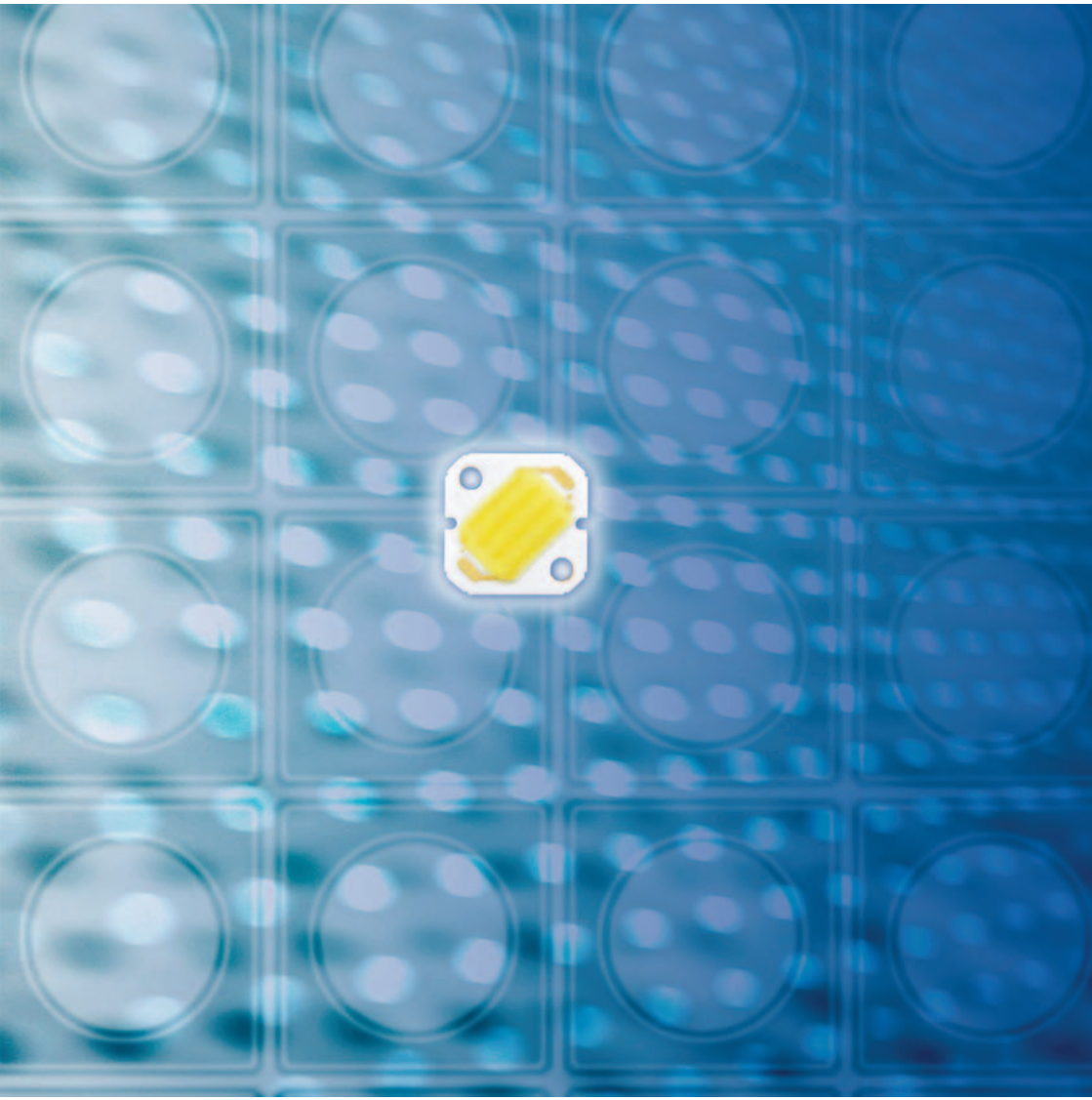
SHARP

ZENIGATA LED
User's guide 2008-11

ZENIGATA LED



http://www.sharp.co.jp/products/device/index.html

Outline

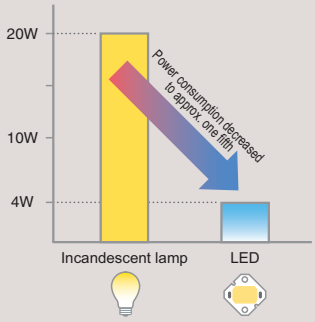
SHARP high-powered ZENIGATA LED, comprising LED chips mounted on an 18mm-square ceramic substrate, ensures broad luminous flux, high light-emitting efficiency and radiation performance, and achieves high reliability.

ZENIGATA LED is suitable for lighting apparatuses shown below.

- Incandescent lamp
- Spotlight
- Downlight
- Pendant light
- Landscape light
- Road lighting

Since the light emission from ZENIGATA LED includes less infrared light (heat ray) than that from a conventional incandescent lamp, ZENIGATA LED is adaptable to the lighting of commodities susceptible to damages caused by temperature rise.
It is also suitable for the lighting of goods of concern for bad influences due to ultraviolet ray, including discoloration, since the light from ZENIGATA LED is free from ultraviolet ray.
In these days, amid mounting environment concerns, light sources having broader luminous flux per electric power and longer service life leading to less replacement intervals are required. LEDs, having features such as superior light emitting efficiency and longer life allowed by high reliability, are expected to make contributions to environmental conservation, including energy-saving and reduction of wastes. ZENIGATA LED, combining favorable features of LEDs, such as high light-emitting efficiency and longer life, has potential of an environmental-friendly key lighting device in a new era.

Comparison of power consumption



* It is estimated only by LED device, not including power supply officiency.

This guide introduces characteristics of ZENIGATA LED and describes some notes on use showing reference case examples.

Environmental performance

ZENIGATA LED, contributing to reduction of CO_2 consumption arise from lighting, is free from lead, mercury, and cadmium, and observes ROHS Directive.

ZENIGATA LED Lineup

Four types of colors are available in 3.6W and 6.7W.

Power consumption (Forward voltage, forward current)	Color	Color temp. (TYP.)	Luminous flux (TYP.)	Average color rendering index (Ra TYP.)	Model
3.6W (10.2V 360mA)	White	5 000K	280 lm	60	GW5BWC15L02
	Warm White	2 800K	200 lm	70	GW5BDC15L02
	High CRI	5 000K	190 lm	90	GW5BNC15L02
	High CRI	6 500K	190 lm	90	GW5BNC15L12
6.7W (10.5V 640mA)	White	5 000K	540 lm	60	GW5BWF15L00
	Warm White	2 800K	400 lm	70	GW5BDF15L00
	High CRI	5 000K	350 lm	90	GW5BNF15L00
	High CRI	6 500K	350 lm	90	GW5BNF15L10

* The case temperature Tc, 25°C, is the value measured 20ms after rated current is applied.

* The values of forward voltage, luminous flux, and average color rendering index Ra are references, and are not guaranteed.

Comparison of hue between White, High CRI and Warm White

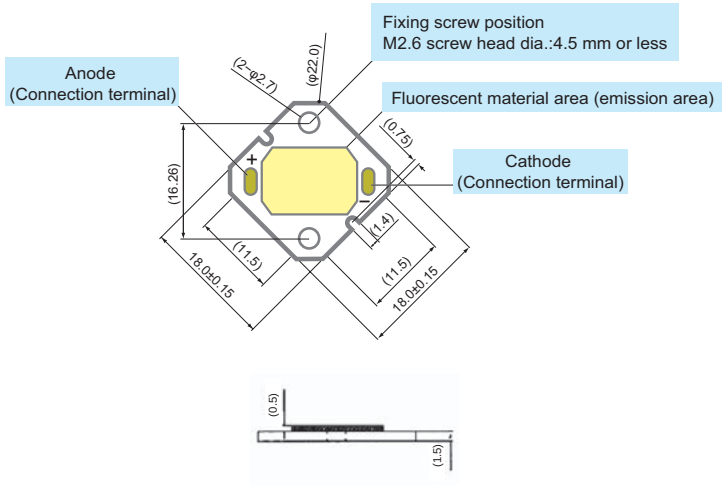
White

High CRI

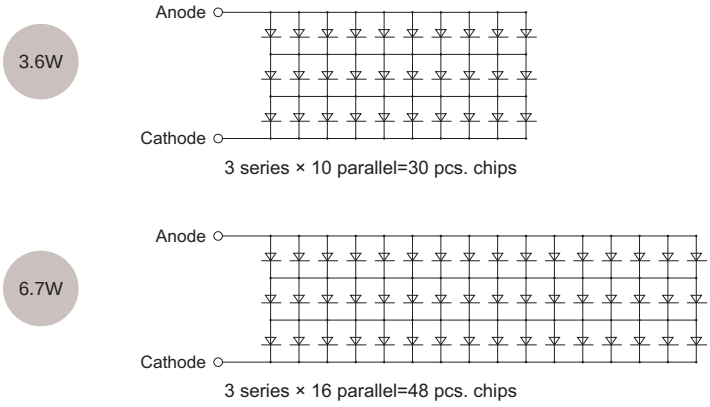
Warm White

Configuration and wiring of ZENIGATA LED

ZENIGATA LED comprises 30 pcs. (3.6W) or 48 pcs. (6.7W) of LED chips mounted on an 18mm-square ceramic substrate. For 3.6W type, three LED chips in series and ten in parallel are arranged. For 6.7W type, three LED chips in series and sixteen LED chips in parallel are arranged , as shown in the internal circuit drawing below.



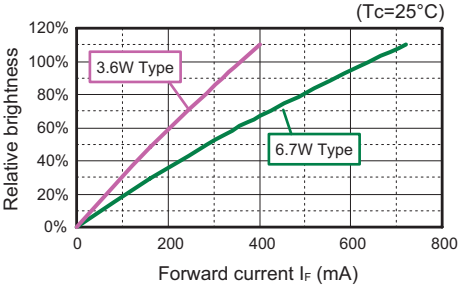
Internal circuit



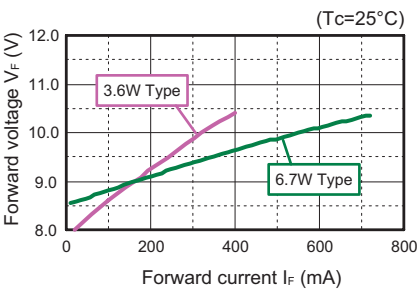
Characteristics of ZENIGATA LED

The characteristics shown below are the values measured at Tc = 25°C. They are references, and as for the distribution of the characteristics, consult us.

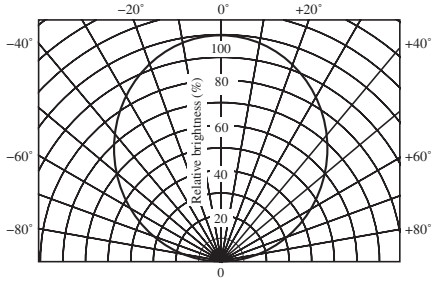
• Forward current-Luminous flux characteristics

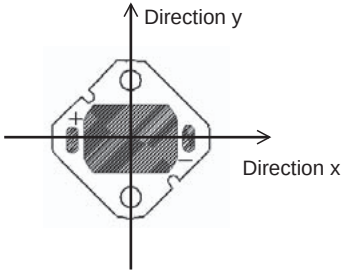


• Forward current-Forward voltage characteristics



• Directional characteristics





Temperature characteristics of ZENIGATA LED

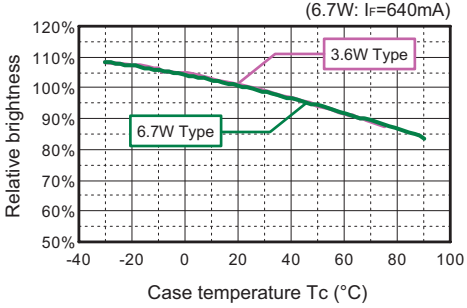
Since the luminous flux, forward voltage and color of LED fluctuate depending on the temperature, temperature (range) in actual use must be recognized for design.
Be sure to design it so that the temperature is within the range shown in page7.

Increase in temperature or current may accelerate degradation of LED, and lead reduction of light emission and efficiency, and fluctuation in color temperature.
Thus, operation of LED in high temperature is unfavorable, and sufficient provision of radiation design by heat sink is recommended.

(High CRI type)

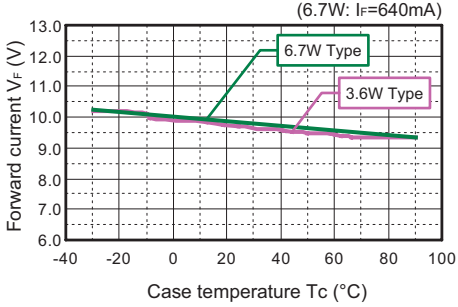
• Case temperature Tc-Luminous flux characteristics

(3.6W: I_F=360mA)
(6.7W: I_F=640mA)



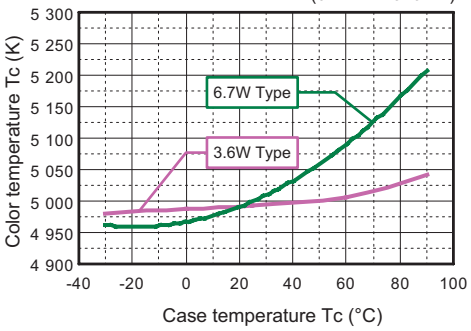
• Case temperature Tc-Forward voltage characteristics

(3.6W: I_F=360mA)
(6.7W: I_F=640mA)



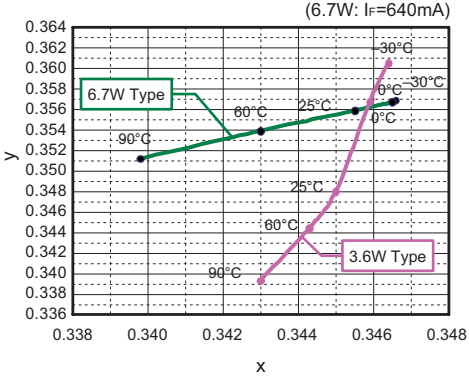
• Case temperature Tc-Color temperature characteristics

(3.6W: I_F=360mA)
(6.7W: I_F=640mA)



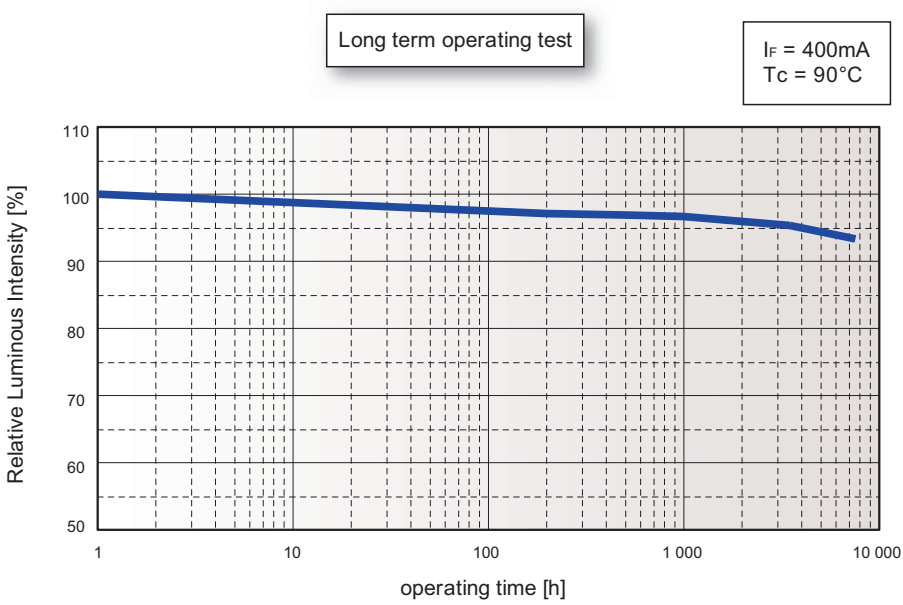
• Case temperature Tc-Color range characteristics

(3.6W: I_F=360mA)
(6.7W: I_F=640mA)



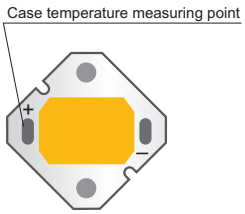
Reliability of ZENIGATA LED

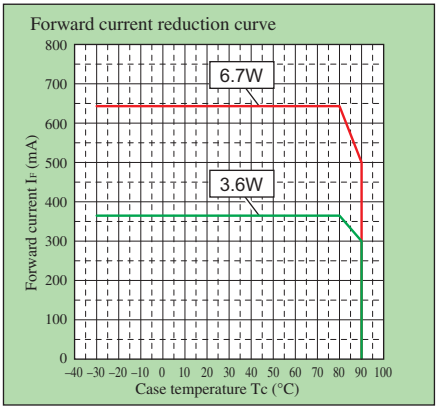
As ZENIGATA LED is developed for lighting, ceramic substrate and resin are adopted for ZENIGATA LED to prevent of reduction in brightness during use in a long period. The graph below shows fluctuations in luminous flux. As shown in the graph below, the luminous flux is restrained for a long period, and it proves high reliability of the ZENIGATA LED.



Heat design of ZENIGATA LED

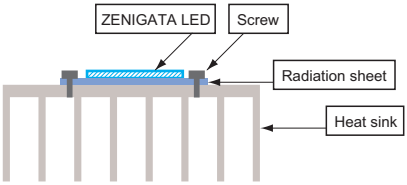
Operation temperature of ZENIGATA LED is detected at the soldering pad position as case temperature Tc. When mounting ZENIGATA LED, case temperature Tc must be controlled within the forward current reduction curve.

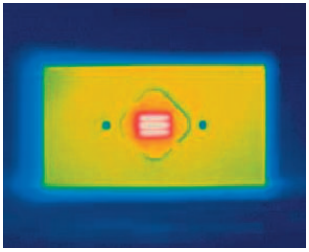


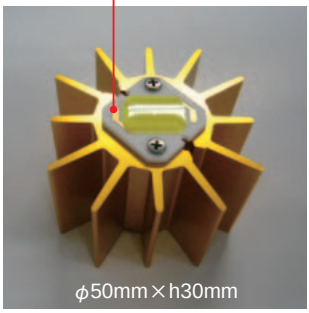


Since ceramic is an insulating substrate, ZENIGATA LED can be directly mounted on a heat sink. To make sure heat radiation, radiation silicone paste or radiation sheet must be insulted between ZENIGATA LED and heat sink.

The drawing left below shows the mounting status. Viewing through thermography, it shows temperature of ceramic substrate portion is close to that of heat sink. It means heat generated from LED translates to heat sink smoothly.





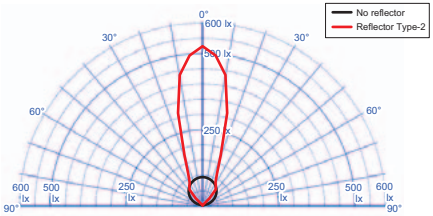


•Solution with Ryosan Company, Limited

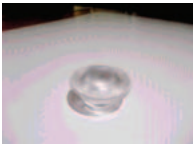
Optical design of ZENIGATA LED

Light from ZENIGATA LED can be controlled by using lens or reflector.

Heat such as downlight, requires higher lighting intensity underneath, the following lens or reflector can be useful.
Heat radiation can be also ensured by adopting an aluminum reflector.
For an application such as light bulb, glass ball diffuser enables soft lighting.



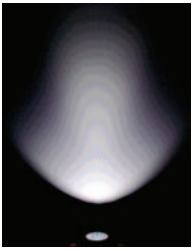
Distribution of lighting intensity measured at the point from light source by 1m when using 3.6W White ZENIGATA

Reflector type1 ※1	Lens type1 ※1	Lens type2 ※2	Glass ball diffuser
			

☐ Beam Spot

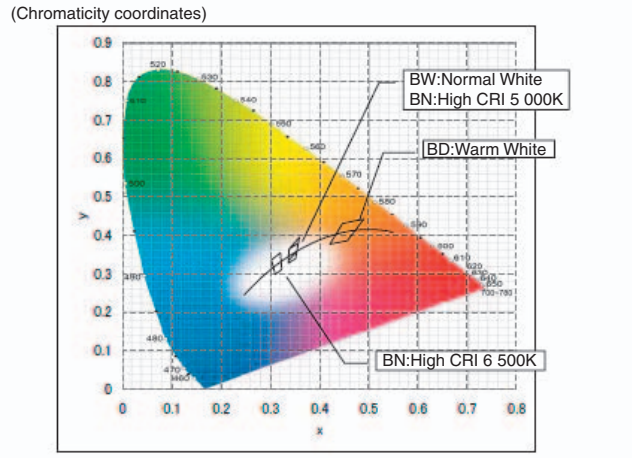
☐ Beam Shape

*1: Solution with Diffractive Optics Ltd.
*2: Solution with IDEALED S.R.L

Chromaticity distribution

(Chromaticity coordinates)

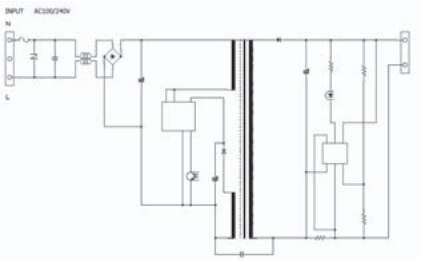


Circuit Design

ZENIGATA LED is used for applications such as bulb, dawn light and street light by optimum circuit design. Constant voltage power supply runs off more than specified current amount due to lowered VF caused by temperature rise.

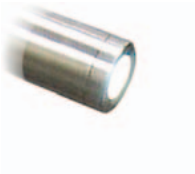
Constant current power supply is recommended to drive.

In designing a circuit, please make sure not to give reverse voltage to the LEDs at any time.



When ZENIGATA LEDs are connected in series, adapt protection device like zener for each ZENIGATA LED. Make sure to be confident of the safety standards or regulations in each location and area.

Featured Application



Precautions

Usage conditions

The products are not designed for the use under any of the following conditions.
Please confirm their performance and reliability well enough if you use under any of the following conditions;

- In a place with a lot of moisture, dew condensation, briny air, and corrosive gas (C1, H_2S, NH_3, SO_2, NO_X, etc.).
- Under the direct sunlight, outdoor exposure, and in a dusty place.
- In water oil, medical fluid, and organic solvent.

Installation

Material of board is alumina ceramic.If installed inappropriately, trouble of no radiation may occur due to board crack.Please take particular notice of install method.
Further information on installation, refer to the following cautions.

- Apply ether screws or adhesives, or both of them when installed to heat radiator.
  In case of applying adhesive only, check the effectiveness before fixing.
  In case of screw, apply thread locker in order to prevent loosening.
  If LED comes off from the heat radiator, unusual temperature rise entails hazardous phenomena including device deterioration coming off of solder at leads and emitting smoke.
- Screw torque:Within 0.2Nm
  If it is inefficient to tighten screws, apply locker to prevent loosening.
- It is recommended to apply screws which use low corrsive materials such as Stainless steel.
  Avoid applying flat-head screws, which cause board crack due to applying stress to screw holes.
- Avoid convexly uneven boards.
  Those convex boards are subject to crack when tightening screws.
- It is recommended to apply thermal conductive sheet or grease with adhesiveness and heat radiating-adhesives, because of thermal and mechanical combination between module and heat radiator.
  However, depending on their thickness, board crack may be entailed by warped board, which is caused when tightening screws.So please check your actual conditions carefully as for the screw torque.

Connecting method

In case of solder connecting method, apply solder to the leads by soldering iron with thermo controller(tip temperature380°C), within 10seconds per one place.
Put the board on materials whose conductivity is poor enough not to radiate heat of soldering.
Avoid touching yellow phosphor with soldering iron.
This product is not designed for reflow and flow soldering.

Safety

Looking directly at LEDs for a long time may result in hurt your eyes.
In case that excess current(over ratings)are supplied to the device, hazardous phenomena including abnormal heat generation, emitting smoke, or catching fire can be caused.
Take appropriate measures to excess current and voltage.
In case of solder connecting method, there is a possibility of fatigue failure by heat.
Please fix the leads in such case to protect from short circuit or leakage of electricity caused by contact.
Please confirm the safety standards or regulations of application devices.

SHARP

SHARP CORPORATION Electro Components Web site http://sharp-world.com/products/device/catalog/index.html

(Notice)
In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc.
Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

The contents of this catalog as of November 2008 [Ref. No. LED-GM08111]