High Power LEDs

IR/UV Edixeon® S Series Datasheet

IR/UV Edixeon® emitters are one of the highest power LEDs in the world by Edison Opto. IR/UV Edixeon® emitters are designed to satisfy more and more Solid-State lighting High Power LED applications for CCTV, plant lights.

Features :

- Low voltage operation
- Instant light
- Long operating life
- Reflow process compatible.

Lighting Design Manufacturing Service

Table of Contents

Lighting Design Manufacturing Service

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®S series nomenclature

E D	E	1	-	1	L	S	3	-	0	3	-	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
V	Ultraviolent
E	Deep Red
F	Cherry Red
I	IR 850nm
N	IR 940nm

X4 Power

Code	Type
1	1W
S	3W

X5 Lens Item

Code	Type
L	Lambertan

X6~X8 Serial No.

X9 Testing Current

Code	Type
1	350mA
3	700mA

X10 AI PCB Color

Code	Type
A	Star
B	Square(25x25mm)
C	Square(30x30mm)

X11 AI PCB Color

Code	Type
B	Black

X12 Shape Item

Code	Type
10	1.0mm
16	1.6mm
20	2.0mm

Environmental Compliance

IR/UV Edixeon® S 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 IR/UV Edixeon® S Series -IR to provide an environmentally friendly product to the customers.

LED Package Dimensions and Polarity

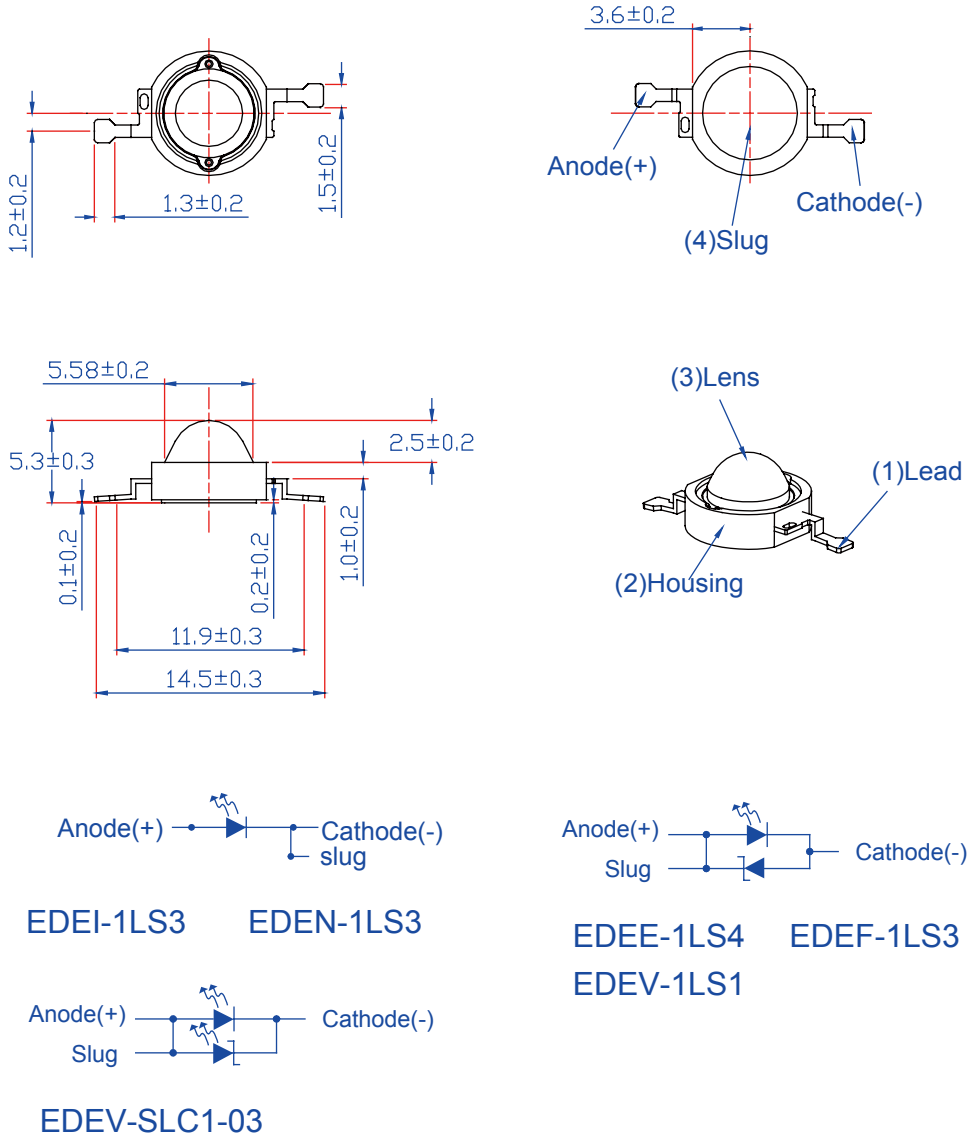
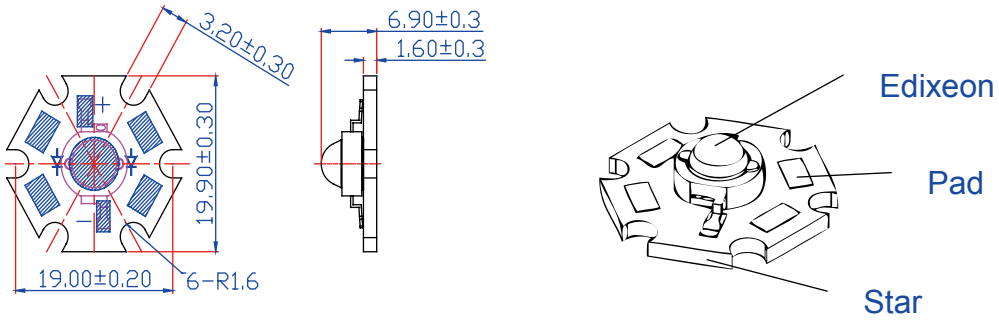


Figure 1. IR/UV Edixeon® S series dimensions

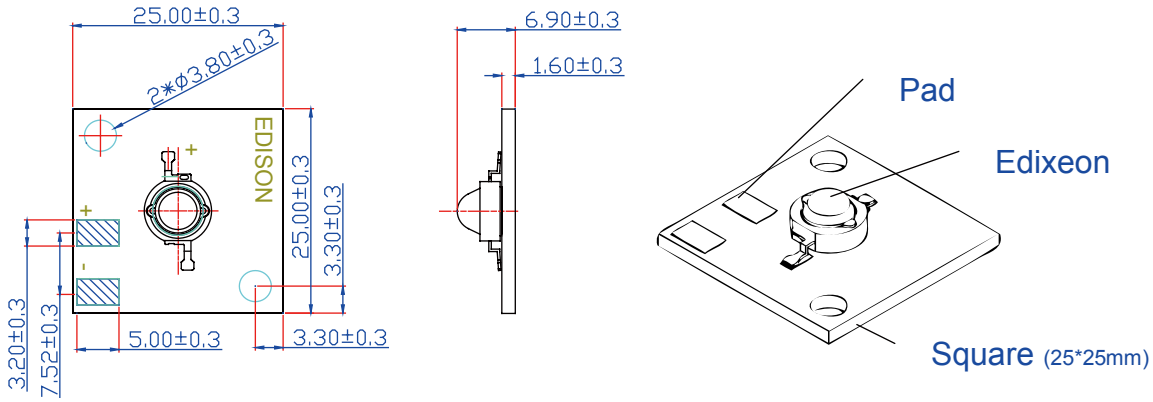
Notes:
1. All dimensions are in mm.
2.Drawings are not to scale.
3.It is strongly recommended that the temperature of lead dose not exceed 55°C.
4.The slug has polarity as anode.
5.It is strongly recommended to apply on electrically isolated heat conducting film between the slug and contact surfaces.

LED Package with Star Dimensions and Polarity

EDSx-xxxx-xx-Ax16



EDSx-xxxx-xx-Bx16



EDSx-xxxx-xx-Cx16

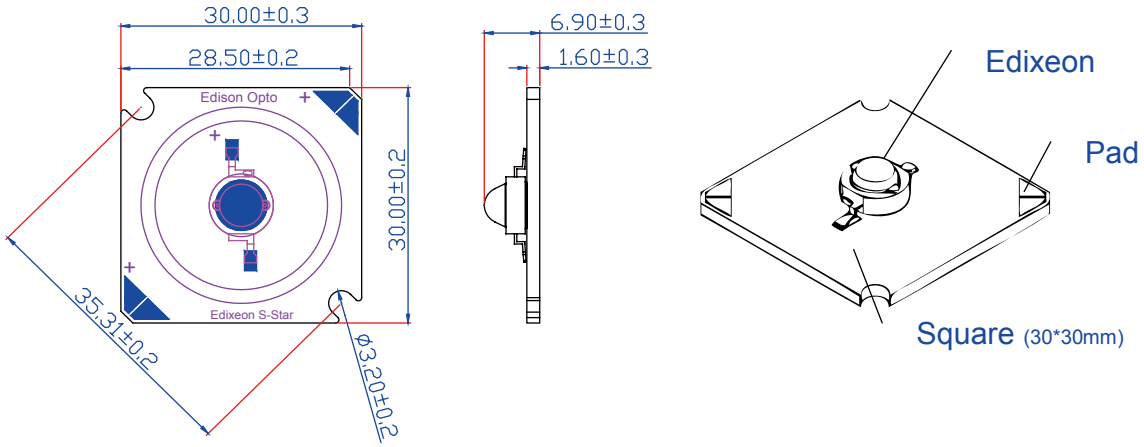


Figure 2. Edixeon® Star dimensions

Notes:

1.All dimensions are in mm.

2.It is strongly recommended that the temperature of lead does not exceed 55°C.

Absolute Maximum Ratings

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 2. Absolute maximum ratings for IR/UV Edixeon® S series

Parameter	EDEE & EDEF	EDEI & EDEN	Unit	Symbol
DC Forward Current(1W)	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	125	125	˚C	T_J
Operating Temperature	-30 ~ +110	-30 ~ +110	˚C	
Storage Temperature	-40 ~ +120	-40 ~ +120	˚C	
Soldering Temperature	260	260	˚C	
ESD Sensitivity	4,000	4,000	V	V_B
Manual Soldering Time at 260˚C(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. Allowable reflow cycles are 3 times for each LED.
4. tp: Pulse width time

The following tables describe thermal resistance of IR/UV Edixeon® S series under various current and different color.

Lens Item	Part Name	Color	$\Delta V_F/\Delta T$		$R\theta_{J-B}$	
			Typ.	Units	Typ.	Unit
Lambertian	EDEx-xLxx	--	-2	mV/˚C	15	˚C/W

Luminous Flux Characteristics

The following tables describe flux of IR/UV Edixeon® S series under various current and different color.

Table 3. Radiometric power characteristics at I_F=350mA and T_J=25˚C: for EDEE-1LS4, EDEV-1LS1 & EDEF-1LS3

Lens Item	Part Name	Color	Radiometric power			Unit
			Min.	Typ.	Max.	
Lambertian	EDEE-1LS4	Deep Red	75.9	150.0	--	mW
	EDEF-1LS3	Cherry Red	50.6	130.0	--	mW
	EDEV-1LS1	Ultraviolet	150.0	180.0	--	mW

Table 4. Radiometric power characteristics at I_F=700mA and T_J=25˚C: for EDEI-1LS3, EDEN-1LS3 & EDEV-SLC1-03

Lens Item	Part Name	Color	Radiometric power			Unit
			Min.	Typ.	Max.	
Lambertian	EDEI-1LS3	IR 850	113.9	300.0	--	mW
	EDEN-1LS3	IR 940	75.9	140.0	--	mW
	EDEV-SLC1-03	Ultraviolet	450.0	528.0	--	mW

Notes:
Flux is measured with an accuracy of ± 10%.

Table 5. Radiometric power rank

Group	Min.	Max.	Group	Min.	Max.
A	10	15	K	384.4	576.7
B	15	22.5	L	576.7	865
C	22.5	33.8	M	865	1298
D	33.8	50.6	N	1298	1946
E	50.6	75.9	P	1946	2919
F	75.9	113.9	Q	2919	4379
G	113.9	170.9	R	4379	6569
H	170.9	256.3	S	6569	9853
J	256.3	384.4	T	9853	14779

Forward Voltage Characteristics

The following tables describe forward voltage of IR/UV Edixeon® S series emitter under various current.

Table 6. Forward voltage characteristics at I_F=350mA and T_J=25˚C for EDEE-1LS4, EDEF-1LS3 & EDEV-1LS1

Lens Item	Part Name	Color	Radiometric power		Unit
			Min.	Max.	
Lambertian	EDEE-1LS4	Deep Red	2.0	3.0	V
	EDEF-1LS3	Cherry Red	2.0	3.0	V
	EDEV-1LS1	Ultraviolet	2.8	4.0	V

Table 7. Forward voltage characteristics at I_F=700mA and T_J=25˚C for EDEI-1LS3, EDEN-1LS3 & EDEV-SLC1-03

Lens Item	Part Name	Color	Radiometric power		Unit
			Min.	Max.	
Lambertian	EDEI-1LS3	IR 850	1.5	2.5	V
	EDEN-1LS3	IR 940	1.5	2.5	V
	EDEV-SLC1-03	Ultraviolet	3.2	5.0	V

Notes:
Forward Voltage is measured with an accuracy of ± 10%.

Table 8. Forward voltage rank for Ultraviolet

V_F(V)			
V01	2.8 — 3.1	V10	6.0 — 6.5
V02	3.1 — 3.4	V11	6.5 — 7.0
V03	3.4 — 3.7	V12	7.0 — 7.5
V04	3.7 — 4.0	V13	7.5 — 8.0
V05	4.0 — 4.3	V14	8.0 — 8.5
V06	4.3 — 4.6	V15	8.5 — 9.0
V07	4.6 — 4.9	V16	9.0 — 9.5
V08	4.9 — 5.2	V17	9.5 — 10.0

Table 9. Forward voltage rank for Deep Red, Cherry Red

V_F(V)			
V01	2.0 — 2.25	V10	3.5 — 4.0
V02	2.25 — 2.5	V11	4.0 — 4.5
V03	2.5 — 2.75	V12	4.5 — 5.0
V04	2.75 — 3.0	V13	5.0 — 5.5
V05	3.0 — 3.25	V14	5.5 — 6.0

Table 10. Forward voltage rank for IR 850, IR940

V_F(V)	
V01	1.50 — 1.75
V02	1.75 — 2.00
V03	2.00 — 2.25
V04	2.25 — 2.50

JEDEC Information

JEDEC moisture sensitivity classification 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 reflow attachment and/or repair operation. The present moisture sensitivity standard contains six levels, the lower the level ,the longer the devices floor life. IR/UV Edixeon® S series are certified at level 4. This means IR/UV Edixeon® S series have a floor life of 72 hours before IR/UV Edixeon® S series need to re-baked.

Table 11. JEDEC characteristics at T_J=25°C for IR/UV Edixeon® S series

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

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

Notes:
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 IR Edixeon® S series package.

Table 12. Operating life, mechanical, and environmental characteristics and T_J=25˚C for IR/UV Edixeon® S series

Stress Tes	Stress Conditions	Stress Duration	Failure Criteria
Room Temperature Operating Life	25˚C, I_F =I_F Max DC (Note 1)	1,000 hours	Note 2
High Temperature High Humidity	85˚C / 85%RH	1,000 hours	Note 2
Temperature Cycle	-40˚C/100˚C ,30 min dwell /<5min transfer	500 cycles	Note 2
High Temperature Storage Life	110˚C	1,000 hours	Note 2
Low Temperature Storage Life	-40˚C	1,000 hours	Note 2
Thermal Shock	-40 / 125˚C 15 min dwell /<10 sec transfer	1,000 cycles	No catastrophics
Natural Drop	On concrete from 1.2 m, 3X		No catastrophics
Solder Heat Resistance (SHR)	260˚C ± 5˚C, 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
   Dimension 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 IR/UV Edixeon® emitter that are handled and operated within the limits specified in IR/UV 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 IR/UV Edixeon® documentation.

Color Spectrum and Radiation Pattern

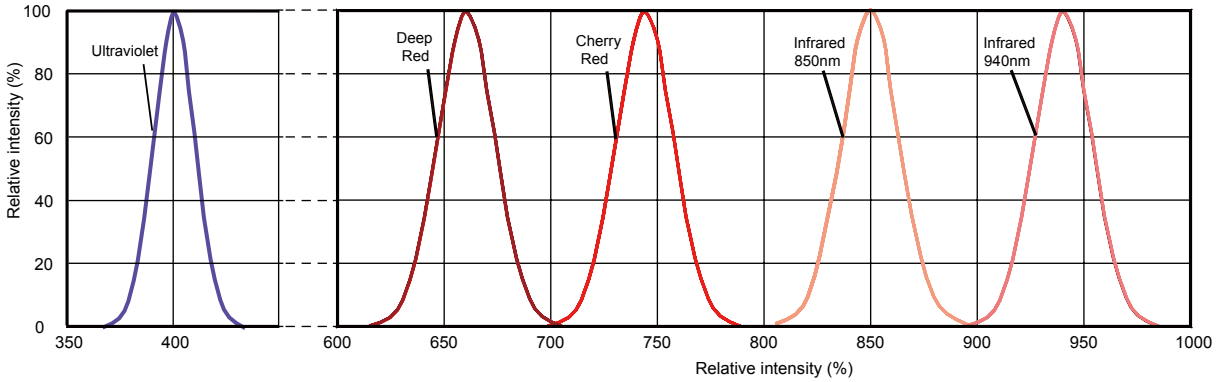


Figure 3. Color spectrum at T_J =25˚C.for IR/UV Edixeon® S series

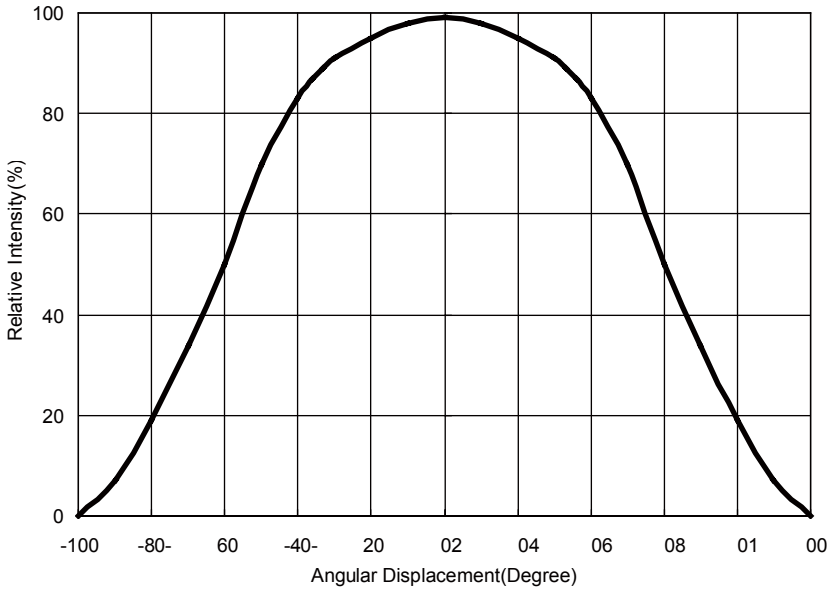


Figure 4. Lambertain at T_J=25˚C for IR/UV Edixeon® S series

Emission Angle Characteristics

Table 13. Emission angle Characteristics at T_J=25˚C for IR/UV Edixeon® S series

Part Name	Color	2Θ½(Typ.)	Unit
		Lambertian	
EDEE-1LS4	Deep Red	120	Deg.
EDEF-1LS3	Cherry Red	120	Deg.
EDEI-1LS3	IR 850	120	Deg.
EDEN-1LS3	IR 940	120	Deg.
EDEV-1LS1	Ultraviolet	150	Deg.
EDEV-SLC1-03			

Table 14. Peak wavelength Characteristics at T_J=25˚C for IR/UV Edixeon® S serie

Lens Item	Part Name	Color	λp		Unit
			Min.	Max.	
Lambertian	EDEE-1LS4	Deep Red	650	670	nm
	EDEF-1LS3	Cherry Red	730	750	nm
	EDEI-1LS3	IR 850	835	860	nm
	EDEN-1LS3	IR 940	930	950	nm
	EDEV-1LS1	Ultraviolet	390	410	nm
	EDEV-SLC1-03				

Notes:
Wavelength is measured with an accuracy of ± 0.5nm

Wavelength Rank

Table 15. Wavelength Rank

Group	λ_d(nm), λ_p(nm)	Group	λ_d(nm), λ_p(nm)
Red	620-630	Cyan=EDEJ	490-510
X	620-630	W	490-495
True Green	515-535	X	495-500
V	515-520	Y	500-505
W	520-530	Z	505-510
X	530-535	Dental Blue	450-470
Y	460-475	W	450-455
Blue	460-765	X	455-460
W	465-470	Y	460-465
X	470-475	Z	465-470
Y	585-595	EDEE-IR 660	650-670
Amber	588-591	U	650-655
X	591-595	V	655-660
Y	610-620	W	660-665
Z	610-620	X	665-670
Red Orange	440-460	EDEF-IR 740	730-750
X	440-445	U	730-735
Royal Blue=C	445-450	V	735-740
V	450-455	W	740-745
W	445-450	X	745-750
X	450-455	EDEI-IR 850	835-860
Y	455-460	V	835-840
EDEV-Ultraviolet	390-410	U	840-845
V	390-395	V	845-850
W	395-400	W	850-855
X	400-405	X	855-860
Y	405-410	EDEN-IR 940	930-950
		U	930-935
		V	935-940
		W	940-945
		X	945-950

Optical & Electrical Characteristics

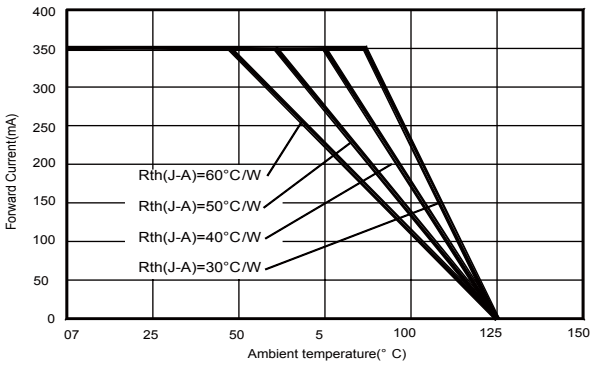


Figure 5. Operating Current & Ambient Temperature for EDEE-1LS4 ,EDEF-1LS3

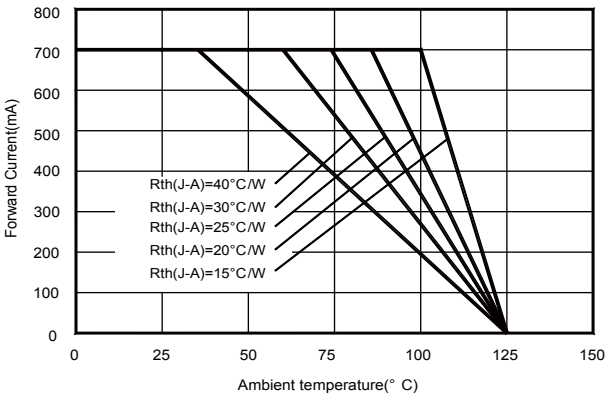


Figure 6. Operating Current & Ambient Temperature for EDEI-1LS3, EDEN-1LS3

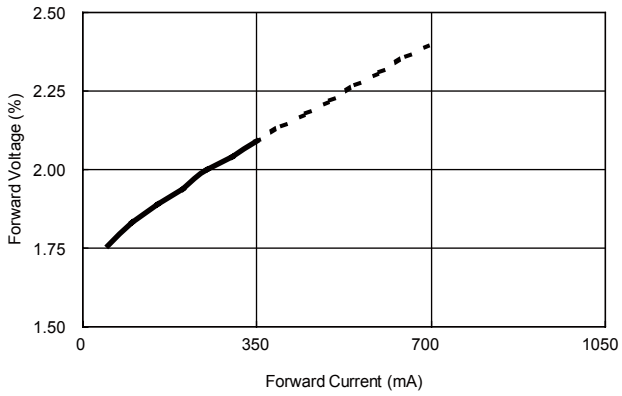


Figure 7. Forward Current & Forward Voltage for EDE-1LS4, EDEF-1LS3

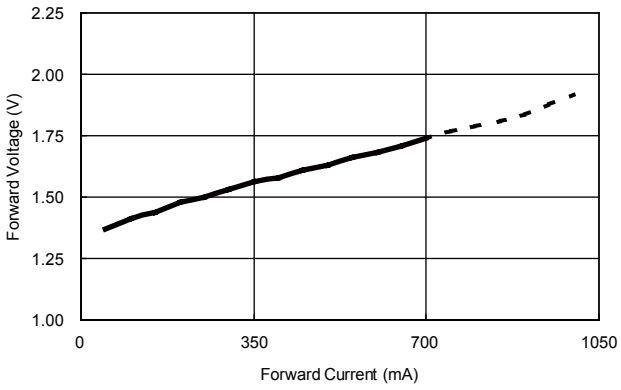


Figure 8. Forward Current & Forward Voltage for EDEI-1LS3, EDEN-1LS3

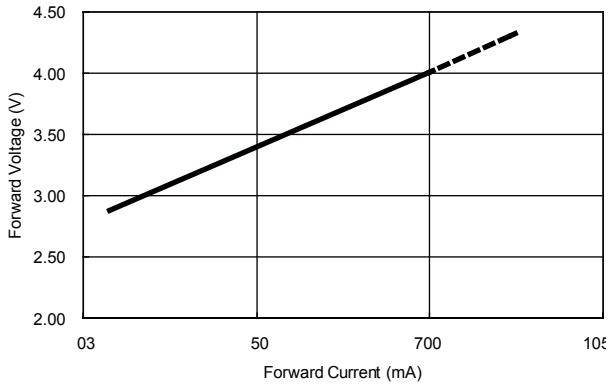


Figure 9. Forward Current & Forward Voltage for EDEV-1LS1, EDEV-SLC1-03

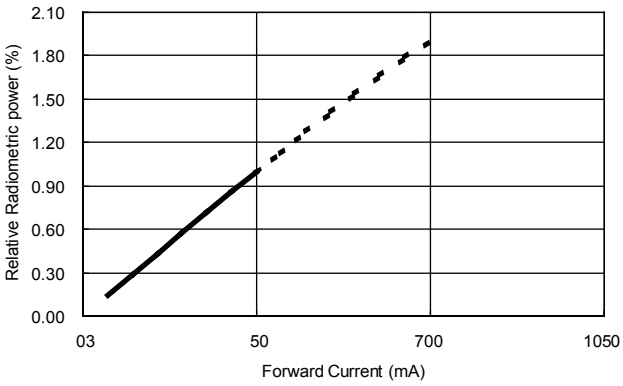


Figure 10. Forward Current & Relative Radiometric Power for at T_J=25 for EDEE-1LS4, EDEF-1LS3

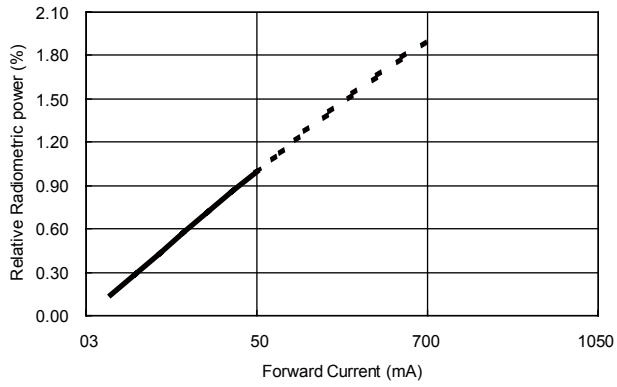


Figure 11. Forward Current & Relative Radiometric Power for at T_J=25°C for EDEE-1LS4, EDEF-1LS3

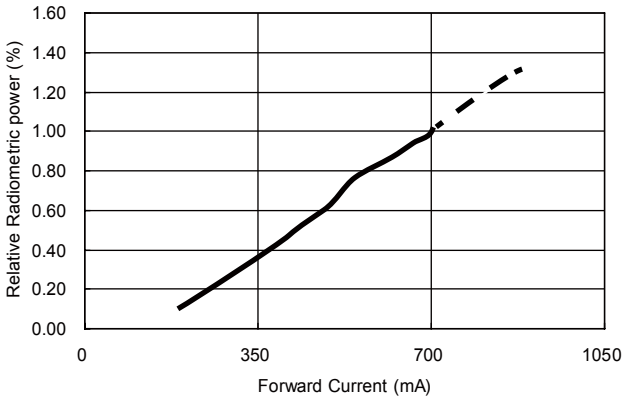


Figure 12. Forward Current & Relative Radiometric Power for at T_J=25°C for EDEI-1LS3, EDEN-1LS3

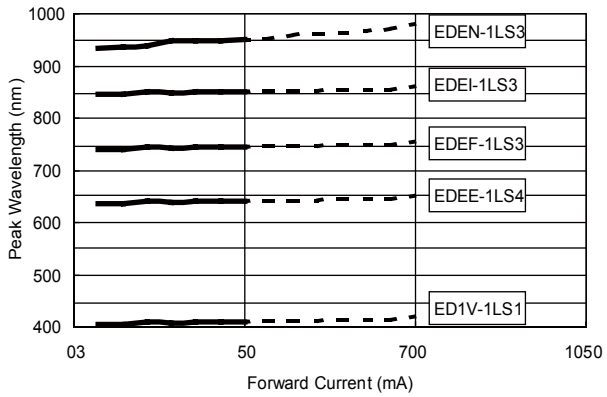


Figure 13. Forward Current & Wavelength at T_J=25°C for EDEN-1LS3, EDEI-1LS3, EDEF-1LS3, EDEE-1LS4, ED1V-1LS1

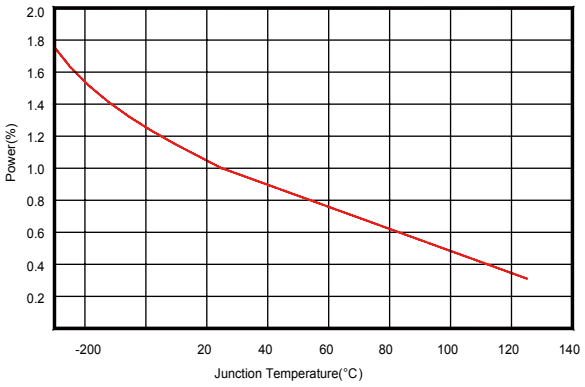
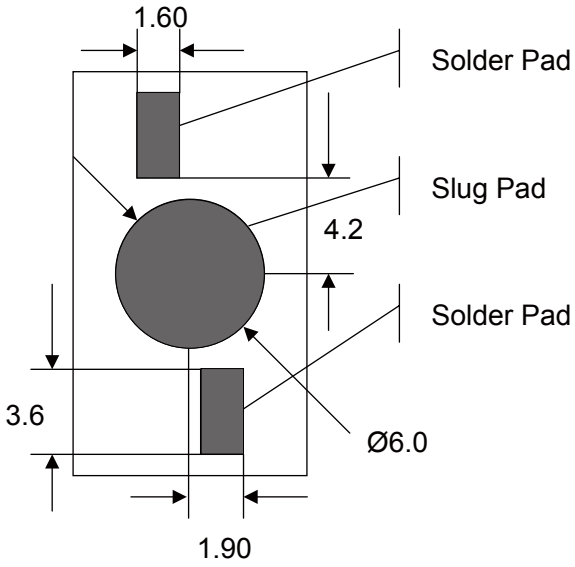


Figure 14. Junction temperature & power rate for all IR/UV Edixeon® S series.

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).



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.

Figure 15. Pad dimensions

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 and reflow completed in a single step. Automated pick-and-place tools are recommended.

The bottom of the slug, which is electrically connected to anode(+), provides the main path for heat dissipation from LED to the heat-sink.

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 IR/UV Edixeon® S 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.

Reflow Profile

The following reflow soldering profiles are provided for reference. It is recommended that users follow the recommended soldering profile provided by the manufacturer of the solder paste used

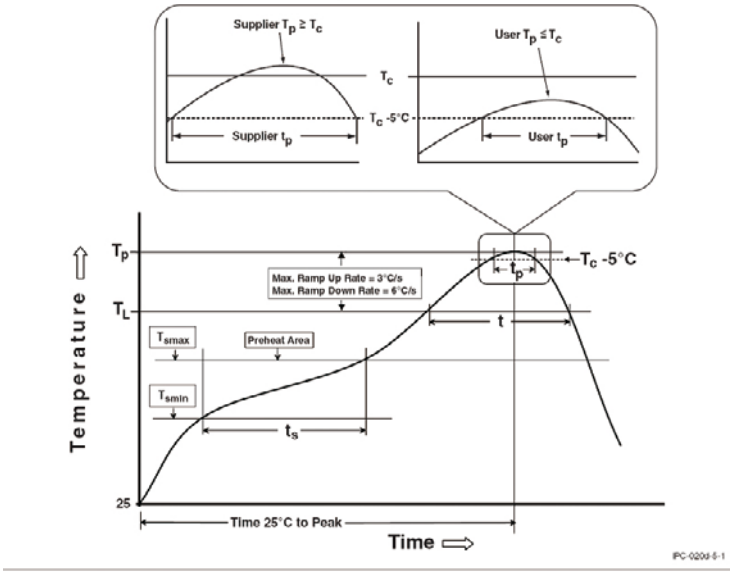


Figure 16. Reflow Profiles

Table 16. Table of Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (Tsmin) Temperature max (Tsmax) Time (Tsmin to Tsmax) (ts)	100°C 150°C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3 °C/second max.
Liquidous temperature (TL) Time at liquidous (tL)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body temperature (Tp)*	230 °C ~235°C *	255 °C ~260 °C *
Classification temperature (Tc)	235°C	260 °C
Time (tp)** within 5 °C of the specified classification temperature (Tc)	20** seconds	30** seconds
Average ramp-down rate (Tp to Tsmax)	6°C/second max.	6°C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.

Notes:
* Tolerance for peak profile temperature (Tp) is defined as a supplier minimum and a user maximum.
** Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum.

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.

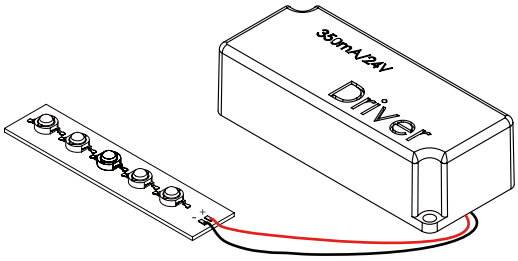


Figure 17. LED Module connect to the DC output of the driver

Step2 : Plug the driver to AC outlet.

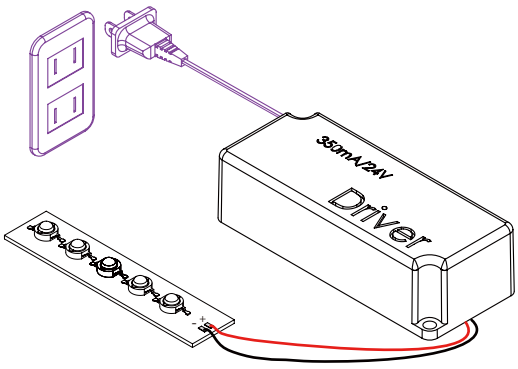
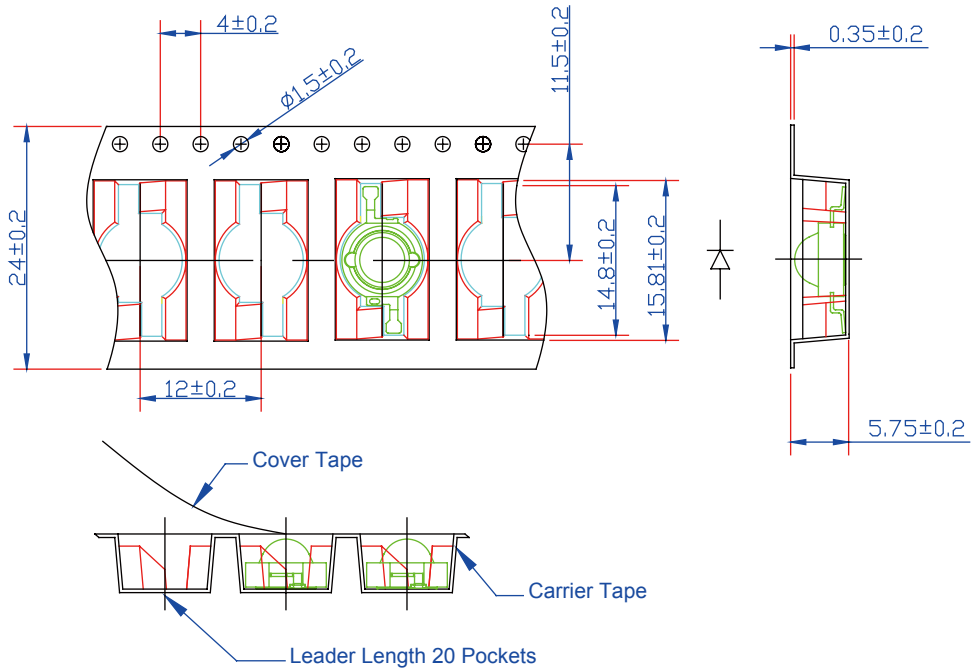


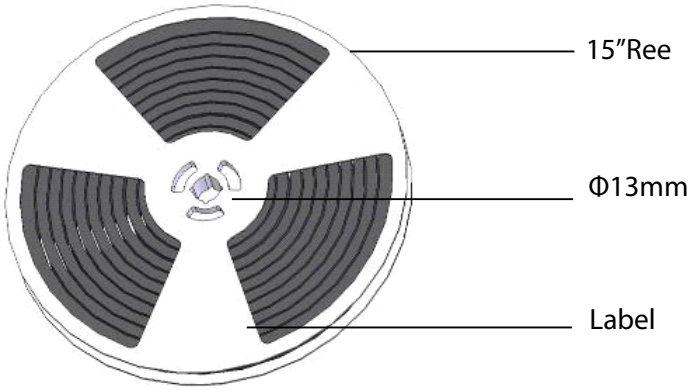
Figure 18. Plug the AC output of the driver to AC outlet

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

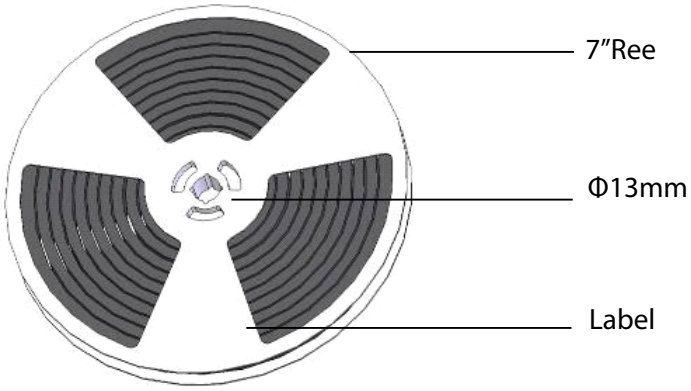
Emitter Product Packaging Information





Item	Quantity	Total	Dimensions(mm)
15"Reel	1,000pcs	1,000pcs	Diameter=380
Box	2 reels	2,000pcs	390*390*170
Carton	2 boxes	4,000pcs	425*405*350

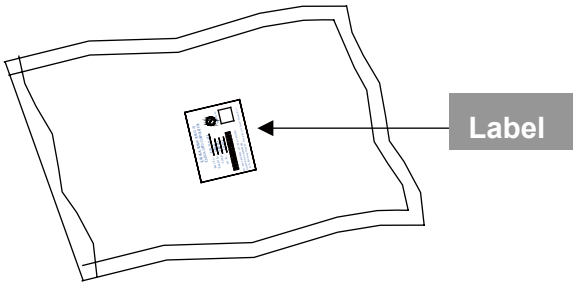
Figure 19. Taping reel dimensions



Item	Quantity	Total	Dimensions(mm)
7"Reel	200pcs	200pcs	Diameter=178
Box	2 reels	400pcs	240*235*67
Carton	5 boxes	2,000pcs	353*254*256

Figure 20. Taping reel dimensions

The Label



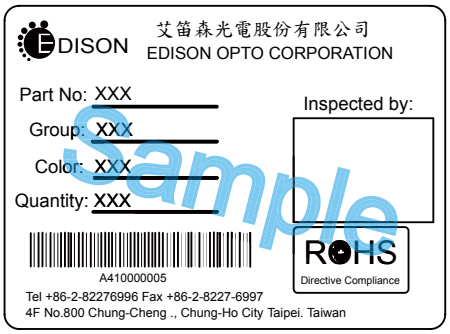
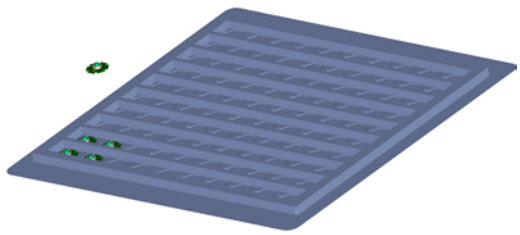
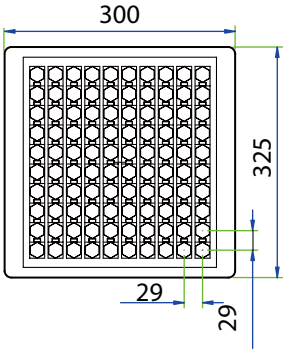


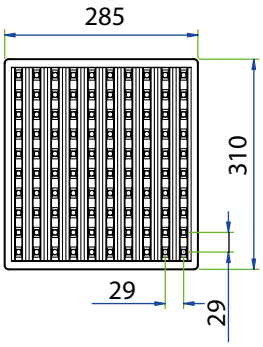
Figure 21. Label on bag and Package label

Star Product Packaging Information



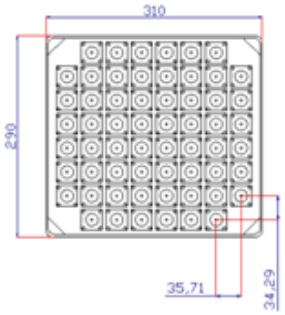


Tray

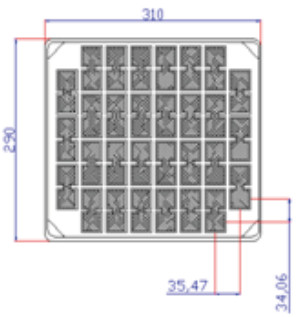


Cover

Item	Quantity	Total	Dimensions(mm)
Tray	100pcs	100pcs	325*300
Box	10 Trays	1,000pcs	340*330*160
Carton	2 boxes	2,000pcs	350*350*340



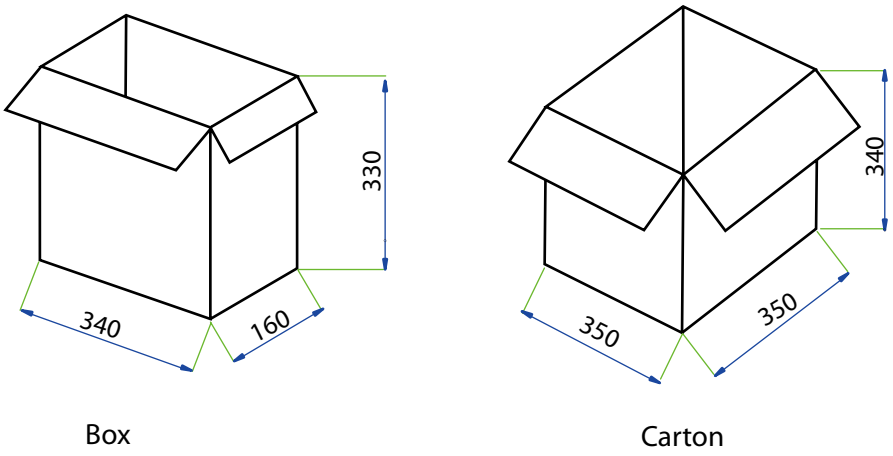
Tray



Cover

Item	Quantity	Total	Dimensions(mm)
Tray	60pcs	60pcs	310*290
Box	10 Trays	600pcs	340*330*160
Carton	2 boxes	1200pcs	350*350*340

Figure 22. Edixeon® Star Package



Box Carton

Figure 23. IR/UV Edixeon® S atar 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 a box.
4. There are 2 boxes in a carton.