.0	V
	EDER-1LA3	Red	2.0	3.0	V
	EDEA-1LA3	Amber	2.0	3.0	V
	EDET-1LA2	True Green	3.1	4.0	V
	EDEB-1LA5	Blue	3.1	4.0	V
Lens Item	Part Name	Color	V_F		Unit
			Min	Max	
Side emitting Batwing Focusing	EDEW-1xA5	Cool White	3.1	4.0	V

<Table 8 Forward voltage characteristics at I_F=700mA and T_J=25℃ for 3W Edixeon® series>

Lens Item	Part Name	Color	V_F		Unit
			Min.	Max.	
Lambertian	EDEW-3LA1-1	Cool White	3.1	4.3	V
	EDEW-3LA1-D3	Cool White	3.1	4.3	V
	EDEH-3LA1-x3	Neutral White	3.1	4.3	V
	EDEX-3LA1-x3	Warm White	3.1	4.3	V
	EDER-3LA3-1	Red	2.0	3.0	V
	EDEA-3LA3	Amber	2.0	3.0	V
	EDET-3LA1-1	True Green	3.1	4.3	V
	EDEB-3LA1-1	Blue	3.1	4.3	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® series are certified at level 4. This means Edixeon® series have a floor life of 72 hours before Edixeon® series need to re-baked.

< Table 9 JEDEC characteristics at T_J=25℃ for Edixeon® 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 10 Operating life, mechanical, and environmental characteristics and T_J=25℃ for Edixeon® 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	1,000 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® 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.

The MTBF of Edixeon® series

Mean time between failures (MTBF) is the mean (average) time between failures of a system, the reciprocal of the failure rate in the special case when the failure rate is constant. Calculations of MTBF assume that a system is "renewed", i.e. fixed, after each failure, and then returned to service immediately after failure. A related term, mean distance between failures, with a similar and more intuitive sense, is widely used in transport industries such as railways and trucking. The average time between failing and being returned to service is termed mean down time (MDT).

The formula of MTBF for Edixeon® series can be

$$\log(\text{Life}) = \frac{1{,}600}{T_J(^{o}C)+273}$$

< Table 11 Relation between Junction Temperature and Life time >

T_J (°C)	Life (hours)	T_J (°C)	Life (hours)
25	*234,000*	*85*	*29,500*
30	*191,000*	*90*	*25,700*
35	*157,000*	*95*	*22,300*
40	*129,000*	*100*	*19,500*
45	*107,000*	*105*	*17,100*
50	*90,000*	*110*	*15,100*
55	*75,000*	*115*	*13,300*
60	*64,000*	*120*	*11,700*
65	*54,000*	*125*	*10,500*
70	*46,000*	*130*	*9,300*
75	*39,600*	*140*	*7,500*
80	*34,000*	*150*	*6,000*

Note:

1. Life means the time when light output decay to 70%

The MTTF of Edixeon® emitters

An estimate of the average, or mean time until a design's or component's first failure, or disruption in the operation of the product, process, procedure, or design occurs.
Mean time until a failure assumes that the product CAN NOT be repaired and the product CAN NOT resume any of it's normal operations.
Mean time to failure (MTTF) is related to items such as expected and/or operating life or other items that in general are not fixed or replacement even though it sometimes may be.
MTTF is assumed to be 100,000,000
The failure rates at different hours and different systems (LED quantity) are as below:

if there is 1 failure of 1 emitter in a system

Tj=75℃ is giving 0.01%(100ppm) at 10,000hrs

if there is 1 failure of 10 emitters in a system

Tj=75℃ is giving 0.1%(1,000ppm) at 10,000hrs

if there is 1 failure of 1 emitter in a system

Tj=75℃ is giving 0.05%(500ppm) at 50,000hrs

if there is 1 failure of 10 emitters in a system

Tj=75℃ is giving 0.5%(5,000ppm) at 50,000hrs.

ASSIST FORM for high power LED reliability(Ex: Edixeon® series @350mA)

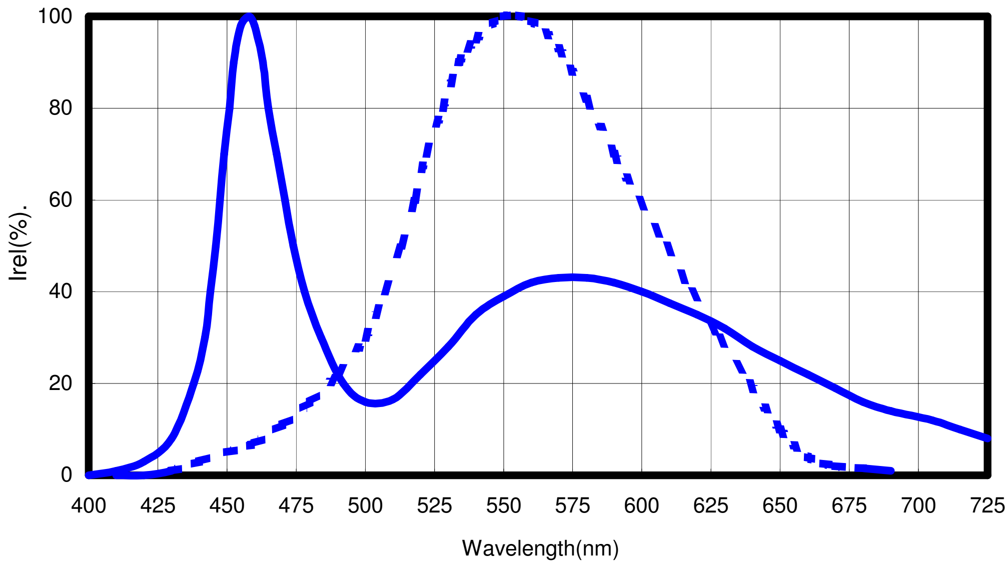
< Table 12 Different junction temperature characteristics >

	Ts=45°C	Ts=65°C	Ts=85°C
Voltage	3.5V	3.5V	3.5V
Current	350mA	350mA	350mA
Wattage	1.2W	1.2W	1.2W
Heat	0.92W	0.92W	0.92W
Rth	15 °C/W	15 °C/W	15 °C/W
T_J	60 °C	80 °C	100 °C
$L_{70\%}$	64,000hrs	34,000hrs	19,500hrs

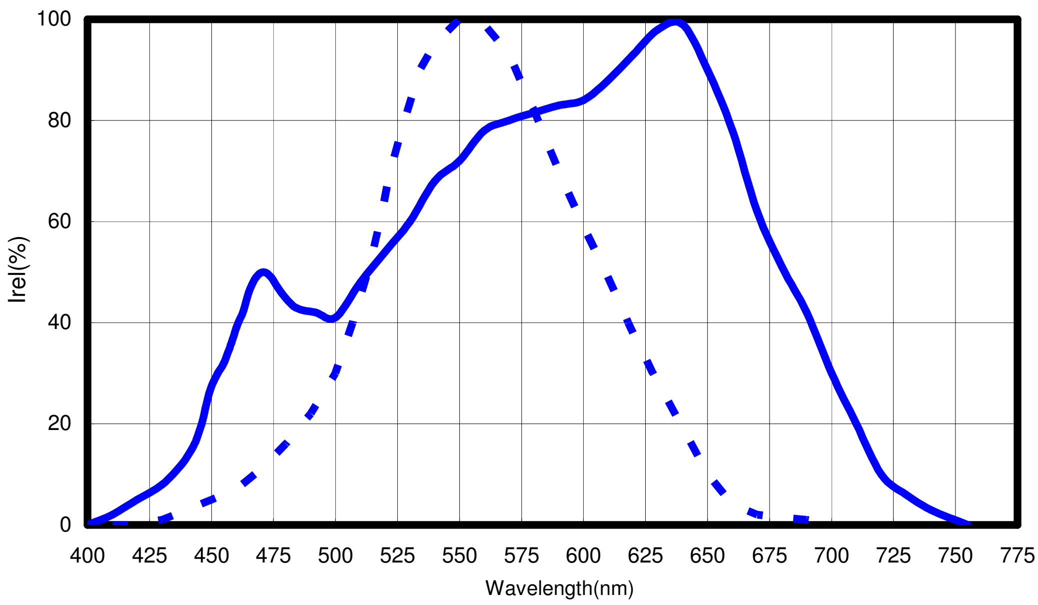
Notes:

1. Ts: slug temperature
2. ASSIST. Alliance for Solid-State Illumonation Systems and Technonlgies

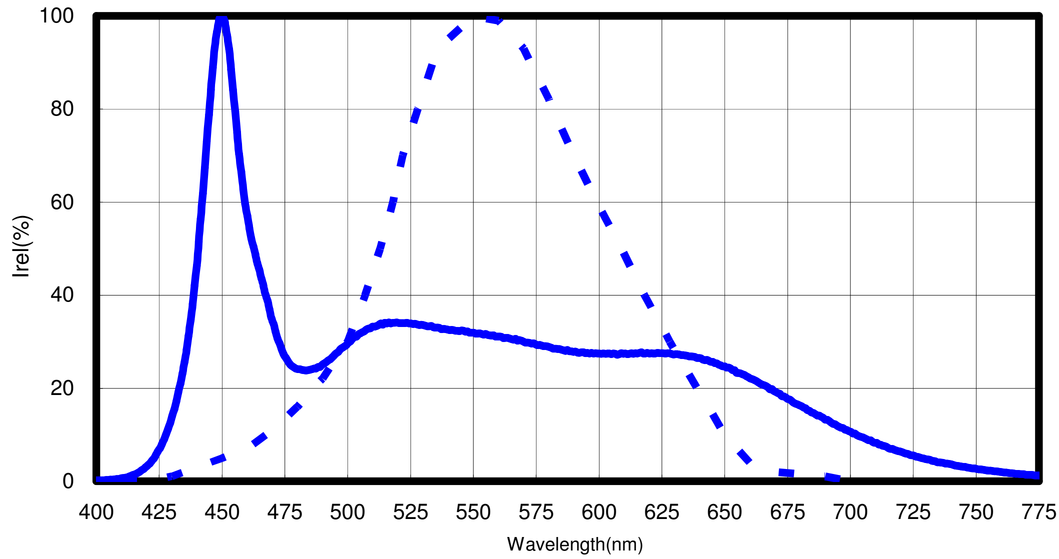
Color Spectrum and Radiation Pattern



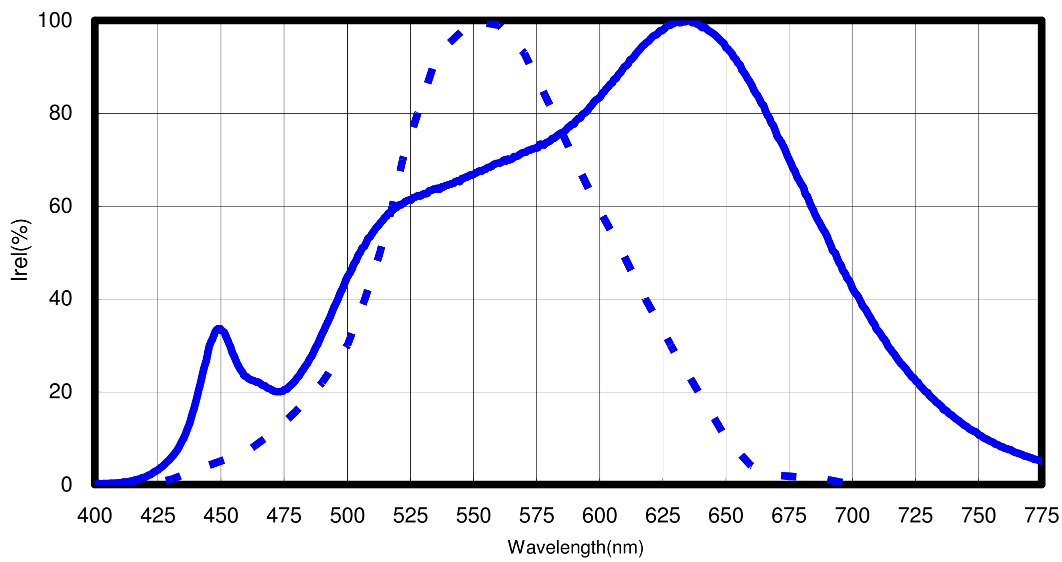
<Figure 3 Cool white color spectrum at T_J =25℃.for Edixeon® series >



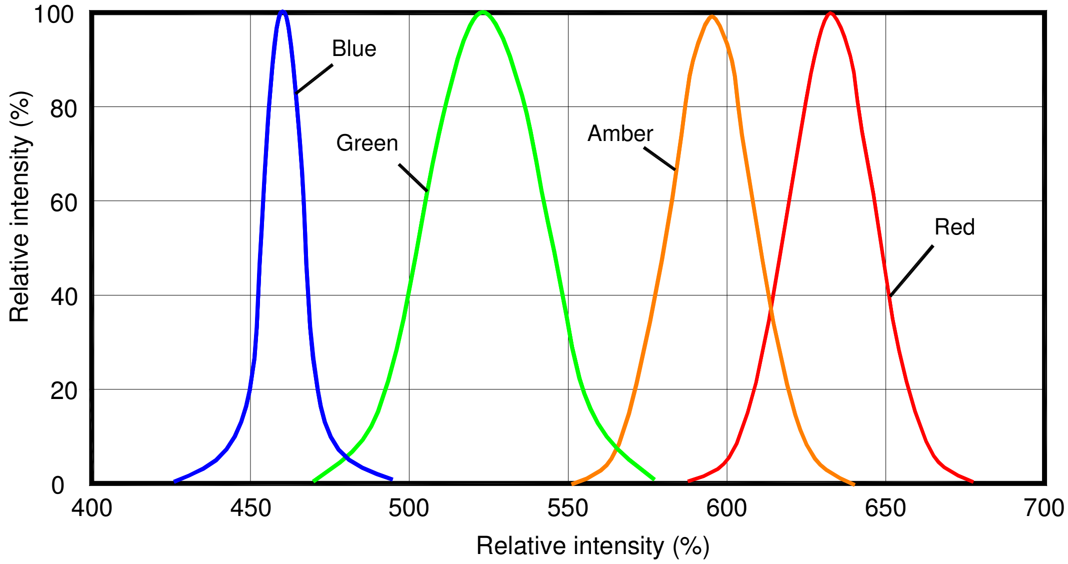
< Figure 4 Neutral white and warm white color spectrum at T_J =25℃.for Edixeon® series >



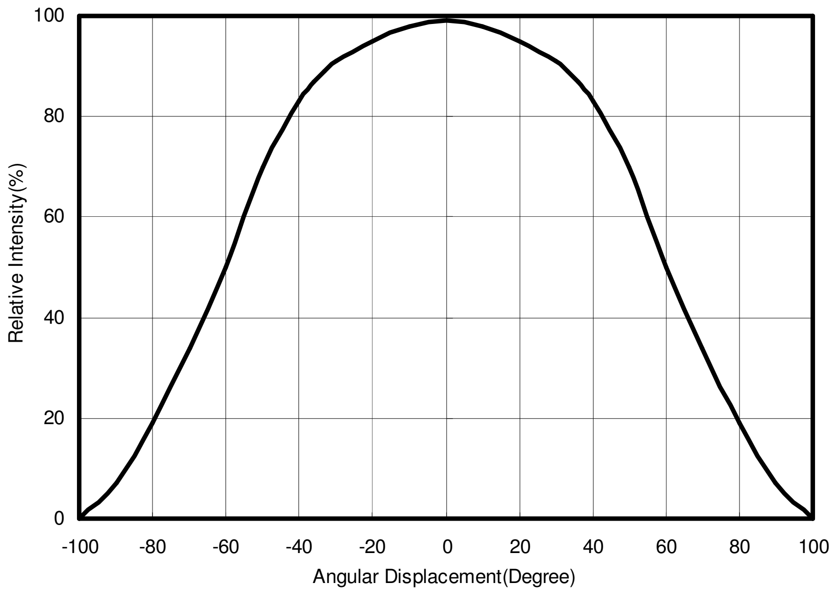
< Figure 5 Color spectrum of typical CCT, standard eyes response to dotted curve line at T_J=25℃. for xLA5-Dx Edixeon® series cool white >



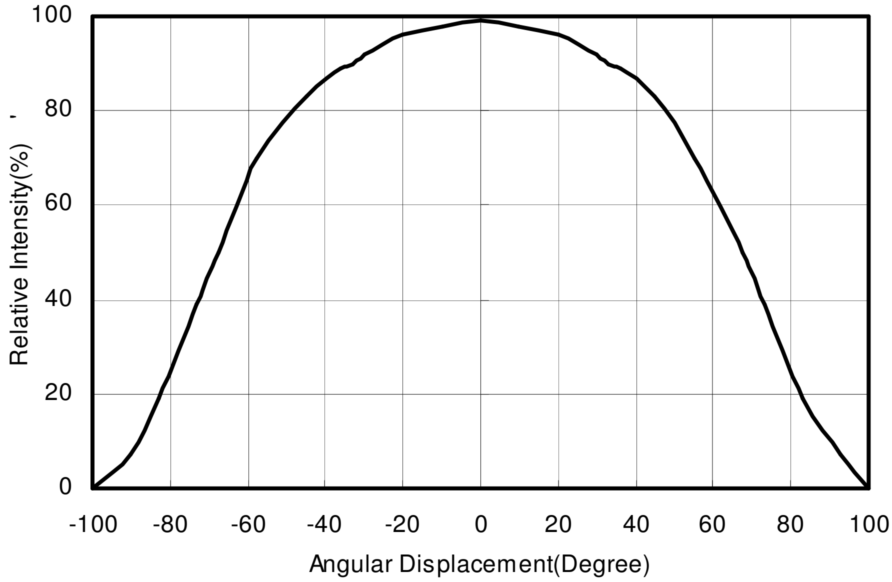
< Figure 6 Color spectrum of typical CCT, standard eyes response to dotted curve line at T_J=25℃. for xLA5-Dx Edixeon® series neutral white ,and warm white >



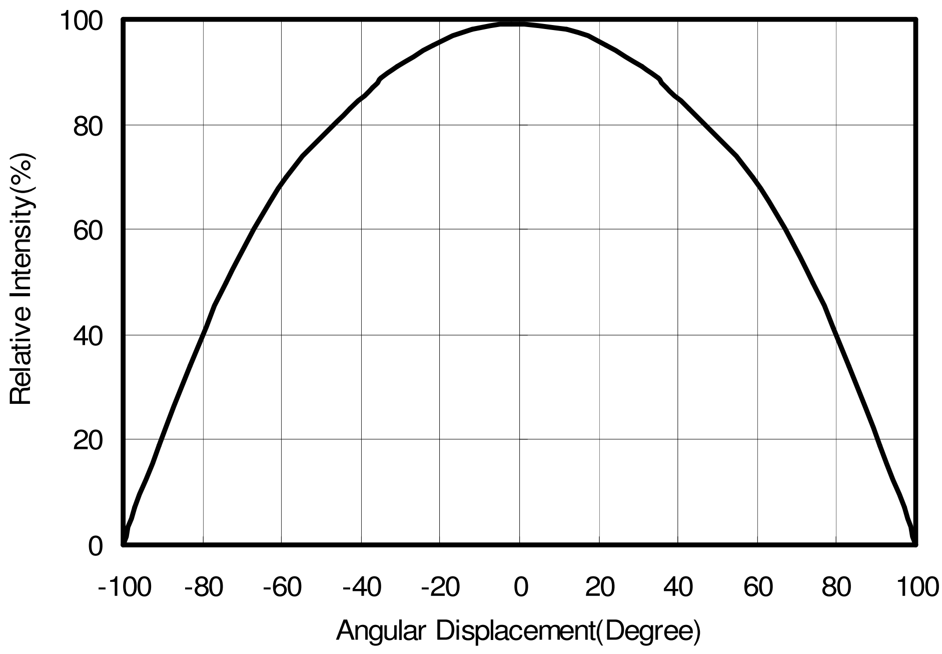
< Figure 7 Red, amber, true green, blue color spectrum at T_J =25℃.for Edixeon® series >



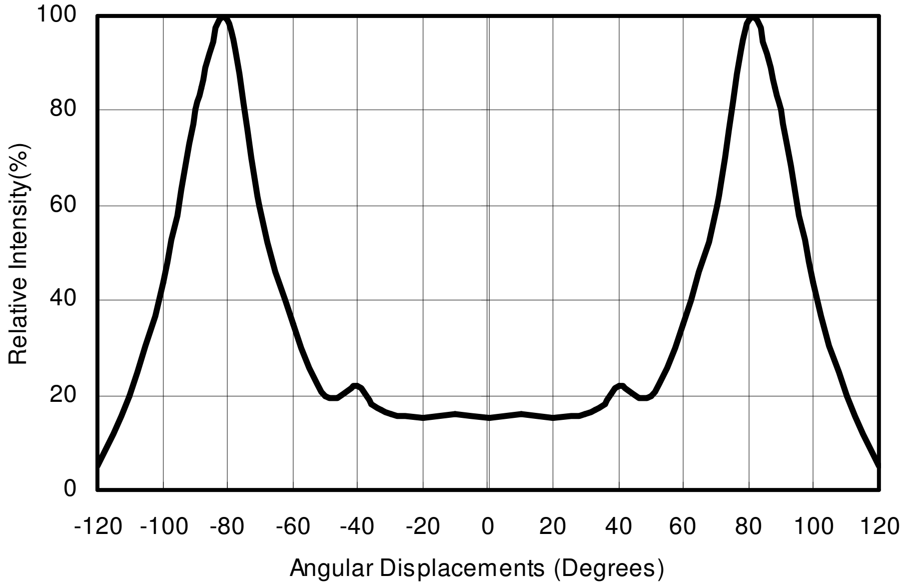
< Figure 8.Lambertain at T_J=25℃ for red and amber >



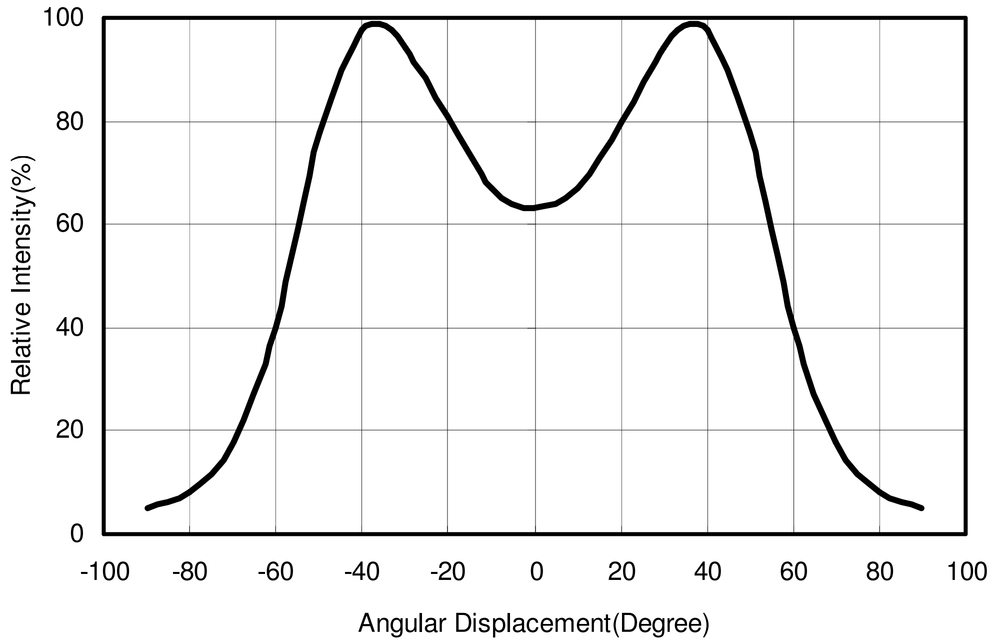
< Figure 9.Lambertain at T_J=25℃ for cool white, neutral white, and warm white >



< Figure 10.Lambertain at T_J=25℃ for blue and true green >



<Figure 11.Side emitting at T_J=25℃ for cool white.>



<Figure 12.Batwing at T_J=25℃ for cool white.>

Color Temperature or Dominant Wavelength Characteristics T_J=25℃

< Table 13 Dominant wavelength or color temperature characteristics at T_J=25℃ for 1W Edixeon® series >

Lens Item	Part Name	Color	λd/ CCT Min.	λd/ CCT Max.	Unit
Lambertian	EDEW-1LA5	Cool White	5,000	10,000	K
	EDEW-1LA5-D1	Cool White	5,000	10,000	K
	EDEH-1LA5-x1	Neutral White	3,800	5,000	K
	EDEX-1LA5-x1	Warm White	2,670	3,800	K
	EDER-1LAx	Red	620	630	nm
	EDEA-1LAx	Amber	585	595	nm
	EDET-1LAx	True Green	515	535	nm
	EDEB-1LAx	Blue	455	475	nm
Lens Item	**Part Name**	**Color**	**CCT Min.**	**CCT Max.**	**Unit**
Side Emitting Batwing Focusing	EDEW-1xA5	White	5,000	10,000	K

Notes:

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

< Table 14 Color temperature characteristics at T_J=25℃ for 3W Edixeon® series >

Lens Item	Part Name	Color	CCT Min.	CCT Max.	Unit
Lambertian	EDEW-3LA1-1	Cool White	5,000	10,000	K
	EDEW-3LA1-D3	Cool White	5,000	10,000	K
	EDEH-3LA1-x3	Neutral White	3,800	5,000	K
	EDEX-3LA1-x3	Warm White	2,670	3,800	K
	EDER-3LA3-1	Red	620	630	nm
	EDEA-3LA3	Amber	585	595	nm
	EDET-3LA1-1	True Green	515	535	nm
	EDEB-3LA1-1	Blue	455	475	nm

Notes:

1. CCT is measured with an accuracy of ± 200K

Emission Angle Characteristics

< Table 15 Emission angle characteristics at T_J =25℃ for 1W Edixeon® series >

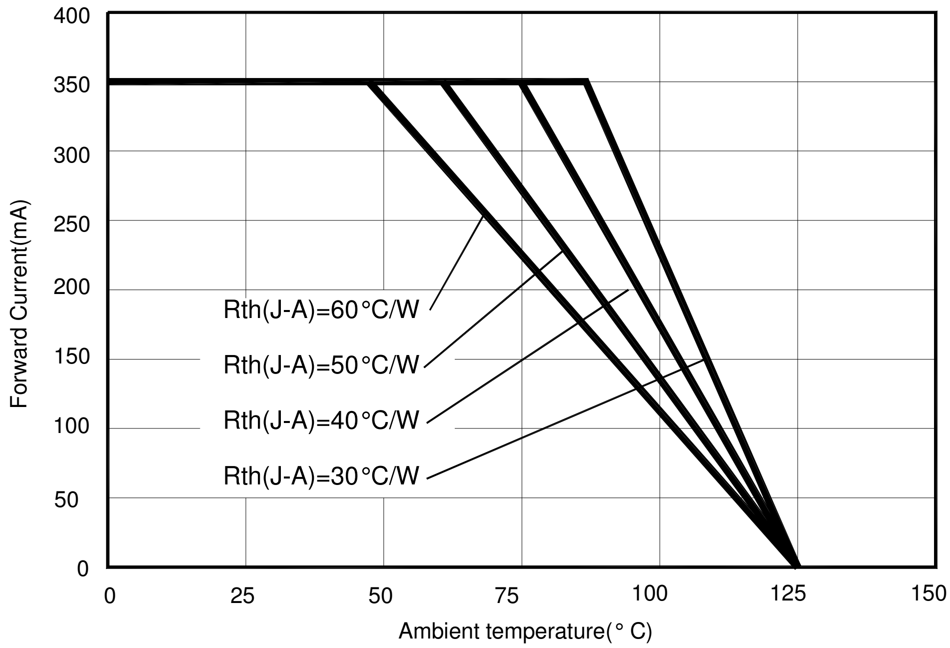
Part Name	Color	$2\Theta_{1/2}$(Typ.) Lambertian	$2\Theta_{1/2}$(Typ.) Batwing	$2\Theta_{1/2}$(Typ.) Focusing	Unit
EDEW-1xA5	Cool White	135	110	80	Deg.
EDEW-1LA5-D1	Cool White	135			Deg.
EDEH-1LA5-x1	Neutral White	135	--	--	Deg.
EDEX-1LA5-x1	Warm White	135	--	--	Deg.
EDER-1LA3	Red	120	--	--	Deg.
EDEA-1LA3	Amber	120	--	--	Deg.
EDET-1LA2	True Green	150	--	--	Deg.
EDEB-1LA5	Blue	150	--	--	Deg.

Part Name	Color	Θ_{PEAK}(Typ.) Batwing	Θ_{PEAK}(Typ.) Side emitting	Unit
EDEW-1xAx	Cool White	±40	±80	Deg.

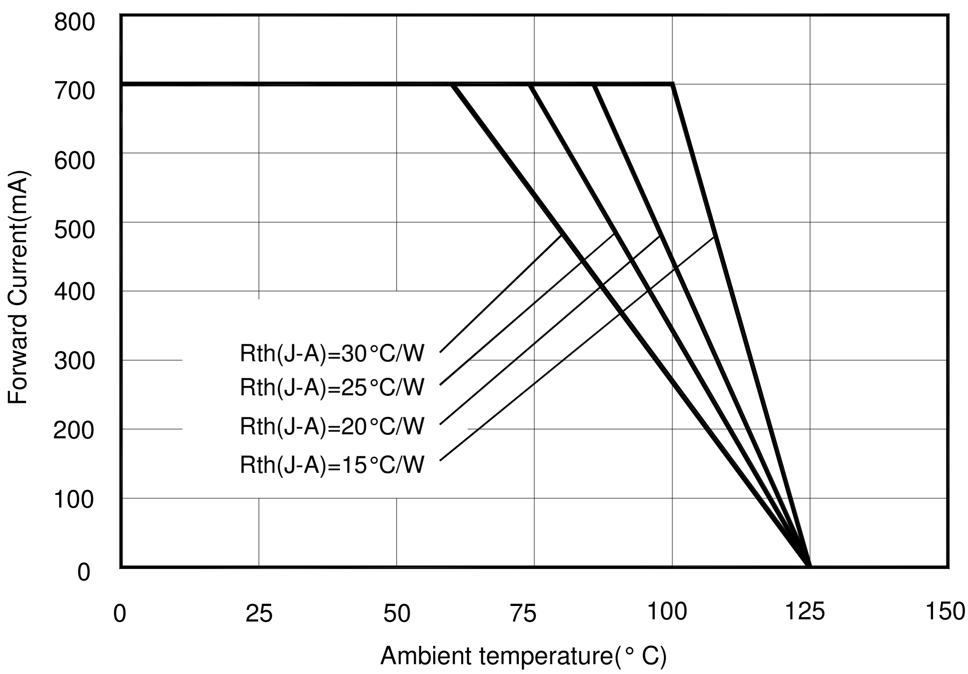
< Table 16 Emission angle characteristics at T_J=25℃ for 3W Edixeon® series >

Part Name	Color	$2\Theta_{1/2}$ Max.	$2\Theta_{1/2}$ Typ.	$2\Theta_{1/2}$ Min.	Unit
EDEW-3LA1-1	Cool White	--	135	--	Deg.
EDEH-3LA1-x3	Neutral White	--	135	--	Deg.
EDEX-3LA1-x3	Warm White	--	135	--	Deg.
EDER-3LA3-1	Red	--	120	--	Deg.
EDEA-3LA3	Amber	--	120	--	Deg.
EDET-3LA1-1	True Green	--	150	--	Deg.
EDEB-3LA1-1	Blue	--	150	--	Deg.

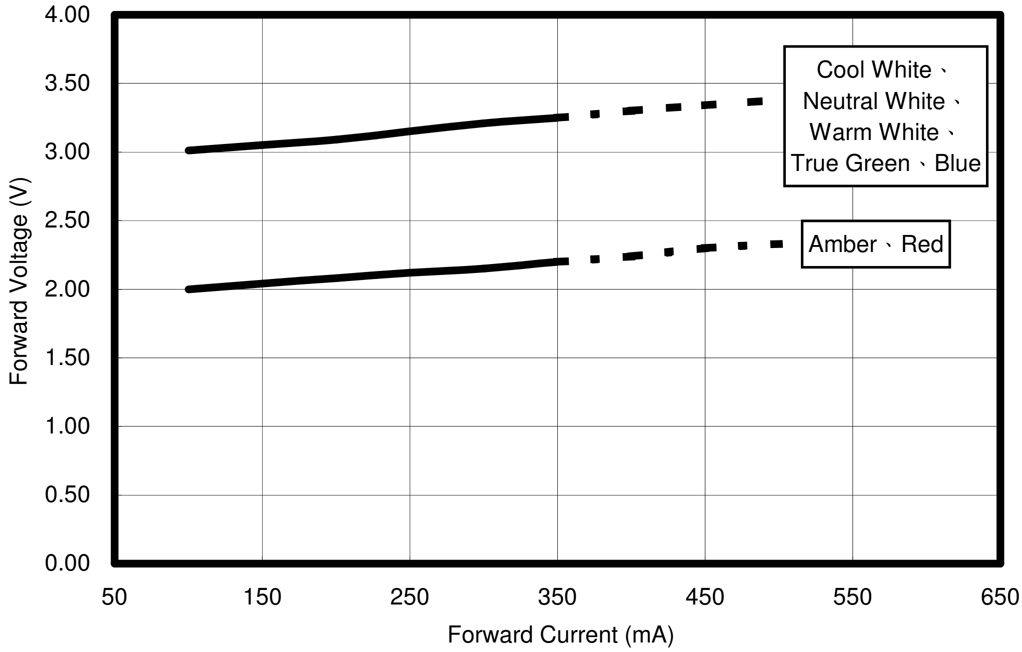
Optical & Electrical Characteristics



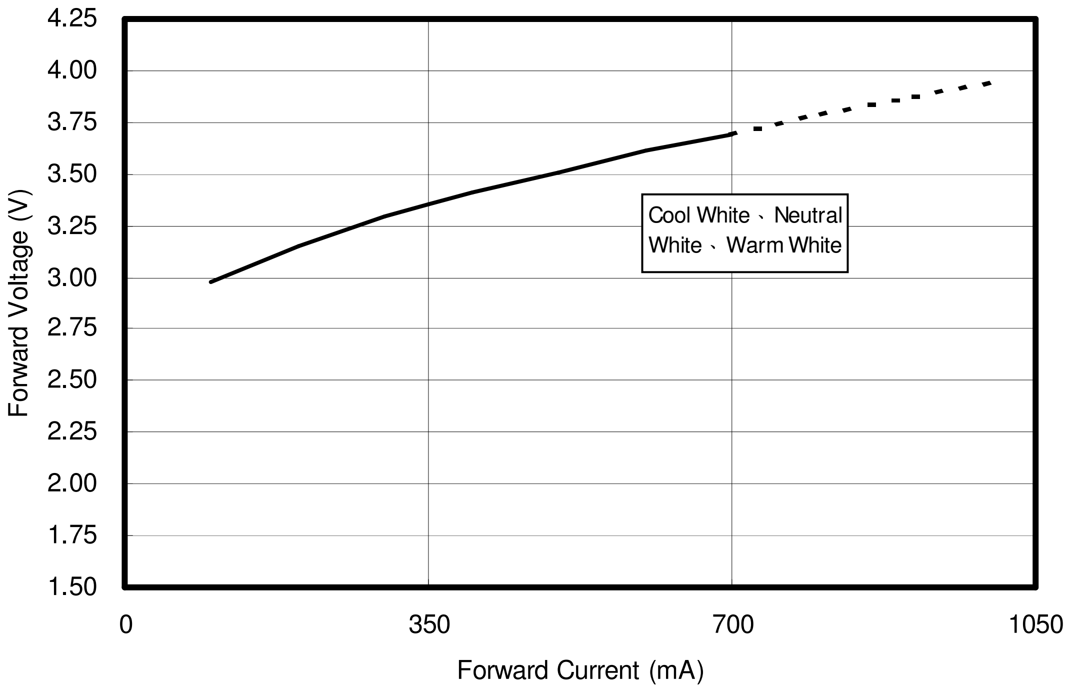
< Figure 13. Operating current & ambient temperature for 1W Edixeon® series >



< Figure 14. Operating current & ambient temperature for 3W Edixeon® series >



< Figure 15. Forward current & forward voltage for 1W Edixeon® series >



< Figure 16. Forward current & forward voltage for 3W Edixeon® series >

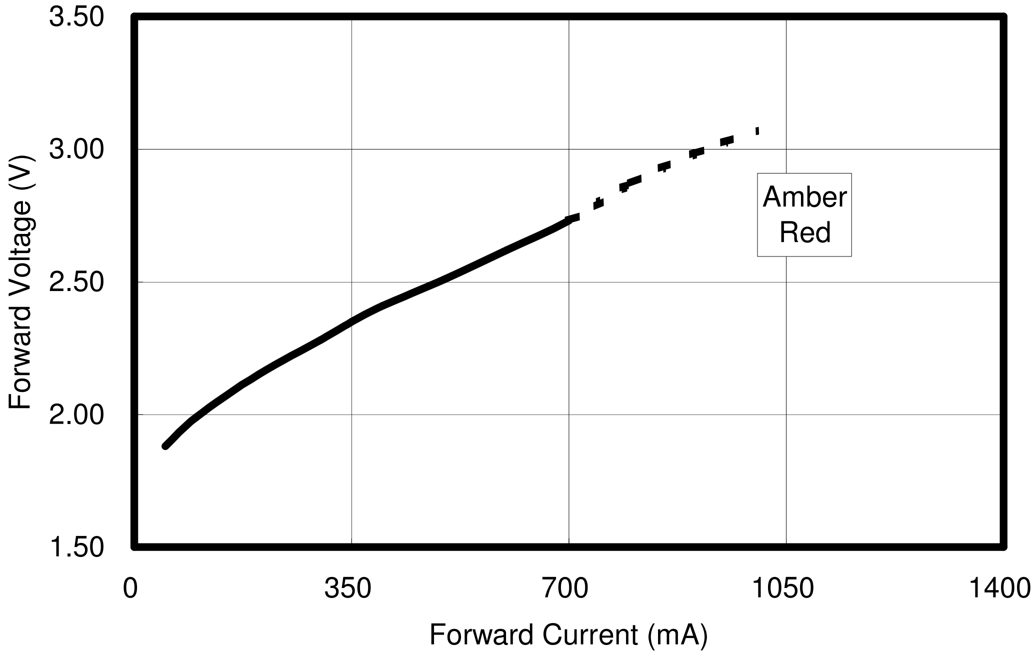
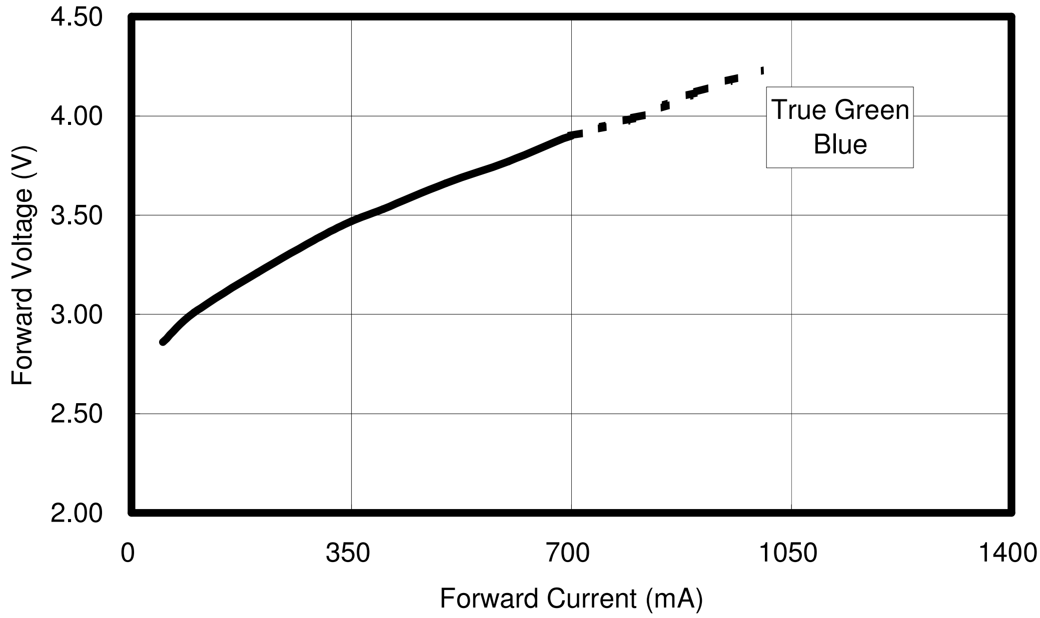
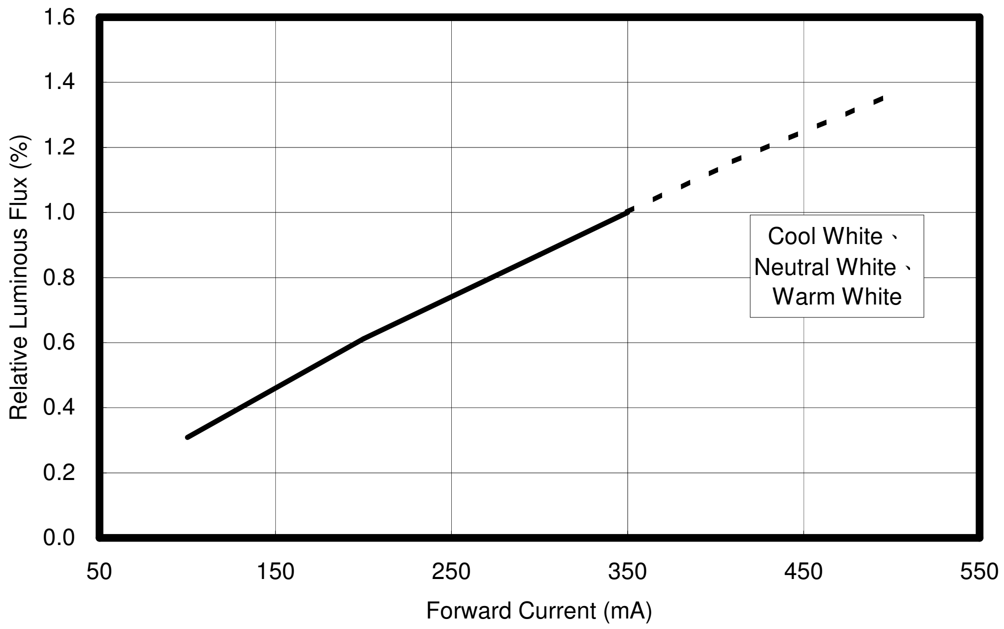


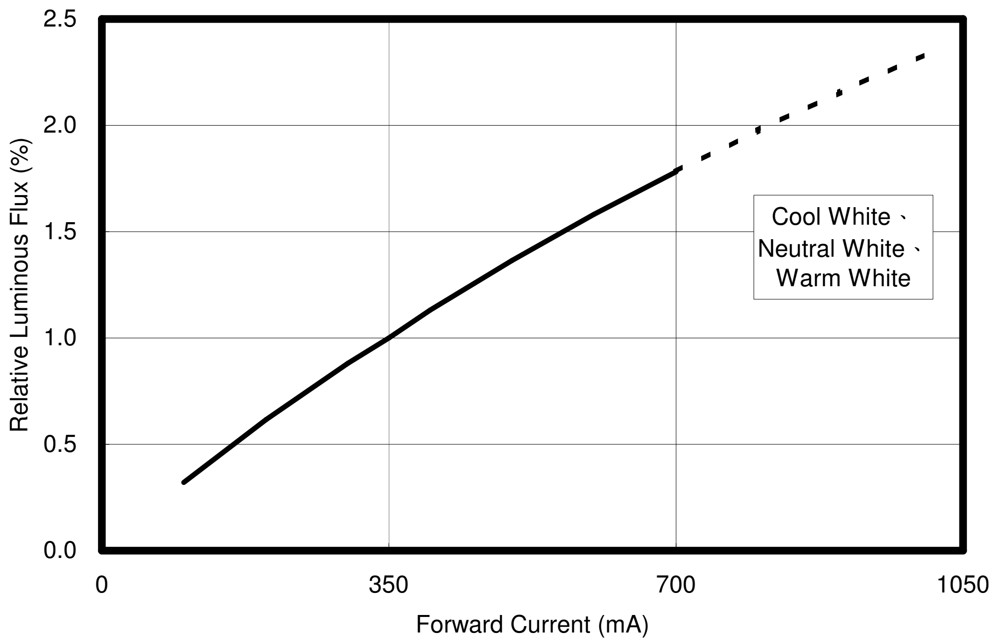
Figure 17 Forward current & forward voltage for 3W Edixeon® series at T_J=25℃>



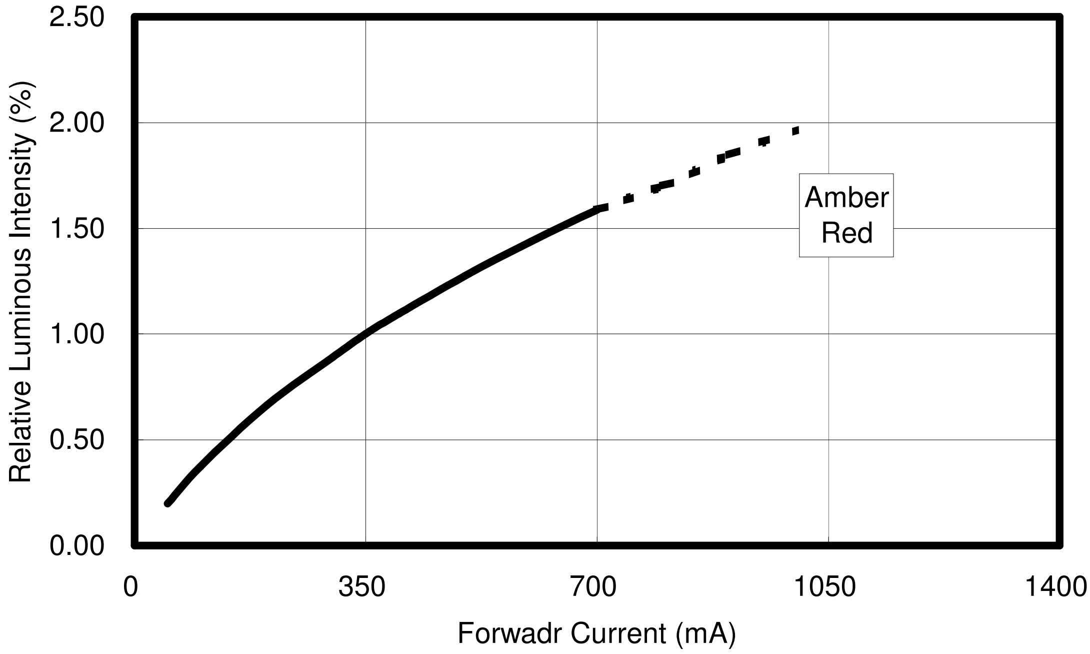
< Figure 18 Forward current & forward voltage for 3W Edixeon® series at T_J=25℃>



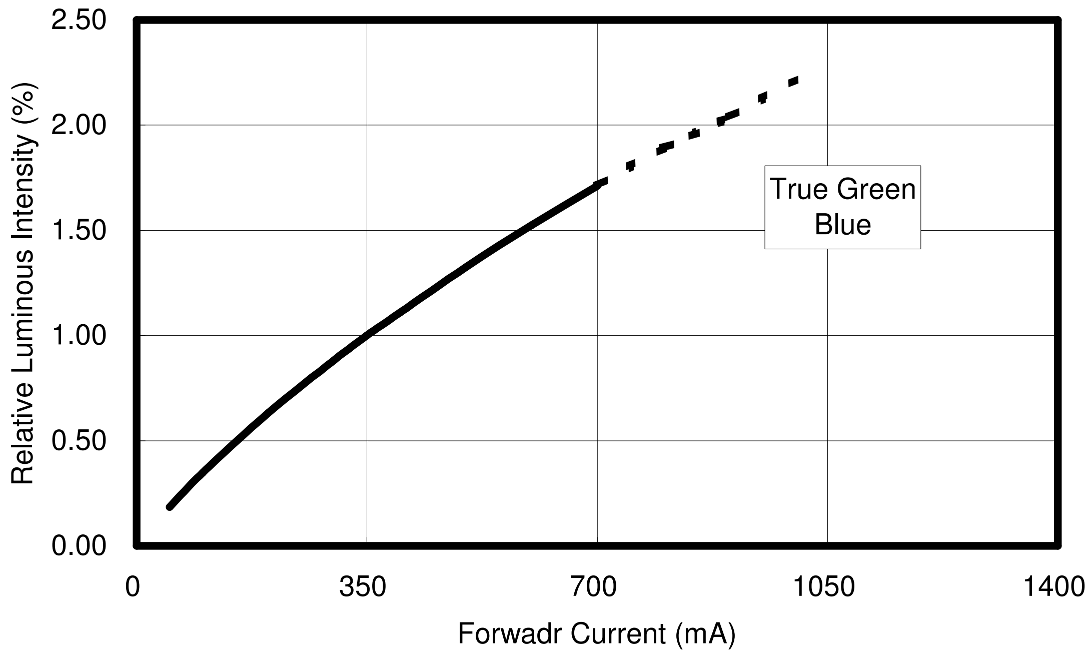
< Figure 19. Forward current & relative luminous at T_J=25℃ for 1W Edixeon® series >



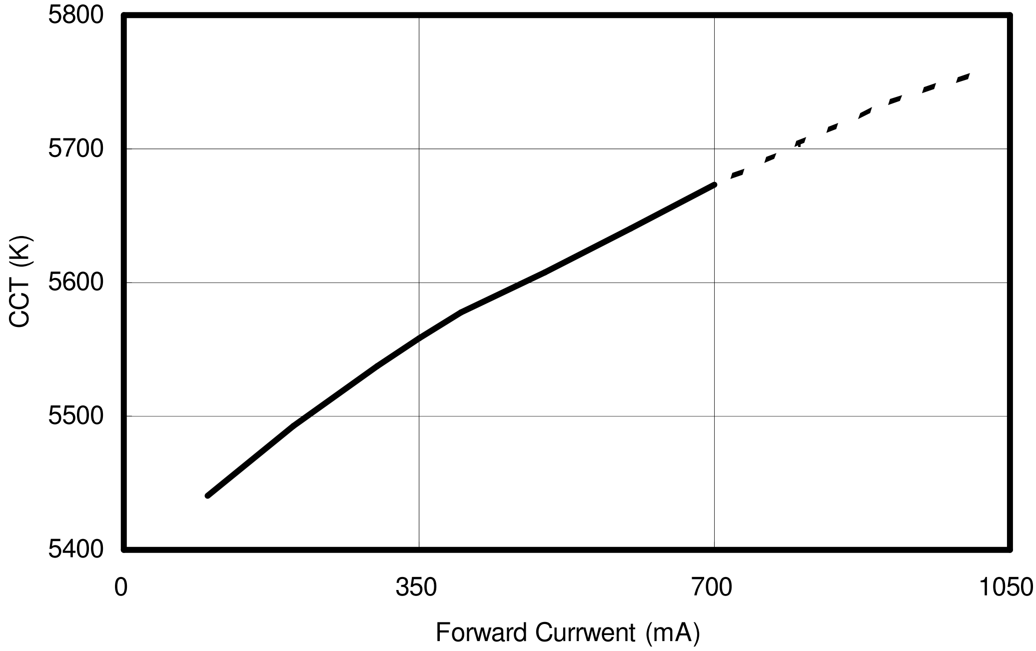
< Figure 20. Forward current & relative luminous at T_J=25℃ for 3W Edixeon® series >



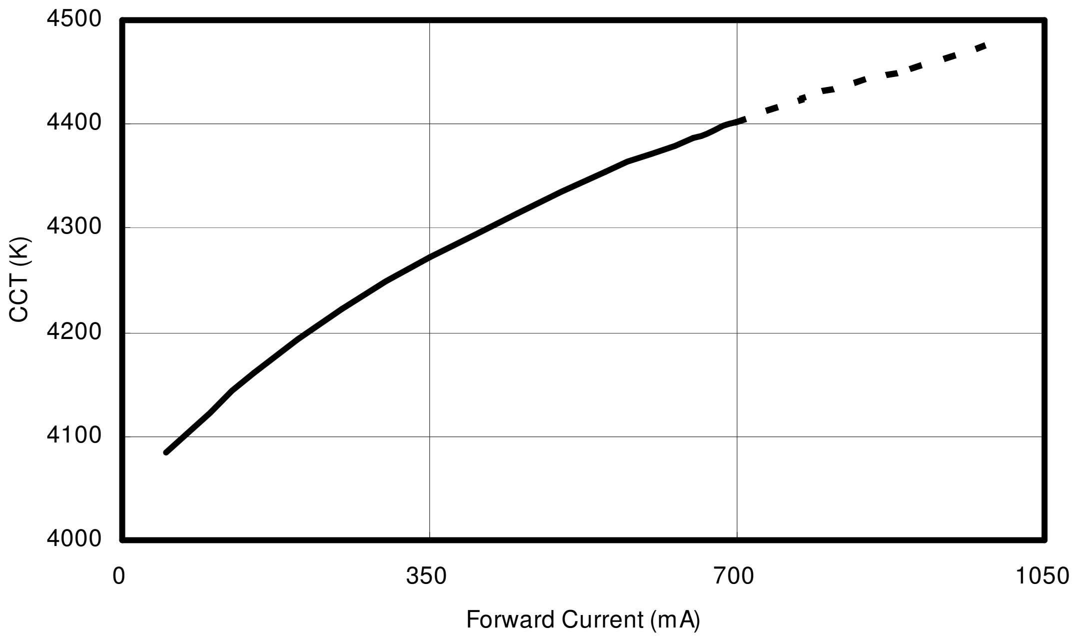
<Figure 21 Forward current & relative luminous for 3W Edixeon® series at T_J=25℃>



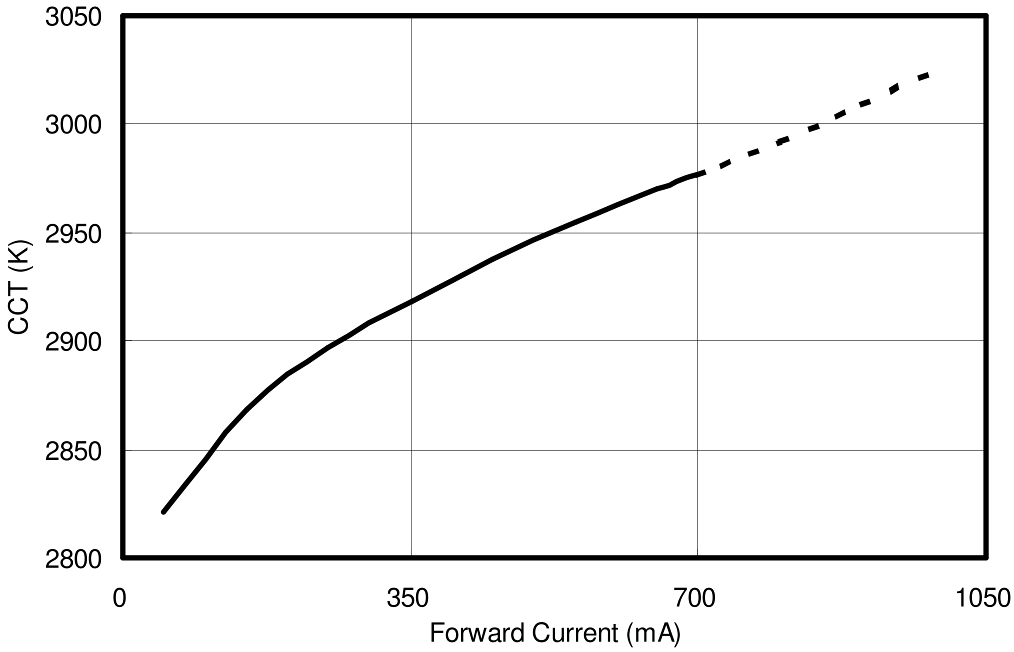
<Figure 22 Forward current & relative luminous for 3W Edixeon® series at TJ=25℃>



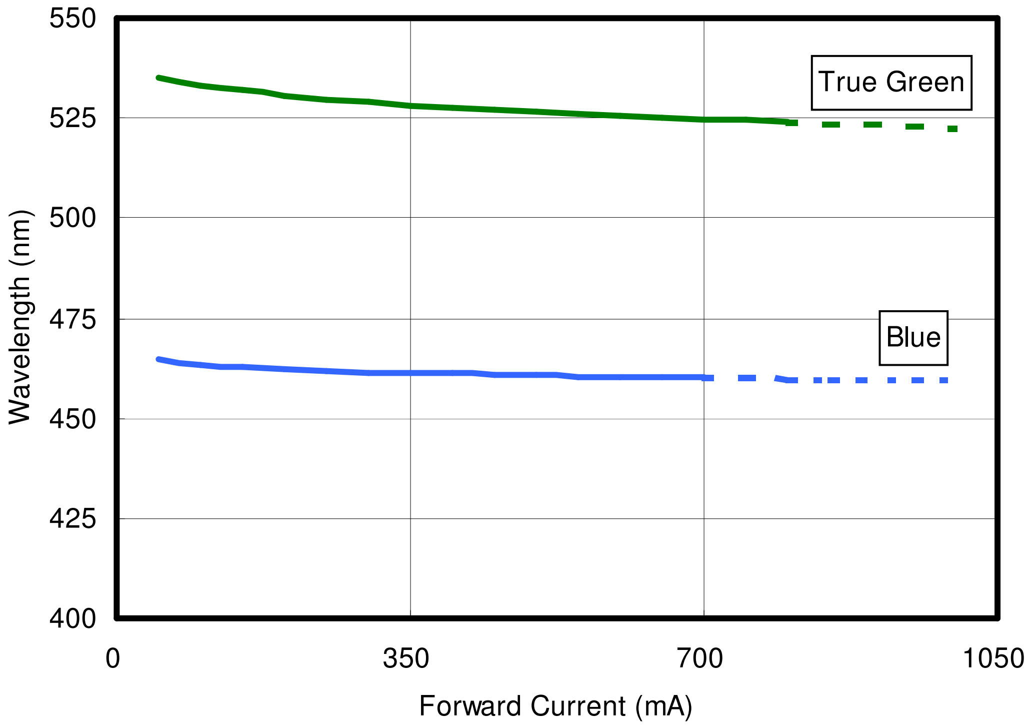
< Figure 23.Forward current & CCT at T_J =25℃ for Edixeon® series cool white >



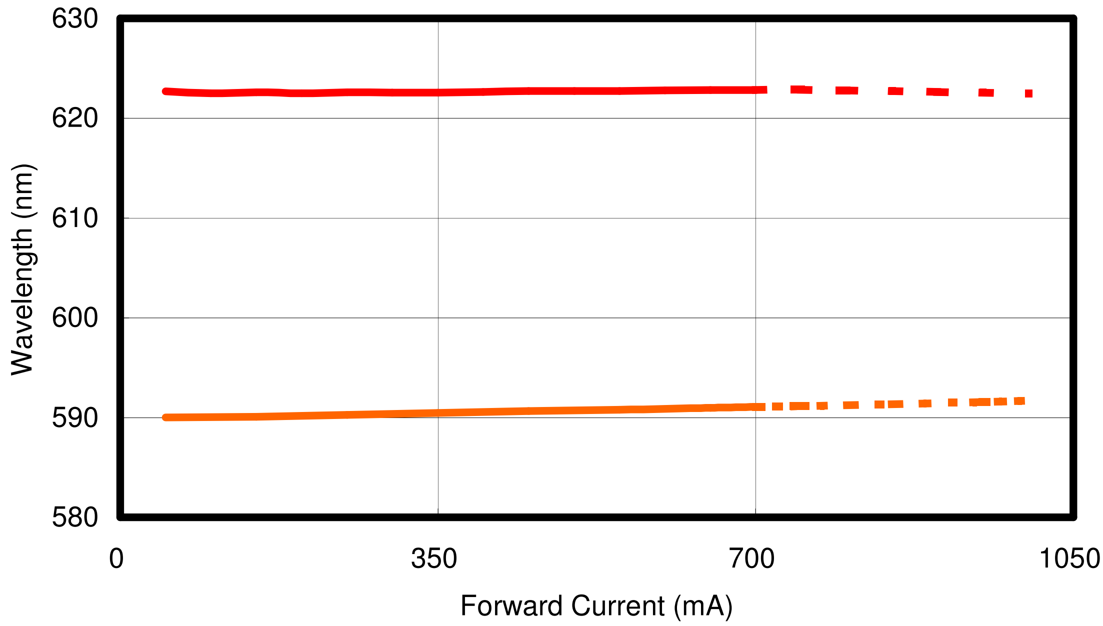
< Figure 24.Forward current & CCT at T_J =25℃ for Edixeon® series neutral white >



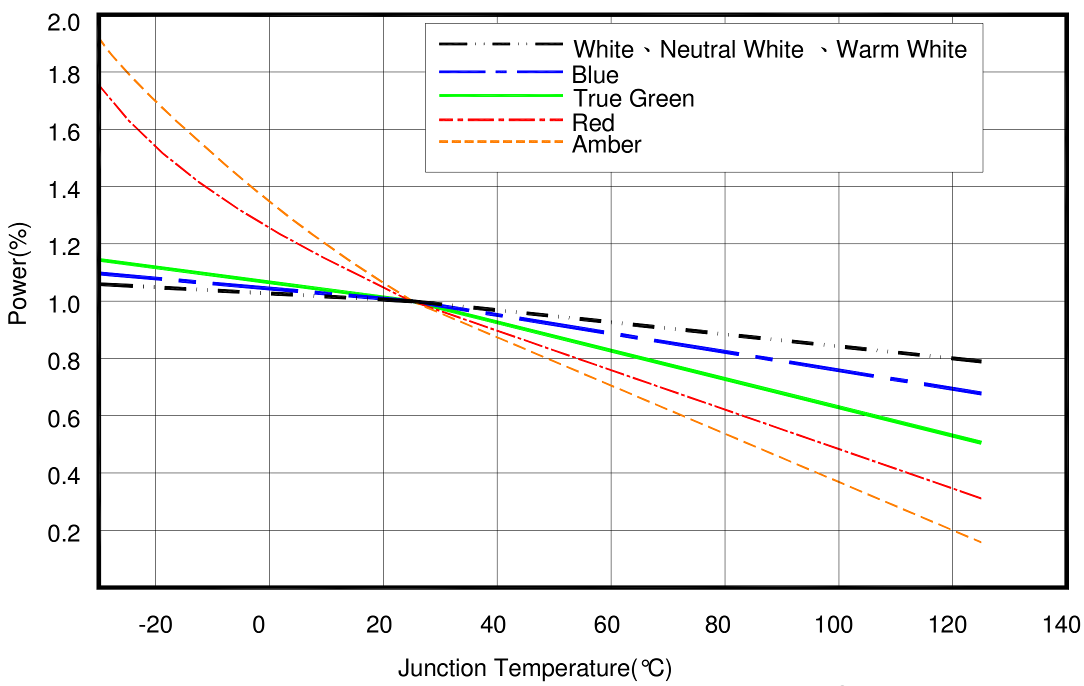
< Figure 25.Forward current & CCT at T_J=25℃ for Edixeon® series warm white >



< Figure 26.Forward current & wavelength at TJ=25℃ for Edixeon® series true green and blue>



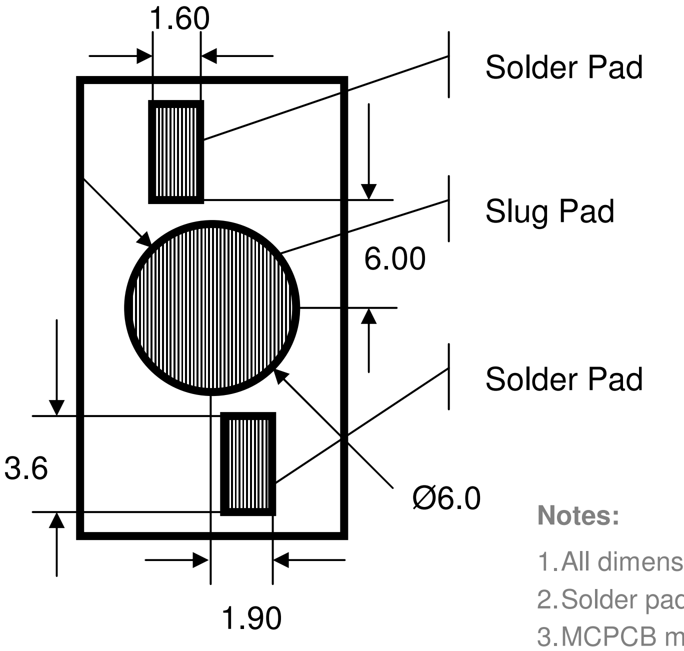
< Figure 27.Forward current & wavelength at TJ=25℃ for Edixeon® series red and amber >



< Figure 28. Junction temperature & power rate for Edixeon® series >

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 29.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® 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® series is an electrically neutral heat path that is separate from the LED's electrical contacts. This electrically isolated thermal pad makes Edixeon® 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:

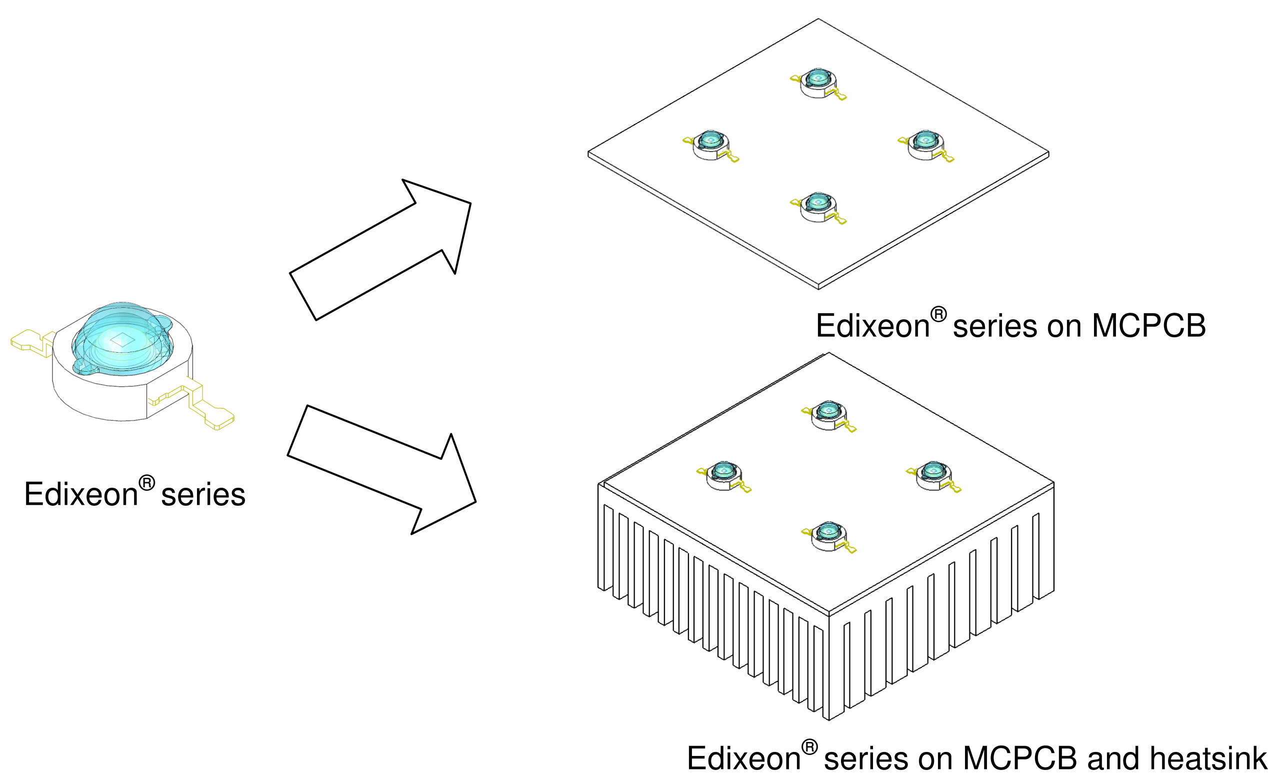
- Time and power
- Mass of the component (for Edixeon® series on MCPCB)
- Size of the component
- Size of the printed circuit board
- Absorption coefficient of the surfaces and MCPCB
- Packing density

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.

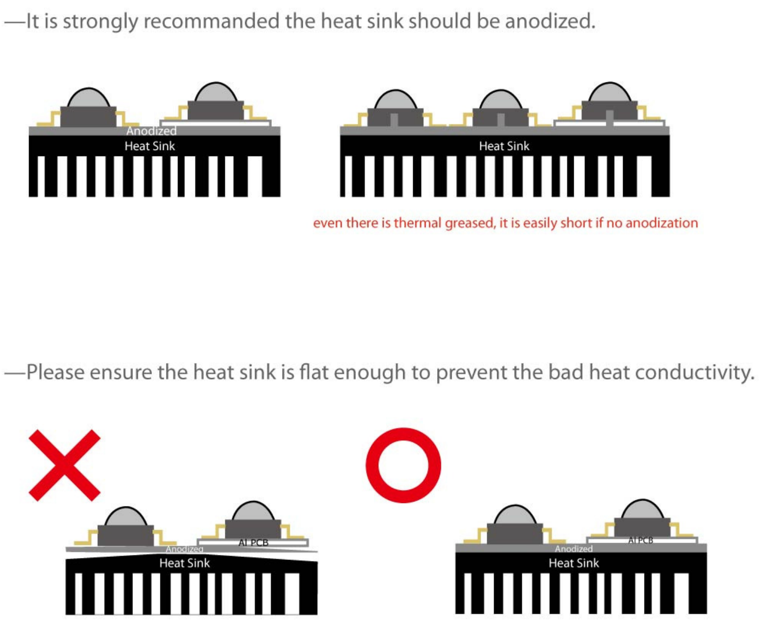
Product Thermal Application Information

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

When assembling on MCPCB or heat sink carrier.

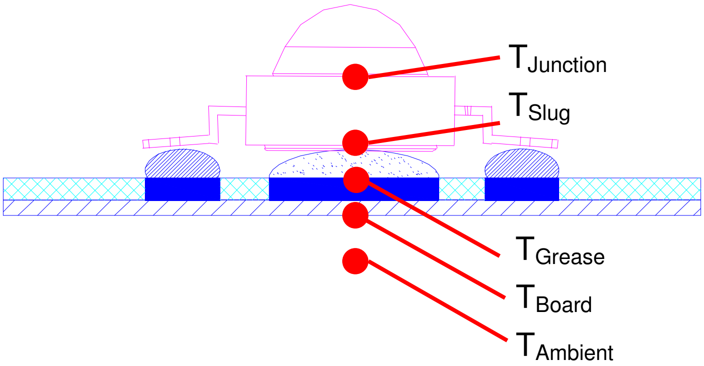


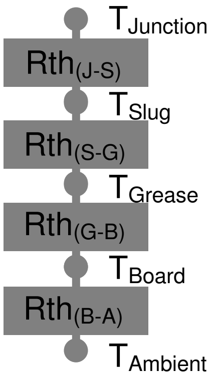
< Figure 30. Edixeon® series heatsink application >



< Figure 31. Edixeon® series assemble with heatsink >

Thermal Resistance Application





$$Rth_{(J-A)} = Rth_{(J-S)} + Rth_{(S-G)} + Rth_{(G-B)} + Rth_{(B-A)}$$

$$T_{Junction} = T_{Ambient} + Rth_{(J-A)} \times P_{Dissipation}$$

$$(T_J = T_A + Rth_{(J-A)} \times P_{Dissipation})$$

<Figure 32. Rth and T_J for Edixeon >

Suggested Adhesive for Selection(such as thermal grease)

- Ease of use
  Non-solvent, One-part
- Fast tack free
  3 minutes at 25°C
- No corrosion
  Alcohol type of room temperature vulcanization (RTV)
- Low volatility
  Low weight loss of silicone volatiles
- Adhesion
  Excellent adhesion to most materials without use of a primer
- Dielectric properties
  Cured rubber exhibits good dielectric properties
- Excellent thermal stability and cold resistance
  Cured rubber provides wide service temperature range

<Table 17 Specification for Adhesive properties >

Specification	Suggested Properties
Take-free time	3~10 minutes
Specific gravity	< 3 g/cm^2
Thermal conductivity	> 2.5 W/mK
Rth in using	< 1.8 $^{o}C/W$
Volume resistance	> $1x10^{14}$
Lap shear adhesion strength	> 200 N/ cm^2
Tensile strength	> 4 Mpa

Thermal Resistance Calculation

The thermal resistance between two points is defined as the ratio of the difference in temperature to the power dissipated. For calculations in the following units used are ℃/W. In the case of LEDs, the resistance of two important thermal paths affects the junction temperature:

From the LED junction to the thermal contact at the bottom of the package, this thermal resistance is governed by the package design. It is referred to as the thermal resistance between junction and slug ($Rth_{(J-S)}$)

From the thermal contact to ambient conditions, this thermal resistance is defined by the path between the slug ,board ,and ambient. It is referred to as the thermal resistance between slug and board ($Rth_{(S-B)}$) and between board and ambient ($Rth_{(B-A)}$).

The overall thermal resistance between the LED junction and ambient ($Rth_{(J-A)}$) can be modeled as the sum of the series resistances $Rth_{(J-S)}$, $Rth_{(S-B)}$.,and $Rth_{(B-A)}$.

The following will show how to calculate Rth for each part of LED module.

1. $Rth_{(J-S)}$

Assume Edixeon® $Rth_{(J-S)}$=10 °C/W

2. $Rth_{(S-G)}$

If the thickness of thermal grease is 100um and area is $(6.4/2)^2\pi$ mm^2.

Thermal conductivity of thermal grease is 2.6 W/mK.

The Formula of Rth is $\dfrac{\text{Thickness(um)}}{\text{Thermal Conductivity (W/mK)} \times \text{Area(mm}^2\text{)}}$

Therefore $Rth_{(S-G)} = \dfrac{100}{2.6 \times (6.4/2)^2\pi} = 1.2\ ^{\circ}C/W$

3. $Rth_{(G-B)}$

The Rth of standard MCPCB is 1.5 °C/W

4. $Rth_{(B-A)}$

The Rth between board and air is mainly dependent on the total surface area.

Therefore $Rth_{(B-A)} \fallingdotseq \dfrac{500}{\text{Area(cm)}^2}$

If Area is 30cm^2	Rth=16.7	$Rth_{(J-A)}$ =10+1.2+1.5+16.7 =29.4 °C/W
If Area is 60cm^2	Rth=8.3	$Rth_{(J-A)}$ =10+1.2+1.5+8.3 =21°C/W
If Area is 90cm^2	Rth=5.5	$Rth_{(J-A)}$ =10+1.2+1.5+5.5 =18.2°C/W

Junction Temperature Calculation

The total power dissipated by the LED is the product of the forward voltage (V_F) and the forward current (I_F) of the LED.

The temperature of the LED junction is the sum of the ambient temperature and the product of the thermal resistance from junction to ambient and the power dissipated.

$T_{Junction} = T_{Air} + Rth_{(J-A)} \times P_{Dissipation}$

If one white Edixeon® in room temperature (25ºC) operated 350mA and V_F=3.3V,

the $P_{Dissipation}$=0.35 x 3.3=1.155W

And junction temperature is

$T_{Junction}$ = 25ºC+ 18.2 x 1.155 = 46.021ºC (total surface area =90cm^2)

$T_{Junction}$ = 25ºC+ 21 x 1.155 = 49.255 ºC (total surface area =60cm^2)

$T_{Junction}$ = 25ºC+ 29.4 x 1.155 = 58.957 ºC (total surface area =30cm^2)

Example : Junction Temperature Calculation

One white LED is used under ambient temperature ($T_{Ambient}$) of 30°C. This LED is soldered on MCPCB (Area=10cm^2). Calculate junction temperature.

Assuming a forward voltage of V_F=3.3V at 350mA and total power dissipated is $P_{Dissipation}$=1x 0.35 x 3.3= 1.155 W.

LED $Rth_{(J-S)}$=10 °C/W.

With good design, $Rth_{(S-G)}$ can be minimized to 1 °C/W.

$Rth_{(G-B)}$ of a standard MCPCB can be 1.5 °C/W.

The Rth between board and air is mainly dependent on the total surface area.

Therefore it can be calculated in formula $\dfrac{500}{\text{Area(cm)}^2}$

$$Rth_{(B-A)} = \frac{500}{10} = 50\ ^{\circ}C/W.$$

Following the formula $T_{Junction} = T_{Ambient} + Rth_{(J-A)} \times P_{Dissipation}$

$T_{Junction}$=30 °C + (10 °C/W +1 °C/W +1.5 °C/W +50 °C/W) x 1.155W

=102.1875 °C

That means this LED emitter is operated under good condition($T_{Junction}$<125 °C).

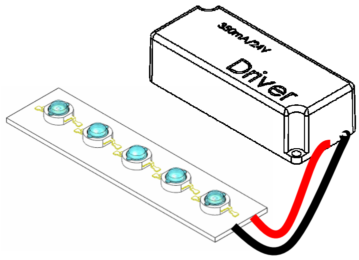
It's strongly recommended to keep the junction temperature under 125 ºC

Or keep the temperature of emitter lead not exceed 55ºC

Product Electrical Application Information

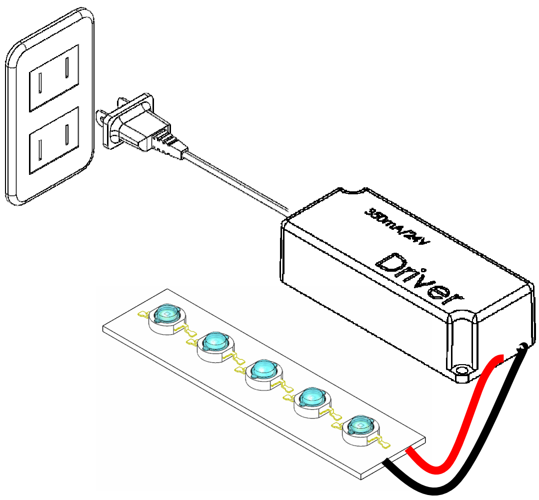
Following graphs and descriptions show how to connect LED or LED module and plug to AC outlet.

Step1: Connect the wires of LED Module to the DC output of the driver.



<Figure 33. LED Module connect to the DC output of the driver>

Step2 : Plug the driver to AC outlet.

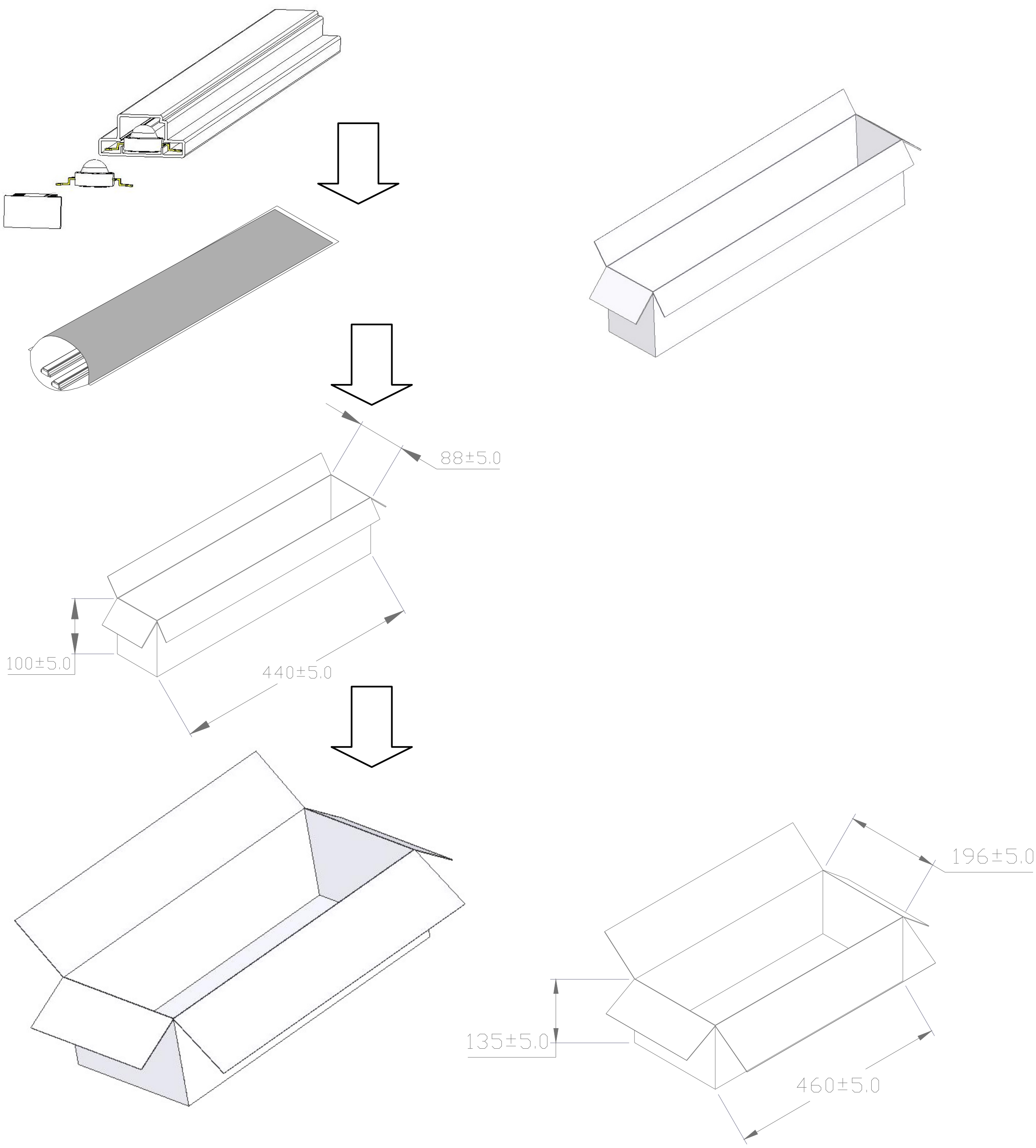


<Figure 34. Plug the AC output of the driver to AC outlet>

Caution: Never plug the driver to AC outlet before the LED Module is properly connected as this may generate transient voltage damage the LEDs permanently with a short or open circuit.

Product Packaging Information

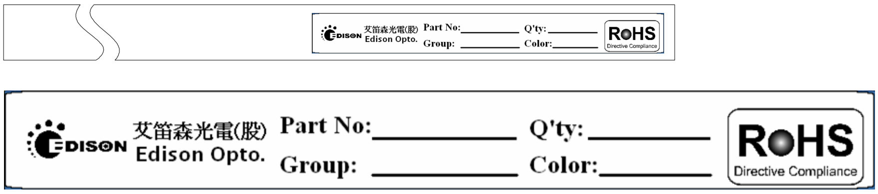
Package Specifications



<Figure 35. Package steps and dimensions >

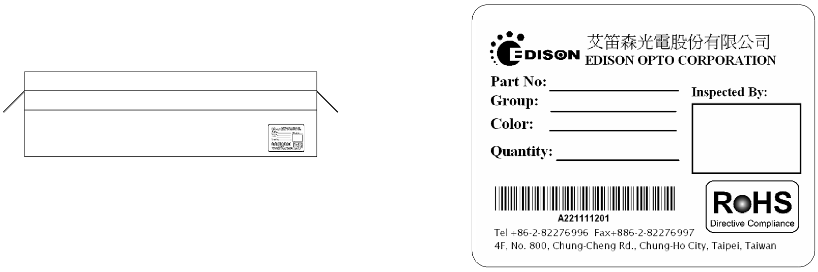
Label

Label on tube：



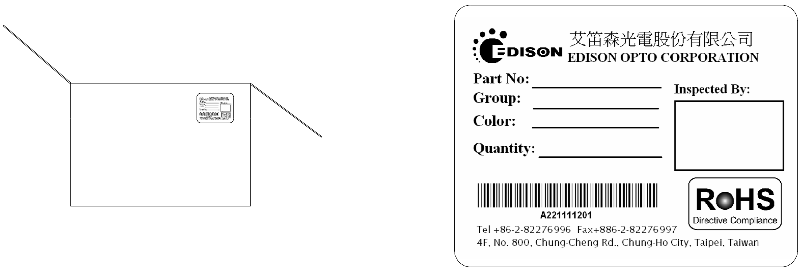
<Figure 31 Label on tube >

Label on inner box：



<Figure 36 Label on inner box >

Label on outer box：

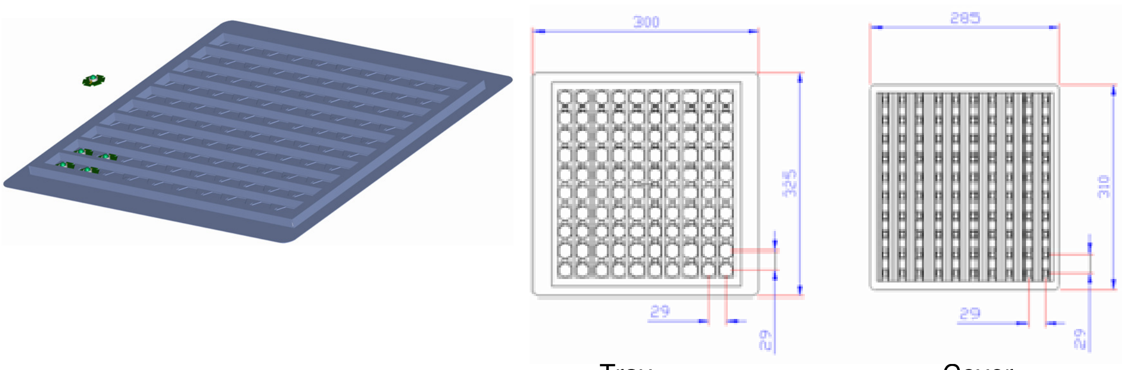


<Figure 37 Label on outer box>

Notes:

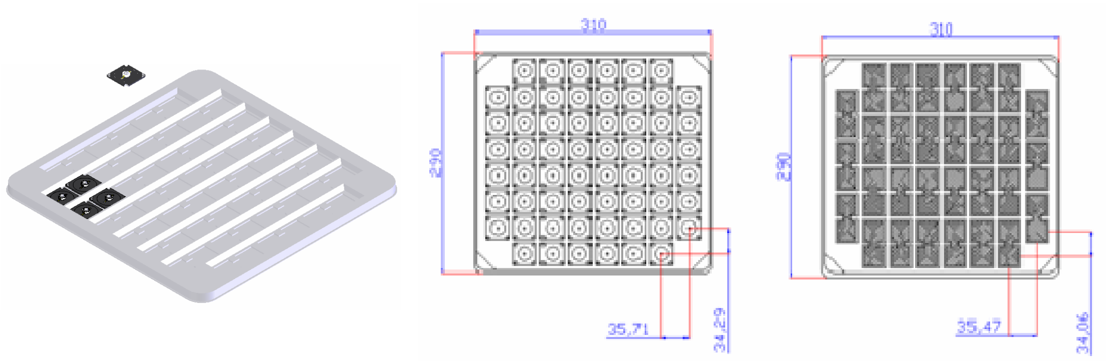
1. All dimensions are in mm.
2. There are 50pcs emitters in a tube
3. There are 20 tubes in a bag.
4. There are 2 bags in a inner box
5. A bag contains one humidity indicator card and drying agent

Star Product Packaging Information



Tray Cover

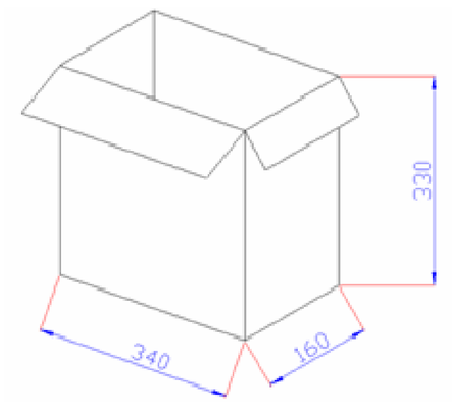
Item	Quantity	Total	Dimensions(mm)
Tray	100pcs	100pcs	325*300
Inner box	10 Tray	1,000pcs	340*330*160
Outer box	2 inner boxes	2,000pcs	350*350*340



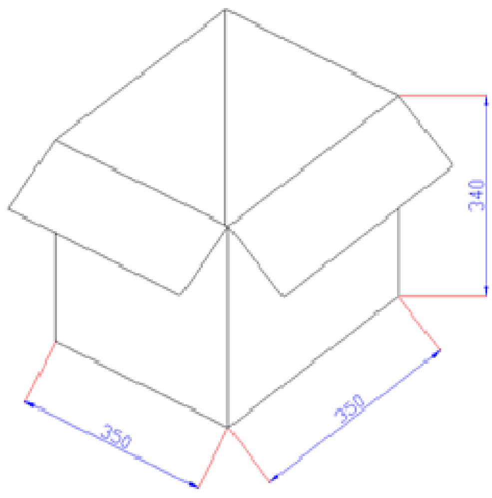
Tray Cover

Item	Quantity	Total	Dimensions(mm)
Tray	60pcs	60pcs	310*290
Inner box	10 Tray	600pcs	340*330*160
Outer box	2 inner boxes	1200pcs	350*350*340

<Figure 38 Edixeon® Star Package>



Inner box



Outer box

<Figure 39 Edixeon® star package and dimensions >

Notes:

1. All dimensions are in mm.
2. There are 60 pcs stars in a tray.(Tray+Cover)
3. There are 10 trays in an inner box.
4. There are 2 inner boxes in an outer box.