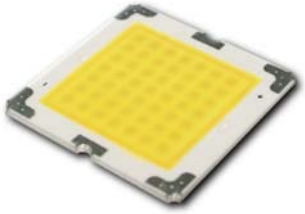
Ultra High Power LED



50W EdiStar

EdiStar Emitter

Approved By Customer	Designer	Checker	Approval

Date：2006/12/04
Version：Preliminary V0.1
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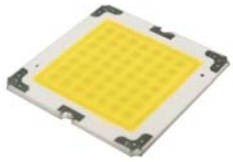
50W EdiStar



EdiStar emitters are the brightenss LEDs in the world by Edison Opto. EdiStar 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 emitters are designed by particular package for High Power LED. 50W EdiStar white has typical 1800 lumens @2400mA. Unlike the fluorescent sources, EdiStar contains no mercury and has more energy efficient than other incandescent light source.

Features

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

Typical Applications

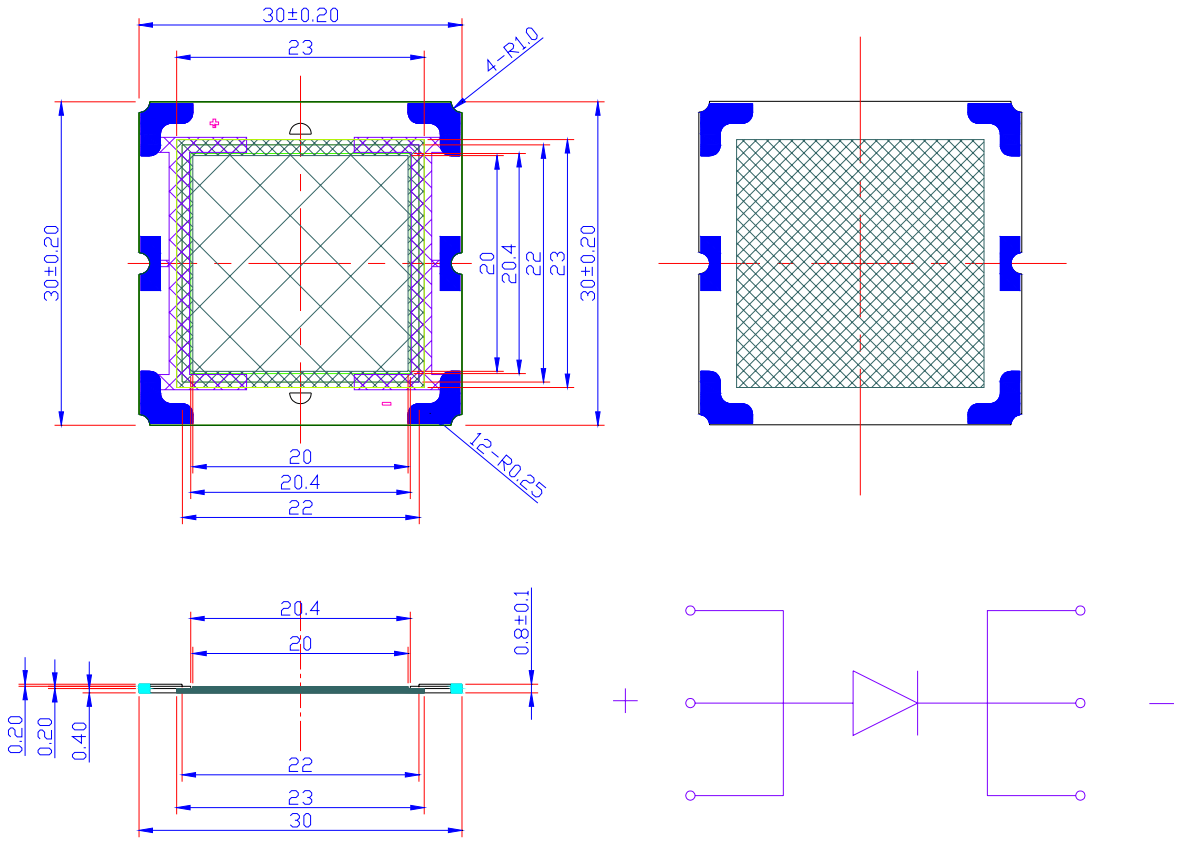
- General lighting
- Ceiling lights
- Indoor and Outdoor Commercial lighting

Technology

- Tjmax = 125 ^{O}C
- High Lumen performance
- Low thermal resistance 0.5~1 ^{O}C/W
- RoHS compliant
- Industrial best lumen maintenance –

  50,000hrs life at I_{Fmax} with 70% lumen if Tj is lower than 65^{o}C

Package Outlines: 50W



Notes:

1. All dimensions are in mm.
2. Drawings are not to scale.

Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
DC Forward Current	I_F	**4900**	mA
Peak pulse current;(tp≦100μs, Duty cycle=0.25)	I_{pulse}	**7000**	mA
Reverse Current	I_R	**50**	μA
Transient Surge Voltage	V_{TS}	**50**	V
Isolation Voltage	**Vi**	**1000**	V
LED Junction Temperature	T_j	**125**	℃
LED Substrate Temperature	**Ts**	**100**	℃
Operating Temperature	T_{opr}	**-30 ~ +60**	℃
Storage Temperature	T_{stg}	**-40 ~ +60**	℃
ESD Sensitivity	V_B	**500**	V
Manual Soldering Time at 400℃(Max.)	T_{sol}	**5**	*seconds*

Notes:

1. **Proper current derating must be observed to maintain junction temperature below the maximum.**
2. **LEDs are not designed to be driven in reserve bias.**

Luminous Flux & Electrical Characteristics (Tj=25℃):

Power Consumption	Part Name	Color	Typ. Voltage (V)	Current (A)	Luminous Flux (lm)	Thermal Resistance (℃/W)
50W	ENEW-05-0707-DA	White	*23*	*2.4*	*1800*	*0.5*
	ENEX-05-0707-DC	Warm White	*23*	*2.4*	*1400*	*0.5*

Luminous Flux Characteristics at I_F=2400mA (Tj=25℃):

Power Consumption	Part Name	Color	Flux			Units
			Min.	Typ.	Max.	
50W	ENEW-05-0707-DA	White	*1600*	*1800*	--	*lm*
	ENEX-05-0707-DC	Warm White	*1250*	*1400*	--	*lm*

Color Temperature Characteristics at I_F=2400mA (Tj=25℃):

Power Consumption	Part Name	Color	λd/λp[1]/CCT			Units
			Min.	Typ.	Max.	
50W	ENEW-05-0707-DA	White	*4000*	--	*8000*	*K*
	ENEX-05-0707-DC	Warm White	*2800*	--	*3800*	*K*

Emission Angle Characteristics at I_F=2400mA (Tj=25℃):

Part Name	Color	2Θ½(Typ.)	Units
ENEW-05-0707-DA	White	*140*	Degrees
ENEX-05-0707-DC	Warm White	*140*	Degrees

Note

1. **Flux is measured with an accuracy of ± 10%.**
2. **CCT selection acc. To CCT groups and an accuracy of ± 300K**
3. **Forward Voltage is measured with an accuracy of ± 0.1V**

3 All white and warm white emitters are built with InGaN

Operating life and environmental tests performed on EdiStar™ package:

Stress Test	Stress Conditions	Stress Duration	Failure Criteria
Room Temperature Operating Life	25℃, I_F = max DC (Note 1)	1000 hours	Note 2
High Temperature High Humidity	85℃ / 85%RH	1000 hours	Note 2
Temperature Cycle	-40℃/100℃ ,30 min dwell /＜5min transfer	200 cycles	Note 2
High Temperature Storage Life	110℃	1000 hours	Note 2
Low Temperature Storage Life	-55℃	1000 hours	Note 2
Thermal Shock	-40 / 120℃, 20 min dwell /＜20 sec transfer	200 cycles	No catastrophics

Note

1. **Depending on the maximum derating curve.**
2. **Failure Criteria:**

Electrical failures

V_F shift >=10%

I_R<50uA @Vr=5V

Light Output Degradation

% Iv shift >= 20% @1,000hrs or 200cycle

Visual failures

Broken or damaged package or lead

Solderability < 95% wetting

Dimension out of tolerance

How to Know Tj in Your Application?

If it is white EdiStar™ Rth(junction to case)=0.5°C/W

The thermal grease is 200um.

K(thermal conductiveity)=3 W/mk

Then Rth(case to board)= $\frac{200}{3x(18)^2}$ **=0.2 °C/W**

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

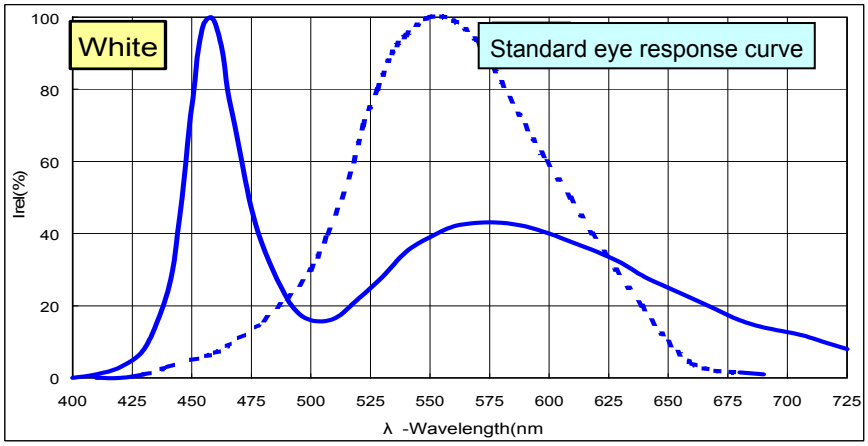
Rth(board-air)≒ $\frac{500}{Area(cm^2)}$

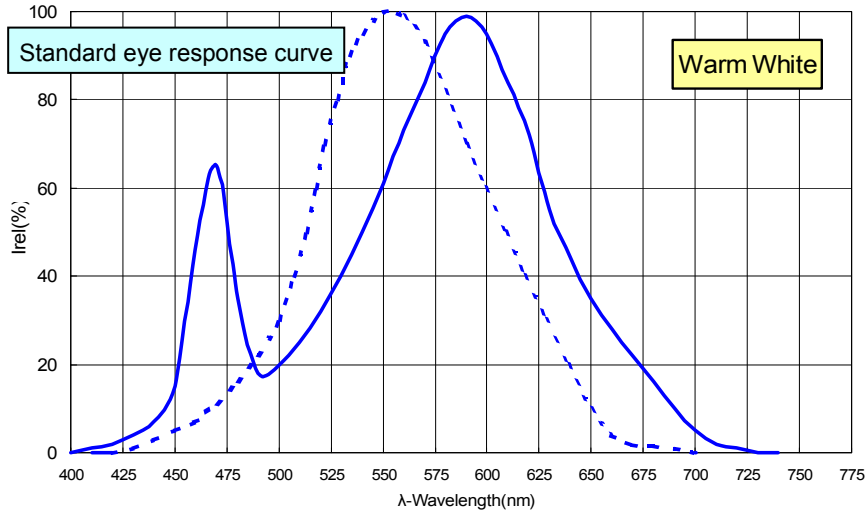
If Area is 3000cm² Rth=0.167 ΔT(junction-air)=(0.5+0.2+0.167)x50=43.35 °C

If Area is 5000cm² Rth=0.1 ΔT (junction-air)=(0.5+0.2+0.1)x50=40 °C

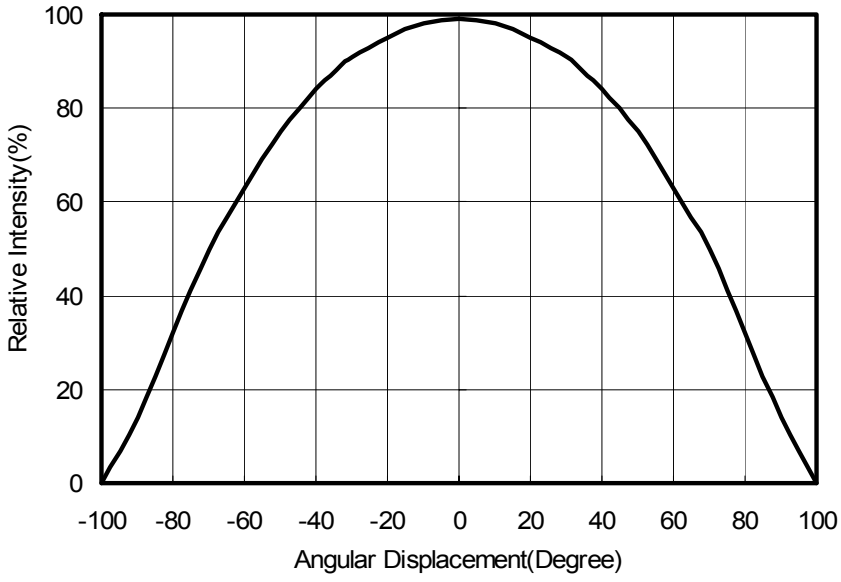
If Area is 8000cm² Rth=0.0625 ΔT (junction-air)=(0.5+0.2+0.0625)x50=38.125 °C

Electrical & Optical Curves-Spectrum





Typical Radiation Pattern for white and warm white



Adhesive for Emitter to Aluminum PCB

Suggestion:

- Ease of use

  Non-solvent, One-part
- Fast tack free

  3 minutes at 25°C
- No corrosion

  Alcohol type of RTV
- Low volatility

  Low weight loss of silicone volatiles
- Adhesion

  Excellent adhesion to most materials without use of a primer
- Dielectric properties

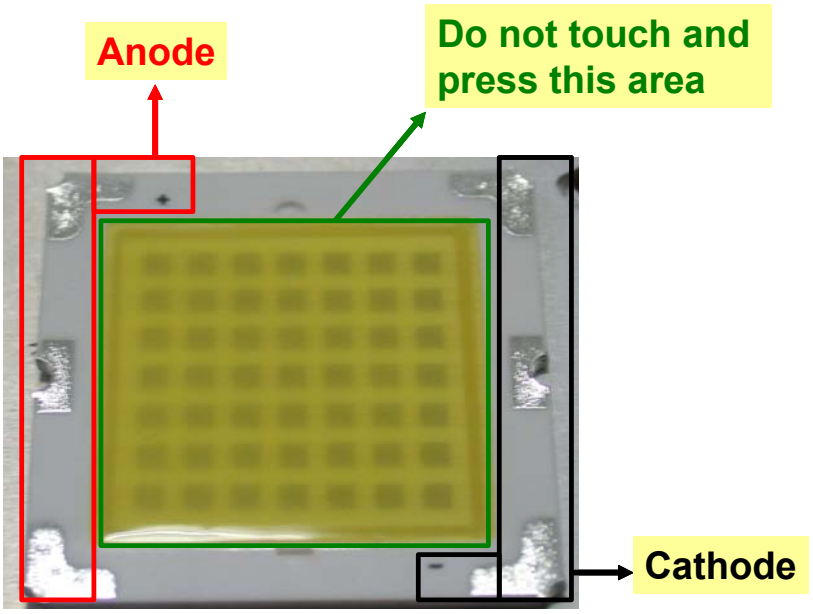
  Cured rubber exhibits good dielectric properties
- Excellent thermal stability and cold resistance

  Cured rubber provides wide service temperature range

Typical Properties

Specification	Suggested Properties
Thermal grease	Silicone base
Take-free time	3~10 minutes
Specific gravity	< 3 g/cm^2
Thermal conductivity	> 3.5 W/mK
Rth in using	< 1 °C/W
Volume resistance	> 1x10^6 MΩm
Lap shear adhesion strength	> 200 N/ cm^2
Tensile strength	> 4 Mpa
Bond Line Thickness	<40um

Instruction for Proper Usage:



Driver:

▪Input Constant Current＝2.1~2.4A

▪Input Voltage (min) ＝24V

Assembly Steps:

1. Spread thermal grease on heat sink or the bottom of EdiStar uniformly.
2. Place EdiStar on heat sink and press it lightly.
3. The heat sink should be anodized.
4. Wire up EdiStar and connect to driver.
5. Use constant current driver.

Thermal grease:

GE TIG825FX or thermal conductivity is greater than 4 w/mk.

The thickness of thermal grease between LED and heat sink should be less than 200 μm

Surface area of heat sink:

Larger than 5000 cm^2 (suggestion)