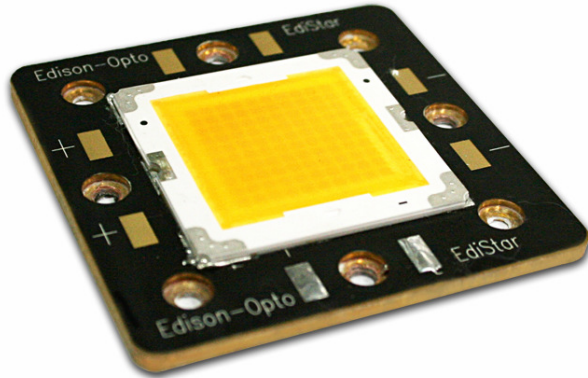


EdiStar Series



EdiStar series are the brightness LEDs in the world by Edison Opto. EdiStar series emitters are designed to satisfy more and more Solid-State lighting High Power LED applications for brilliant world such as general lighting, street light and projector light engine. EdiStar series emitters are designed by particular package for High Power LED. 50W and 100W EdiStar series white has typical 3,700 and 6500 lumens at 2,400mA and 3,000mA. Unlike the fluorescent sources, EdiStar series contain no mercury and has more energy efficient than other incandescent light source.

Features

- Outstanding thermal performance
- LED lighting engine
- Ultra high power LED

Table of Contents

LED Package Dimensions and Polarity	3
LED Package with Star Dimension and Polarity.....	5
Absolute Maximum Ratings	6
Luminous Flux Characteristics	7
Forward Voltage Characteristics	8
JEDEC Information	9
Reliability Items and Failure Measures	10
Color Spectrum and Radiation Pattern.....	11
Product Soldering Instructions	13
Product Thermal Application Information	15
Product Electrical Application Information.....	18
Product Packaging Information	21

Product Nomenclature

The following table describes the available color, power, and lens type. For more information on luminous flux and color, please refer to the Bin Group document.

< Table 1 EdiStar series nomenclature >

X1 LED Item		X2 Type		X3 Emitting Color	
Code	Type	Code	Type	Code	Type
EN	EdiStar	E	Emitter	W	White
		P	Emitter+Driver	H	Neutral White
		S	Emitter+Cu Star	X	Warm White
		C	Emitter+Cu Star+Driver		

X4 Power		X5 Circuit Series		X6 Circuit Parallel	
Code	Type	Code	Type	Code	Type
05	50W	1~10	1~10 Series	1~10	1~10 Parallel
10	100W				

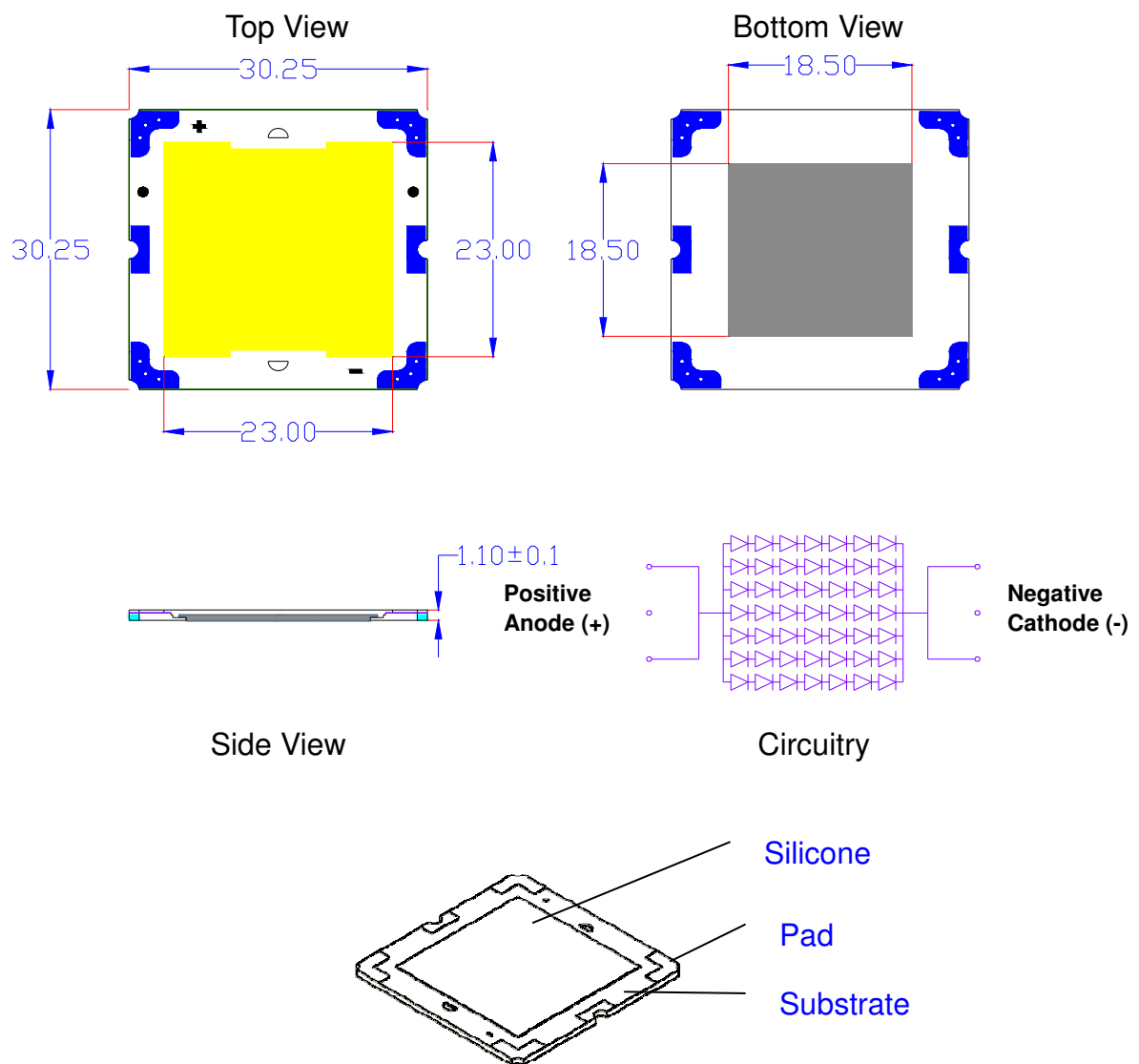
X7 Material		X8 Phosphor	
Code	Type	Code	Type
--	--	--	--

Environmental Compliance

EdiStar 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 EdiStar series to provide an environmentally friendly product to the customers.

LED Package Dimensions and Polarity

ENEW-05-0707-EB

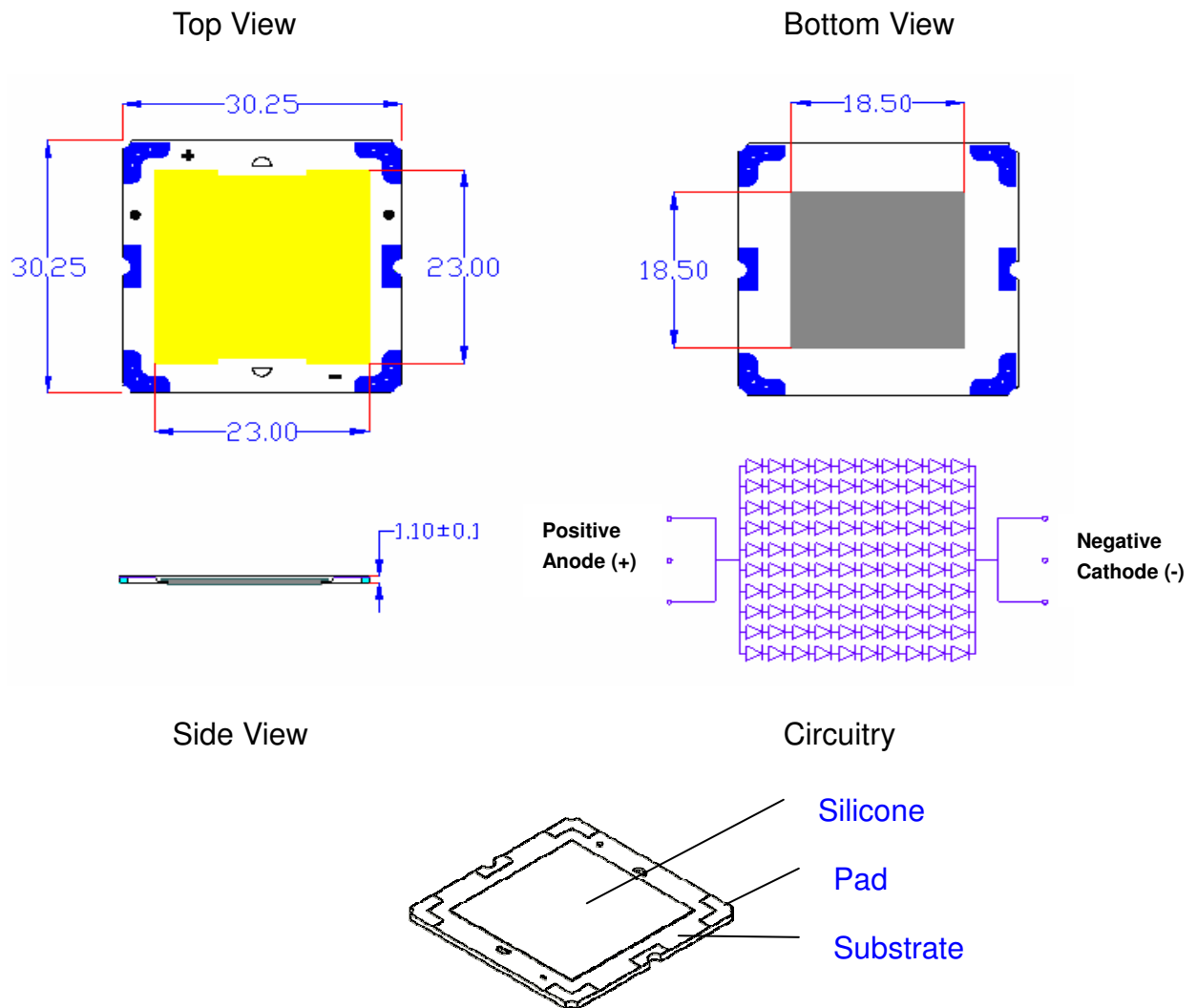


< Figure 1 EdiStar series dimensions >

Notes:

1. All dimensions are in mm.
2. The tolerance is ± 0.35 mm

ENEW-10-1010-EB



< Figure 1 EdiStar series dimensions >

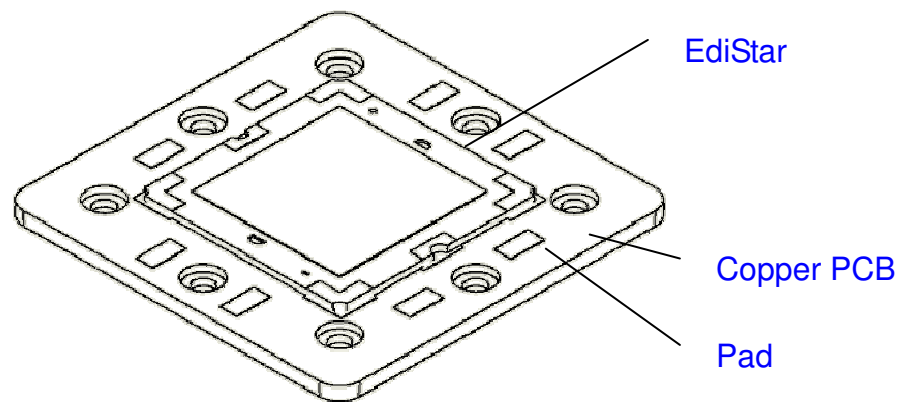
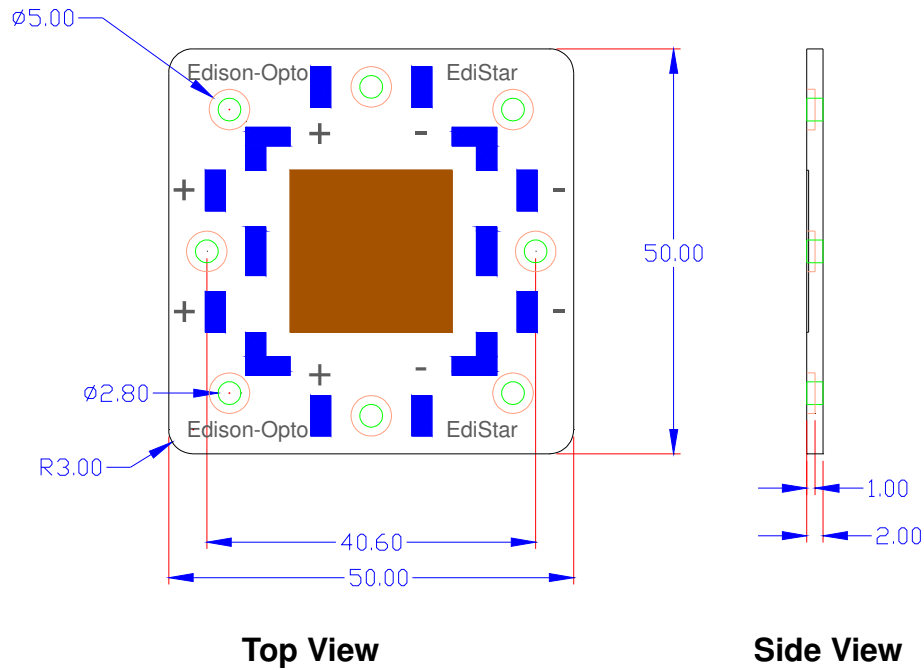
Notes:

1. All dimensions are in mm.
2. The tolerance is ± 0.35 mm

LED Package with Star Dimension and Polarity

Copper Core PCB for SMT Type of EdiStar series

ENSW-10-1010-EB



<Figure 2 EdiStar series with copper PCB dimensions>

Notes:

1. All dimensions are in mm.
2. The tolerance is ± 0.35 mm

Absolute Maximum Ratings

The following table describes flux of EdiStar series.

< Table 2 Absolute maximum ratings for EdiStar 50W series >

Parameter	Rating(1W)	Unit	Symbol
DC Forward Current	2,400	mA	I _F
Peak pulse current;(t _p ≤ 100μs, Duty cycle=0.25)	5,000	mA	
Forward Voltage	35	V	V _F
Junction Temperature	125	°C	T _j
Cu Star Substrate Temperature	100	°C	
Operating Temperature	-30 ~ +60	°C	
Storage Temperature	-40 ~ +60	V	
ESD Sensitivity	500	V	
Manual Soldering Time at 400°C (Max.)	5	Sec.	

< Table 3 Absolute maximum ratings for EdiStar 100W series >

Parameter	Rating(1W)	Unit	Symbol
DC Forward Current	3,000	mA	I _F
Peak pulse current;(t _p ≤ 100μs, Duty cycle=0.25)	5,000	mA	
Forward Voltage	35	V	V _F
Junction Temperature	125	°C	T _j
Cu Star Substrate Temperature	100	°C	
Operating Temperature	-30 ~ +60	°C	
Storage Temperature	-40 ~ +60	V	
ESD Sensitivity	500	V	
Manual Soldering Time at 400°C (Max.)	5	Sec.	

Notes:

1. Proper current rating 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. t_p: Pulse width time

The following table describes thermal resistance of EdiStar series.

< Table 4 Temperature Coefficient of Forward Voltage & Thermal Resistance Junction to Case Characteristics at $T_j=25^\circ\text{C}$ for EdiStar 50W series >

Part Name	Color	$\Delta V_F/\Delta T$		$R_{\theta_{J-B}}$	
		Typ.	Unit	Typ.	Unit
ENEW-05-0707-EB	Cool White	-2	mV/ $^\circ\text{C}$	0.75	$^\circ\text{C}/\text{W}$
ENEH-05-0707-EE	Neutral White	-2	mV/ $^\circ\text{C}$	0.75	$^\circ\text{C}/\text{W}$
ENEX-05-0707-EE	Warm White	-2	mV/ $^\circ\text{C}$	0.75	$^\circ\text{C}/\text{W}$

< Table 5 Temperature Coefficient of Forward Voltage & Thermal Resistance Junction to Case Characteristics at $T_j=25^\circ\text{C}$ for EdiStar 100W series >

Part Name	Color	$\Delta V_F/\Delta T$		$R_{\theta_{J-B}}$	
		Typ.	Unit	Typ.	Unit
ENEW-10-1010-EB	Cool White	-2	mV/ $^\circ\text{C}$	0.75	$^\circ\text{C}/\text{W}$
ENEH-10-1010-EE	Neutral White	-2	mV/ $^\circ\text{C}$	0.75	$^\circ\text{C}/\text{W}$
ENEX-10-1010-EE	Warm White	-2	mV/ $^\circ\text{C}$	0.75	$^\circ\text{C}/\text{W}$

Luminous Flux Characteristics

The following table describes flux of EdiStar series emitters.

< Table 6 Luminous flux characteristics at $I_F=2,400\text{mA}$ and $T_j=25^\circ\text{C}$ for EdiStar 50W series >

Part Name	Color	Flux			Unit
		Min.	Typ.	Max.	
ENEW-05-0707-EB	Cool White	--	3,700	--	lm
ENEH-05-0707-EE	Neutral White	--	2,600	--	lm
ENEX-05-0707-EE	Warm White	--	2,300	--	lm

< Table 7 Luminous flux characteristics at $I_F=3,000\text{mA}$ and $T_j=25^\circ\text{C}$ for EdiStar 100W series >

Part Name	Color	Flux			Unit
		Min.	Typ.	Max.	
ENEW-10-1010-EB	Cool White	--	6,500	--	lm
ENEH-10-1010-EE	Neutral White	--	5,200	--	lm
ENEX-10-1010-EE	Warm White	--	4,800	--	lm

Note:

Flux is measured with an accuracy of $\pm 10\%$.

Forward Voltage Characteristics

The following table describes forward voltage of EdiStar series.

< Table 8 Forward voltage characteristics at $I_F=2,400\text{mA}$ and $T_J=25^\circ\text{C}$ for EdiStar 50W series >

Part Name	Color	V_F			Unit
		Min.	Typ.	Max.	
ENEW-05-0707-EB	Cool White	22.0	24.5	27.5	V
ENEH-05-0707-EE	Neutral White	22.0	24.5	27.5	V
ENEX-05-0707-EE	Warm White	22.0	24.5	27.5	V

Table 9 Forward voltage characteristics at $I_F= 3,000\text{mA}$ and $T_J=25^\circ\text{C}$ for EdiStar 100W series >

Part Name	Color	V_F			Unit
		Min.	Typ.	Max.	
ENEW-10-1010-EB	Cool White	30.0	33.0	36.0	V
ENEH-10-1010-EE	Neutral White	30.0	33.0	36.0	V
ENEX-10-1010-EE	Warm White	30.0	33.0	36.0	V

Note:

Forward Voltage is measured with an accuracy of $\pm 0.2\text{V}$

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. EdiStar series are certified at level 4. This means EdiStar series have a floor life of 72 hours before EdiStar series emitters need to re-baked.

< Table 10 JEDEC characteristics at $T_J=25^{\circ}\text{C}$ for EdiStar series >

Level	Floor Life		Soak Requirements			
	Time	Conditions	Standard Time (hours)	Conditions	Accelerated Environment Time (hours)	Conditions
4	72hours	$\leq 30^{\circ}\text{C}$ / 60% RH	96 +5/-0	30°C / 60% RH	20 +0.5/-0	60°C / 60% RH

Level	Floor Life		Soak Requirements			
	Time	Condition	Standard		Accelerated Equivalent	
			Time(hours)	Condition	Time(hours)	Condition
1	Unlimited	$\leq 30^{\circ}\text{C}$ /85% RH	168 +5/-0	85°C /85% RH		
2	1 year	$\leq 30^{\circ}\text{C}$ /60% RH	168 +5/-0	85°C /60% RH		
2a	4 weeks	$\leq 30^{\circ}\text{C}$ /60% RH	696 ¹ +5/-0	30°C /60% RH	120 +1/-0	60°C /60% RH
3	168 hours	$\leq 30^{\circ}\text{C}$ /60% RH	192 ¹ +5/-0	30°C /60% RH	40 +5/-0	60°C /60% RH
4	72 hours	$\leq 30^{\circ}\text{C}$ /60% RH	96 ¹ +5/-0	30°C /60% RH	20 +5/-0	60°C /60% RH
5	48 hours	$\leq 30^{\circ}\text{C}$ /60% RH	72 ¹ +5/-0	30°C /60% RH	15 +5/-0	60°C /60% RH
5a	24 hours	$\leq 30^{\circ}\text{C}$ /60% RH	48 ¹ +5/-0	30°C /60% RH	10 +5/-0	60°C /60% RH
6	Time on tabel (TOL)	$\leq 30^{\circ}\text{C}$ /60% RH	TOL	30°C /60% RH		

Note:

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 EdiStar series package.

< Table 11 Reliability Items and Conditions >

Stress Test	Stress Conditions	Stress Duration	Failure Criteria
Room Temperature Operating Life	25°C, $I_F = I_F$ Max DC current	1000 hours	Note 1
High Temperature High Humidity Storage Life	85°C / 85%RH	1000 hours	Note 1
Non-Operating Temperature Cycle	-40°C/100°C ,30 min dwell / <5min transfer	200 cycles	Note 1
High Temperature Storage Life	85°C	1000 hours	Note 1
Low Temperature Storage Life	-40°C	1000 hours	Note 1
Non-Operating Thermal Shock	-40 / 125°C, 15 min dwell / <10 sec transfer	300 cycles	Note 1

Notes:

1. A failure is a LED that is not fully lit, or less than 70% of its initial luminous flux.
2. All results of the above stress tests are 0 failures.

Failure Types

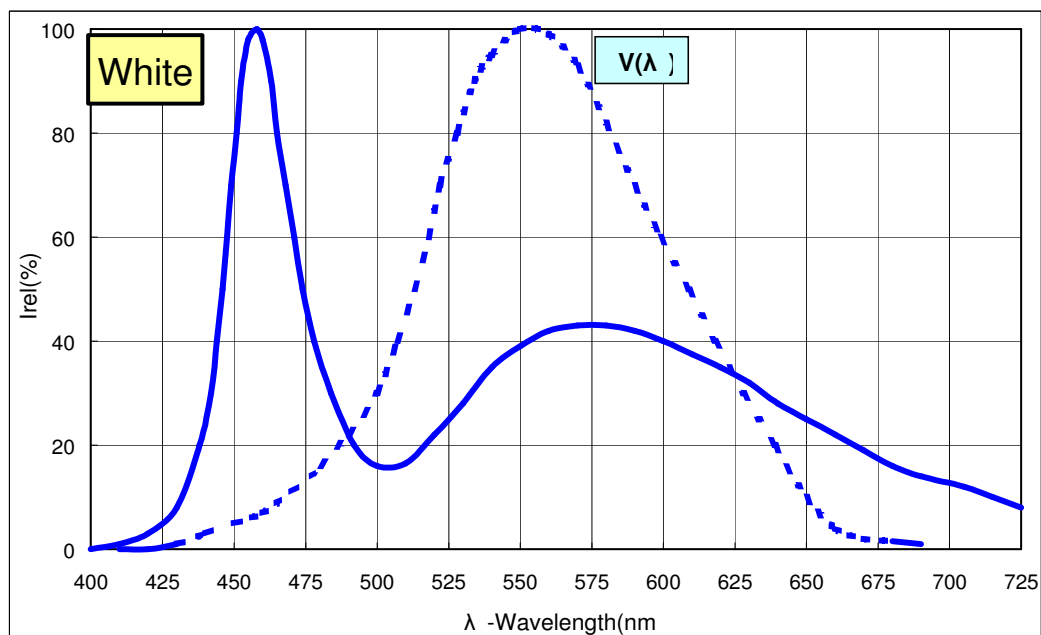
Catastrophic failures are failures that result in the LED emitting no light or very little light at normal current levels. Catastrophic failures are not expected for EdiStar series emitters that are handled and operated within the limits specified in EdiStar series documentation. Please refer to Absolute 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

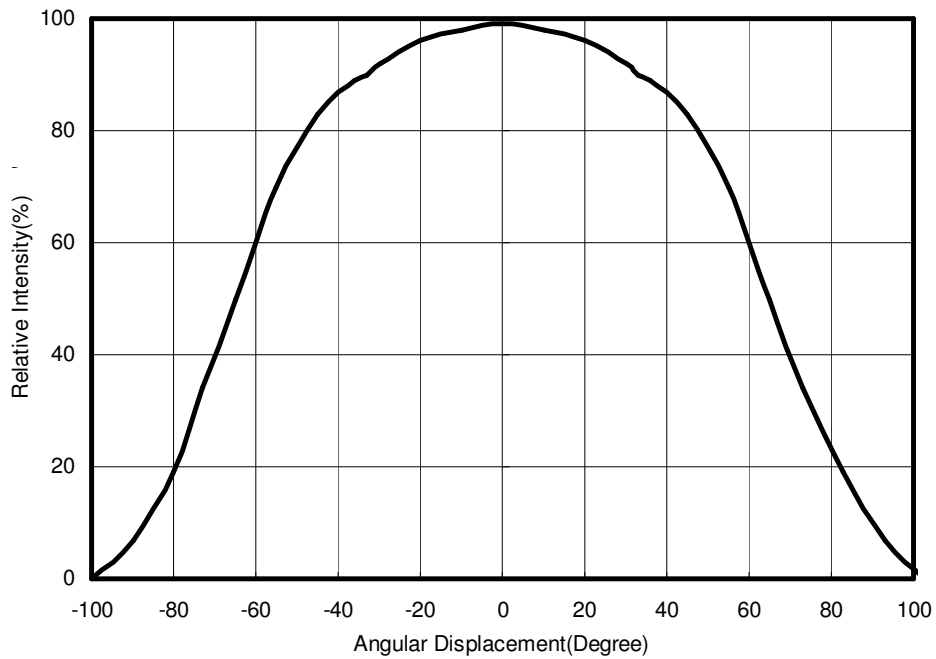
side-by-side comparison of multiple LEDs. Since each lighting installation commonly uses many high-power LEDs, white point stability is a point of concern for lighting designers. Typically, white high-power LEDs, created by combining blue LEDs with yellow (and sometimes red) phosphor, will shift towards 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 EdiStar series documentation.

Color Spectrum and Radiation Pattern



< Figure 3 Color spectrum at $T_J = 25^\circ\text{C}$.for EdiStar series >



< Figure 4 Angular at T_j=25°C for EdiStar series >

Emission Angle Characteristics

< Table 12 Emission angle characteristics at T_j=25°C for EdiStar 50W series>

Part Name	Color	2θ ^{1/2} (Typ.) Lambertian	Unit
ENEW-05-0707-EB	Cool White	140	Deg.
ENEH-05-0707-EE	Neutral White	140	Deg.
ENEX-05-0707-EE	Warm White	140	Deg.

Table 13 Emission angle characteristics at T_j=25°C for EdiStar 100W series>

Part Name	Color	2θ ^{1/2} (Typ.) Lambertian	Unit
ENEW-10-1010-EB	Cool White	140	Deg.
ENEH-10-1010-EE	Neutral White	140	Deg.
ENEX-10-1010-EE	Warm White	140	Deg.

Correlated Color Temperature Characteristics $T_j=25^{\circ}\text{C}$

< Table 14 Correlated Color Temperature Characteristics at $T_j=25^{\circ}\text{C}$ for EdiStar 50W series >

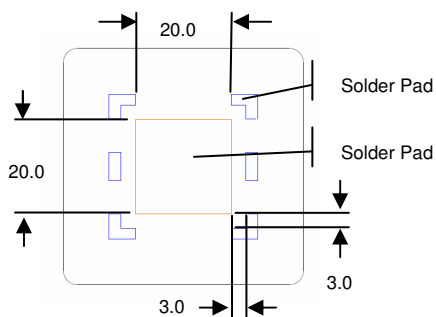
Part Name	Color	CCT		Unit
		Min.	Max.	
ENEW-05-0707-EB	Cool White	5,000	10,000	K
ENEH-05-0707-EE	Neutral White	3,800	5,000	K
ENEX-05-0707-EE	Warm White	2,670	3,800	K

< Table 15 Correlated Color Temperature Characteristics at $T_j=25^{\circ}\text{C}$ for EdiStar 100W series >

Part Name	Color	CCT		Unit
		Min.	Max.	
ENEW-10-1010-EB	Cool White	5,000	10,000	K
ENEH-10-1010-EE	Neutral White	3,800	5,000	K
ENEX-10-1010-EE	Warm White	2,670	3,800	K

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 heatsink (heatsink contact).



< Figure 6 Pad dimensions >

Notes:

1. All dimensions are measured in mm.
2. MCPCB material with a thermal conductivity greater than 3.0 W/mK.
3. Please avoid touching the EdiStar center area during assembly processes. This may cause pollution or scratch on the EdiStar.

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 50 μm . 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 EdiStar series emitters are an electrically neutral heat path that is separate from the LED's electrical contacts. This electrically isolated thermal pad makes EdiStar series emitters 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.

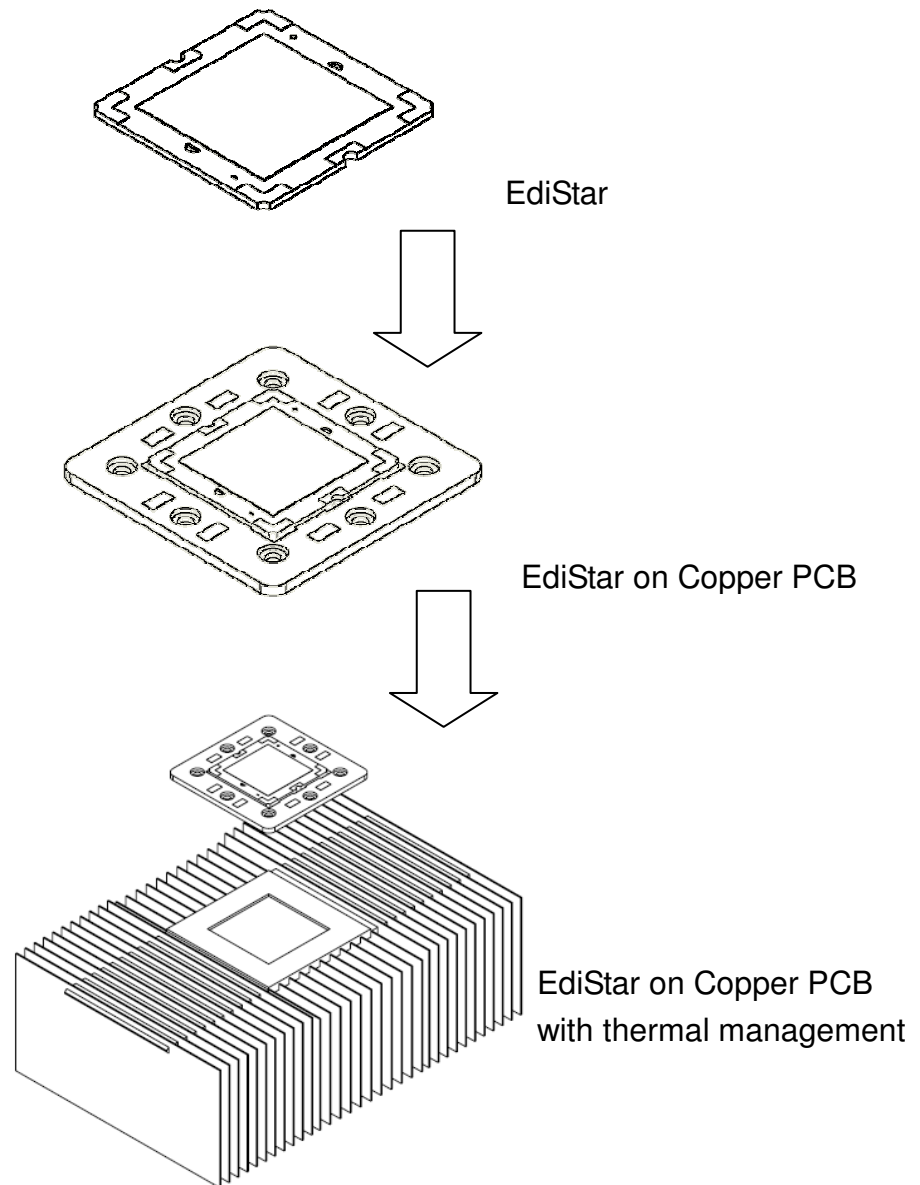
Temperature measurement may be performed by measuring the temperature of a specific component while it is being transported through the furnace. Influencing parameters on the internal temperature of the component are as follows:

- Time and power
- Mass of the component (for EdiStar series emitters on MCPCB this is very important)
- 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 spreaded with a thickness <math>< 100\mu\text{m}</math>. When assembling on Copper PCB and heatsink carrier.



< Figure 7 EdiStar series heatsink application >

Note:

EdiStar series emitter will generate ultra high thermal power, therefore its need a great-design heatsink to dissipate heat.

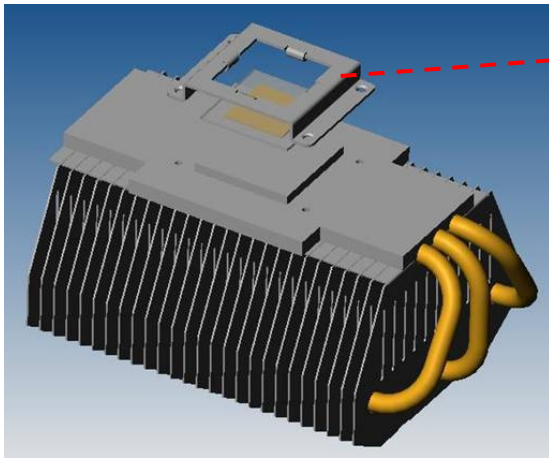
Suggested Adhesive for Selection(such as thermal grease)

- 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

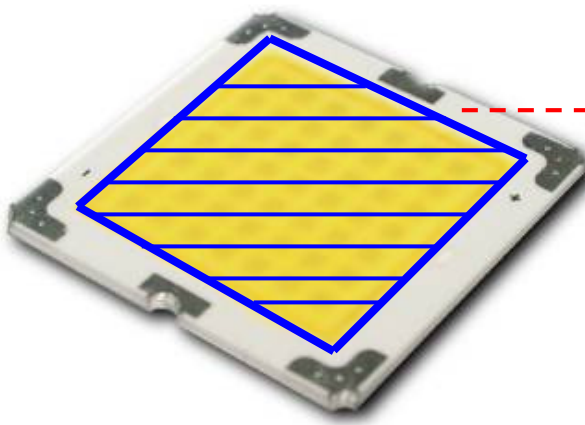
< Table 16 Specification for adhesive properties >

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 °C/W
Volume resistance	> 1x10 ¹⁴
Lap shear adhesion strength	> 200 N/ cm ²
Tensile strength	> 4 Mpa

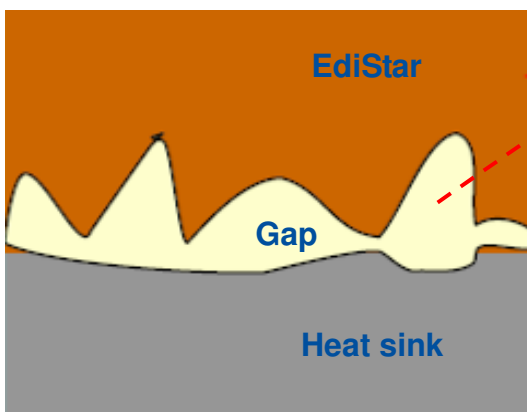
Recommended heat sink and attachment



The function of cover (clip) is used to fix and force Edistar and heatsink to prevent the small gaps generate between the bottom surface of Edistar and the top surface of heat sink.



The forced area is the edge of the Edistar (outside the shaded emitting area). The applied force on the Edistar should not exceed 3kgf/cm^2 .



Without the applied force on Edistar, the gap between Edistar and heat sink will be filled with air. The thermal path would be affected such that the thermal resistance between the medium will increase.

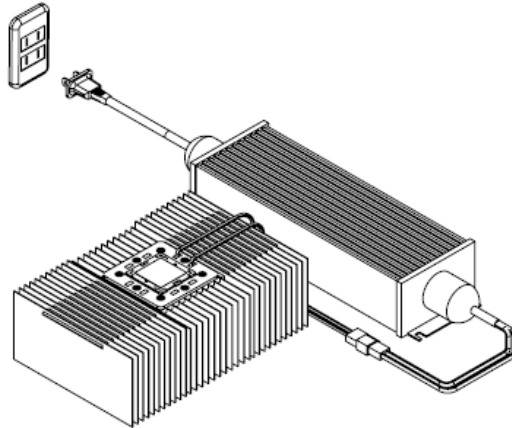
< Figure 8 Heatsink and attachment >

Product Electrical Application Information

Electrical Application

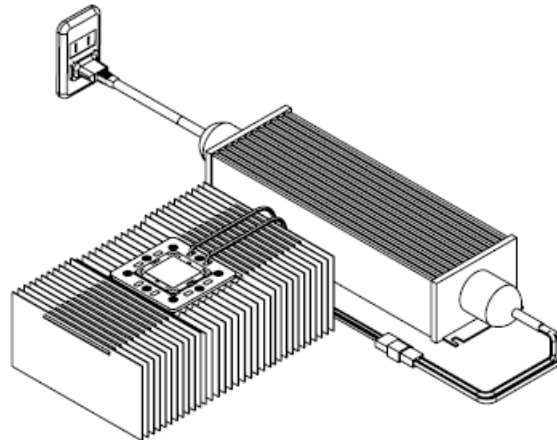
Following graphs and descriptions show how to connect LED or LED module and plug to AC outlet.

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



<Figure 14 LED Module connect to the DC output of the driver>

Step2: Plug the driver to AC outlet.




<Figure 15 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.

Recommended for 50W Series driver

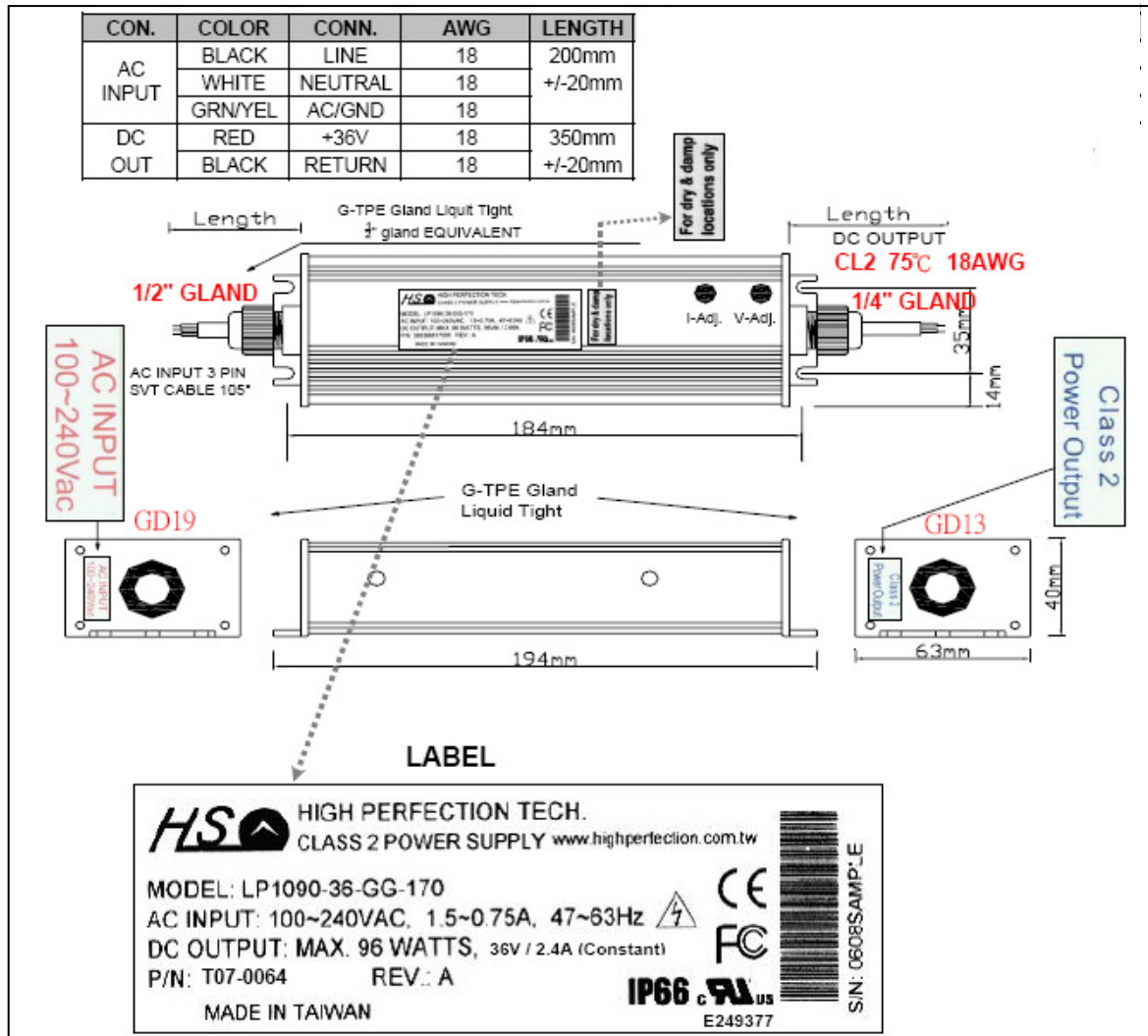


Part No.: EP-C50C-2400
 DC Output Forward Voltage: 18~36V
 Output Current: 2.4A (constant current)
 Made by High Perfection

<p>Safety standard Compliance UL1310,Class 2 (Recognized) UL48 LVD</p> <p>EMI Stantards : FCC 47 CFR PART 15 Class A CE EN55022,EN61000-3-2,-3 CE EN61000-4-2,3,4,5,6,8,11</p>	<p>Safety Certifications E249377</p> <p></p> <p style="writing-mode: vertical-rl; text-orientation: mixed;">SAFETY</p>								
<p>INPUT RANGE : 90~263VAC,1.5~0.75A@FULL LOAD FREQUENCY : 47~63Hz POWER FACTOR : >0.92 @115VAC @230VAC TOTAL HARMONIC DISTORTION : < 20% EFFICIENCY : 85% TYP. PEAK INRUSH : <20A@115VAC,40A@230VAC LEAKAGE CURRENT : <0.7mA/230Vac</p> <p style="writing-mode: vertical-rl; text-orientation: mixed;">INPUT</p>									
<p>LOAD CAPACITY : 96 Watts</p> <table border="1" data-bbox="421 1137 997 1205"> <thead> <tr> <th>DC OUTPUT</th> <th>MIN.</th> <th>MAX.</th> <th>LOAD REG.</th> </tr> </thead> <tbody> <tr> <td>36V</td> <td>0.1Amps</td> <td>2.66Amps</td> <td>+/-5%</td> </tr> </tbody> </table> <p>CALIBRATION SET : CONSTANT CURRENT MODE - 2.4A 36 ~ 18 V +/- 3%</p> <p>CREST FACTOR : 1.5 MAX.</p> <p style="writing-mode: vertical-rl; text-orientation: mixed;">OUTPUT</p>		DC OUTPUT	MIN.	MAX.	LOAD REG.	36V	0.1Amps	2.66Amps	+/-5%
DC OUTPUT	MIN.	MAX.	LOAD REG.						
36V	0.1Amps	2.66Amps	+/-5%						
<p>PROTECTION : OCP,SCP - AUTO RECOVERY COOLING : CONVECTION , ALUMINUM HOUSING OPERATION TEMPERTURE : -30 ~ 70°C TEMP. DE-RATING 1% PER°C FROM 50°C TO 70°C RELATIVE HUMIDITY : 5 ~ 95% STORAGE TEMP. : -40°C ~ 85°C</p> <p>RELIABILITY(MTBF) : >100,000Hours @25°C FULL LOAD (MIL-HDBK-217E)</p> <p>3 YEARS WARANTY : PART AND LABOR</p> <p>APPLIABLE LOCATION : DRY OR DAMP,WET, IP66</p> <p>Weight : 600g (Typical)</p> <p style="writing-mode: vertical-rl; text-orientation: mixed;">MISCELLANEOUS</p>									

< Figure 16 Recommended driver specifications >

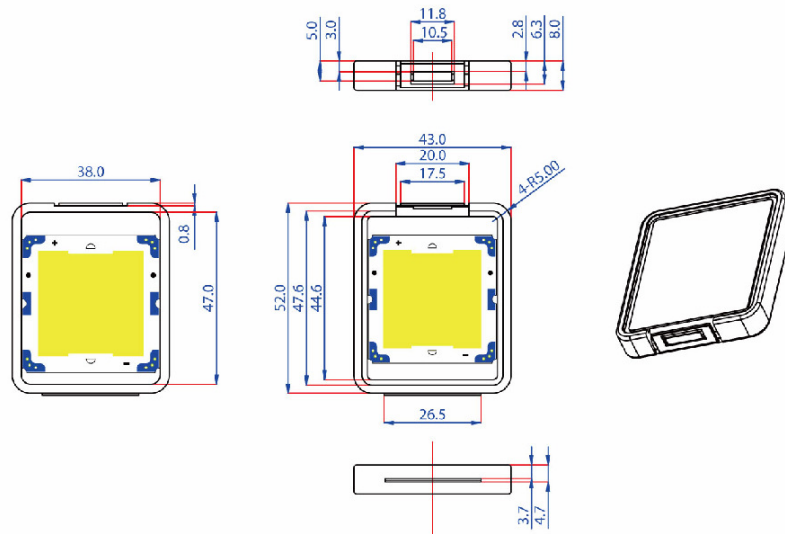
Product Outlines (HS LP1090 series)



< Figure 17 Recommended driver dimensions >

Product Packaging Information

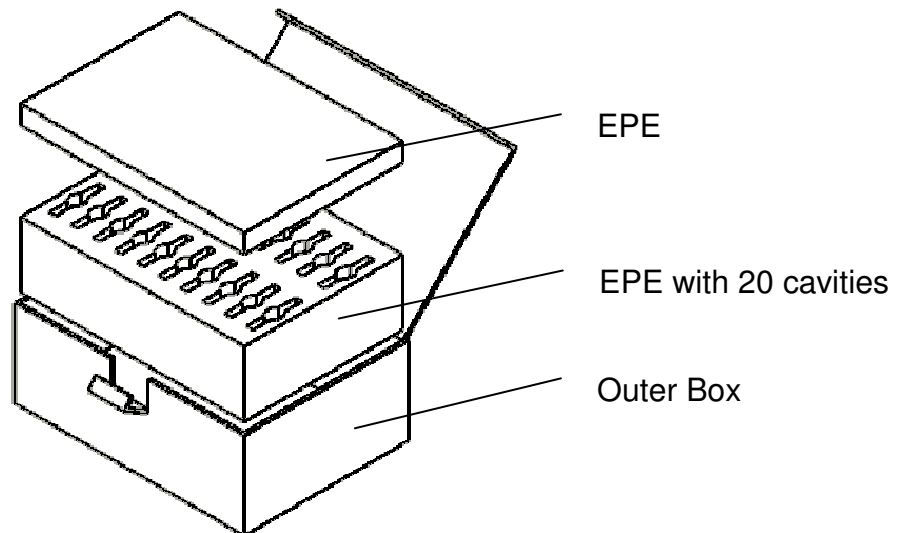
Package Specifications



< Figure 18 PP box dimensions >

Notes:

1. All dimensions are in mm.
2. Tolerance: $\pm 0.2\text{mm}$



< Figure 19 Outer box and EPE package >

< Table 13 Package dimensions and quantity >

Item	Quantity	Dimensions(mm)
PP Box	1 pc	52*43*8
Outer box	20 PP boxes	240*170*90