Zenigata LEDs

March 2009

Introducing Sharp's Zenigata LED Modules; this document provides basic background on this product line.

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Introduction

Sharp's high-power Zenigata LED modules, with an LED die array mounted on 18mm-square ceramic substrate, ensure high luminous flux, high efficiency and radiation performance, plus they offer high reliability.

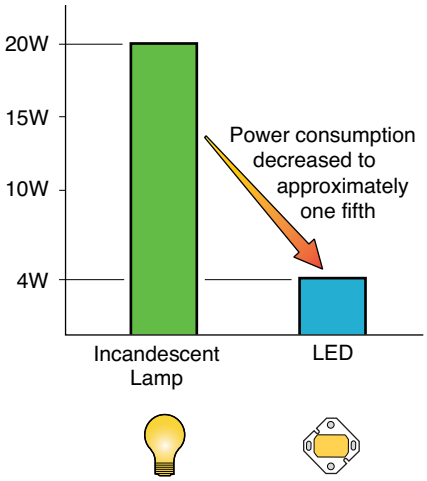
Sharp's Zenigata LED is suitable for lighting applications anywhere you'd use an incandescent lamp, such as:

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

The light from Zenigata LEDs contains less infrared light (heat) than that from a conventional incandescent lamp, so the Zenigata LED is adaptable to lighting applications where items may be susceptible to damage caused by temperature rise.

It is also an excellent fit for lighting items where there is a concern of deterioration or discoloration from ultraviolet rays, because the Zenigata LEDs have no emission in the UV spectrum.

Environmental friendliness is also a feature of the Zenigata LEDs. Next-generation lighting will require high luminous efficiencies, high reliability, and long life. LEDs offer these and more: they save energy and reduce waste. LEDs contain no hazardous substances, convert energy to light in an efficient manner, meaning less heat output for a given amount of light – and less need for space conditioning.



NOTE: Estimated by LED device, not including power supply efficiency.

Zenigata LED Lineup

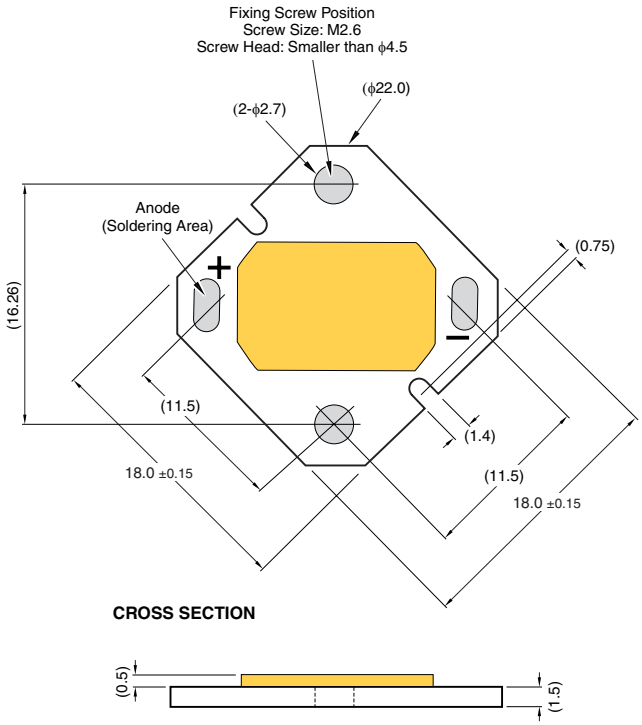
Match your illumination needs with one of our solid modules.

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

NOTES:
1. Case temperature Tc, 25°C, is the value measured 20 ms after rated current is applied.
2. Values of forward voltage, luminous flux, and average color rendering index Ra are references, and are not guaranteed.

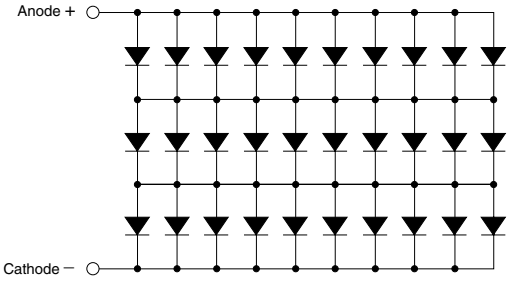
Configuration and Connection of Zenigata

- 3.6 W: 30 LED dies mounted on 18 mm square ceramic substrate.
- 6.7 W: 48 LED dies mounted on 18 mm square ceramic substrate.



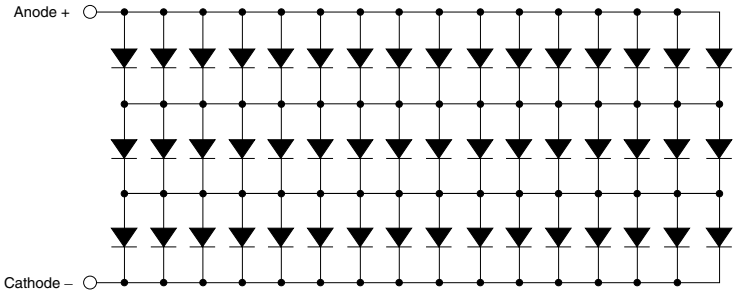
Internal Circuit

3.6W



3 Series x 10 parallel = 30 chips

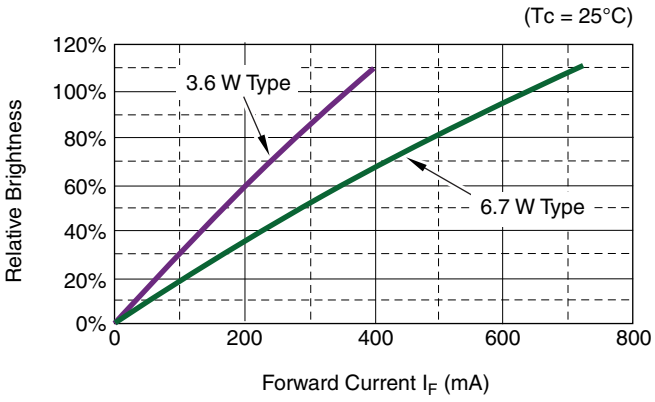
6.7W

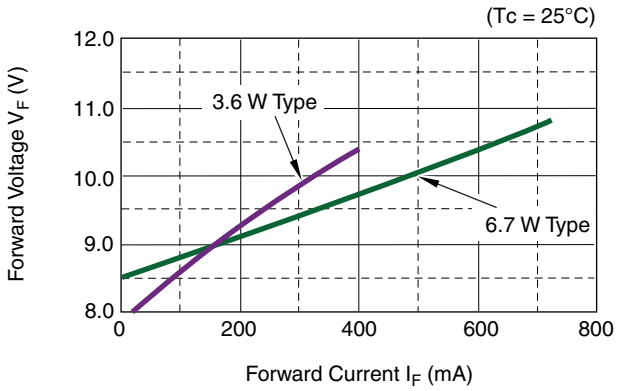


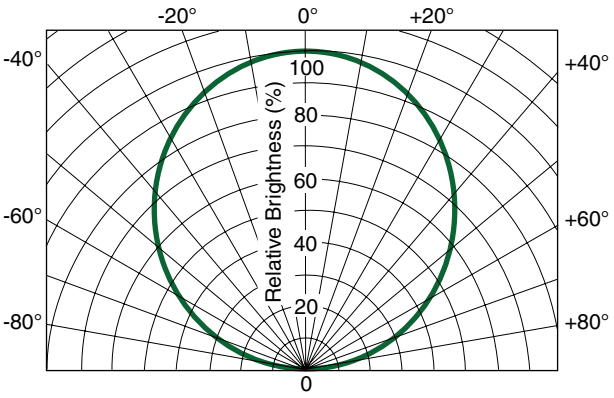
3 Series x 16 parallel = 48 chips

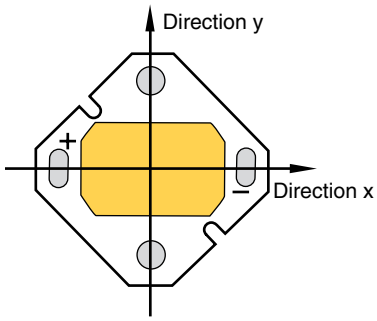
Characteristics of Zenigata LED

Values shown were measured at 25°C, and are sampled from typical parts;
and so are not guaranteed data.







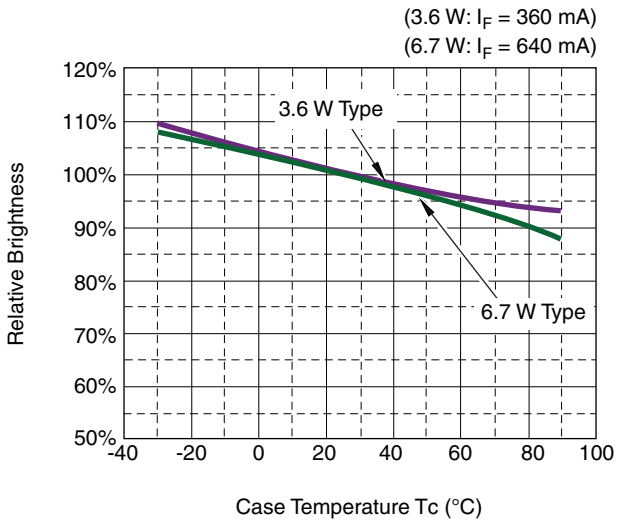


Zenigata Temperature Characteristics

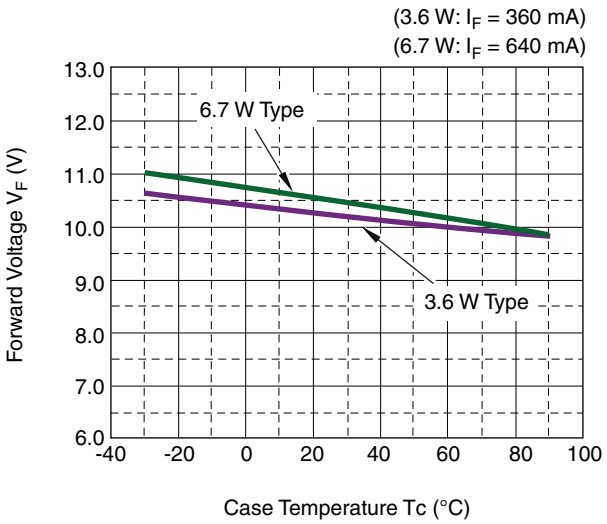
Temperature exerts a great influence upon the optical and electrical characteristics of solid-state LED modules; therefore it's important to employ good heat management practices.

An increase in temperature or current may cause premature degradation in performance or lifetime, along with affecting light output, efficiency, and color temperature.

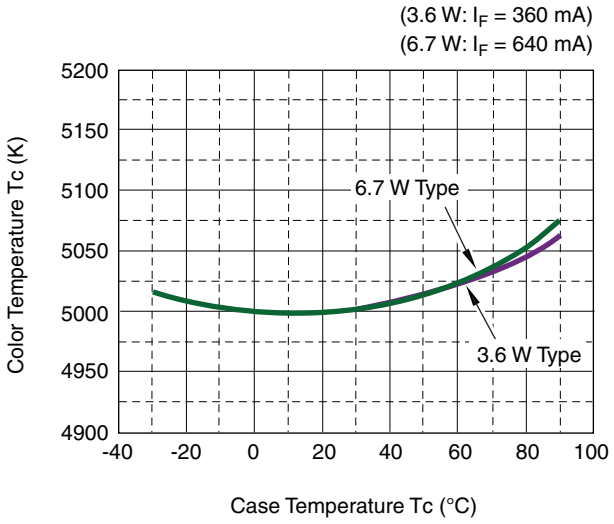
Case Temperature Tc-Luminous Flux Characteristics



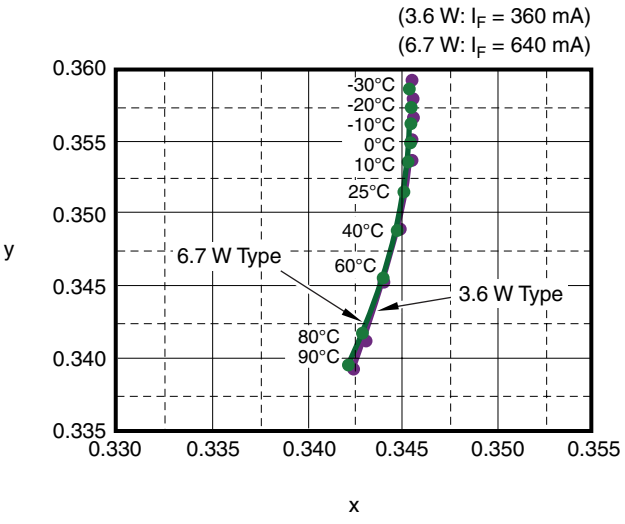
Case Temperature Tc-Forward Volatage Characteristics



Case Temperature Tc-Color Temperature Characteristics



Case Temperature Tc-Color Range Characteristics

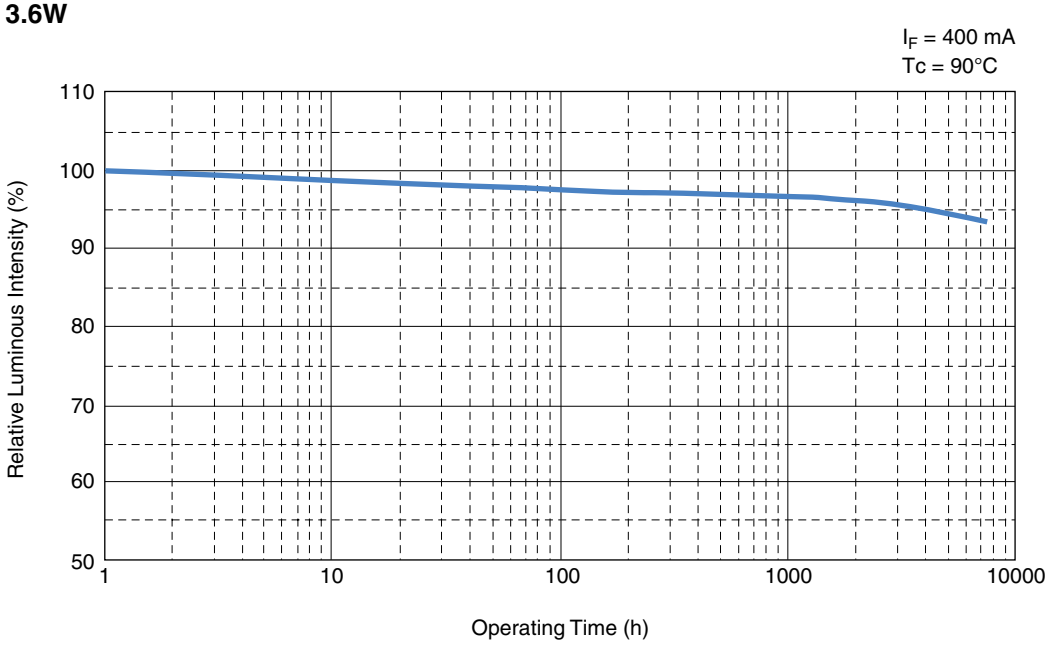


Zenigata LED Reliability

Sharp's Zenigata modules are built upon highly reliable ceramic substrates and resins, achieving high reliability and long life; with a very low degradation in luminous output.

Long Term Operating Test

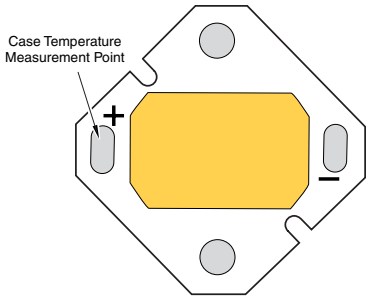
3.6W

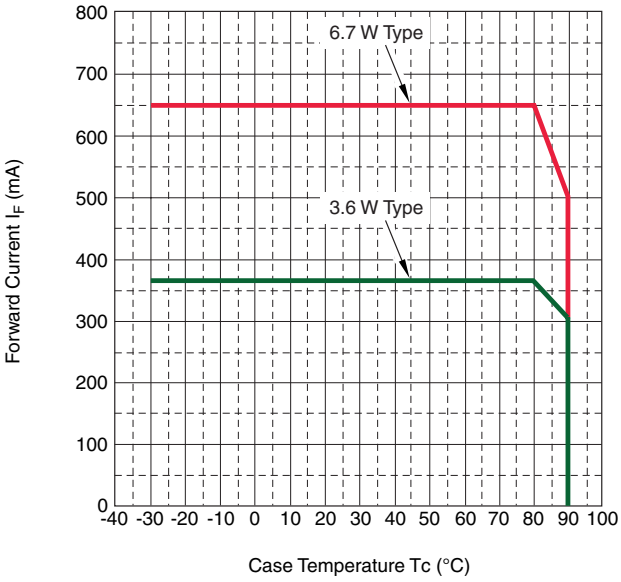


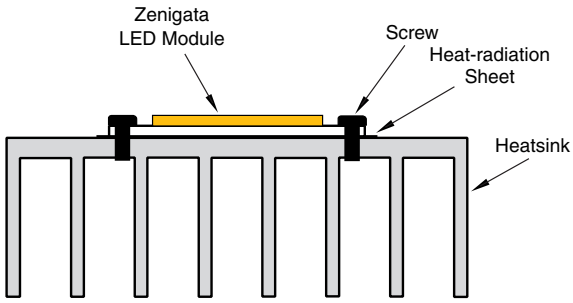
Zenigata Heatsink Design

This chart is the operating temperature envelope of the Zenigata. Heat management should be designed within a forward current reduction curve.

Zenigata is designed with a ceramic substrate, allowing it to be mounted directly to a heatsink. Sharp suggests the use of a heat transfer sheet, paste, or both. The graphic shows a typical heatsink mount.

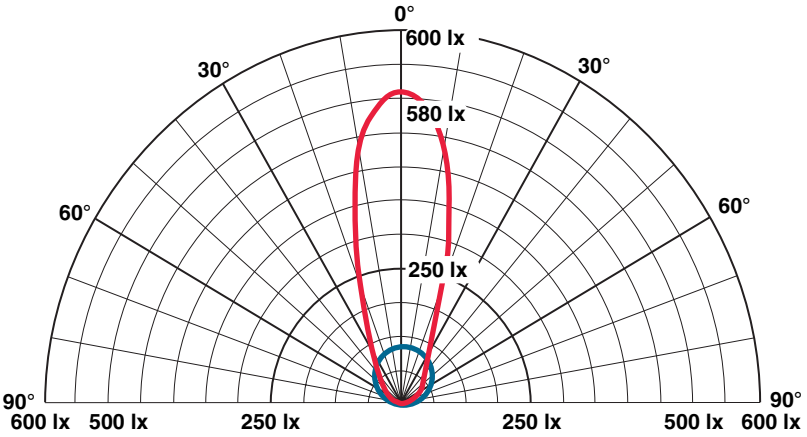


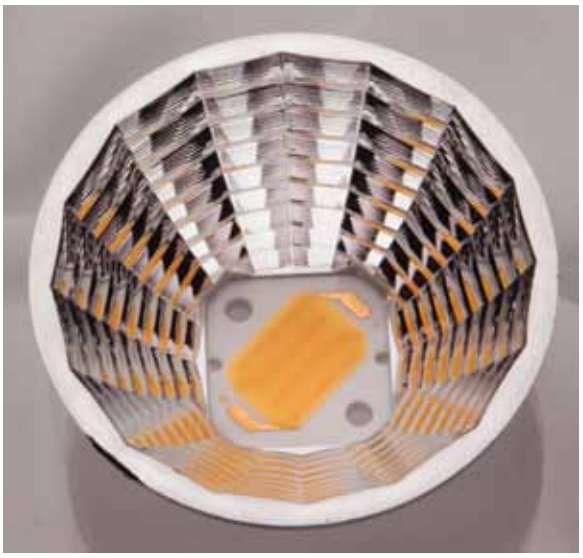




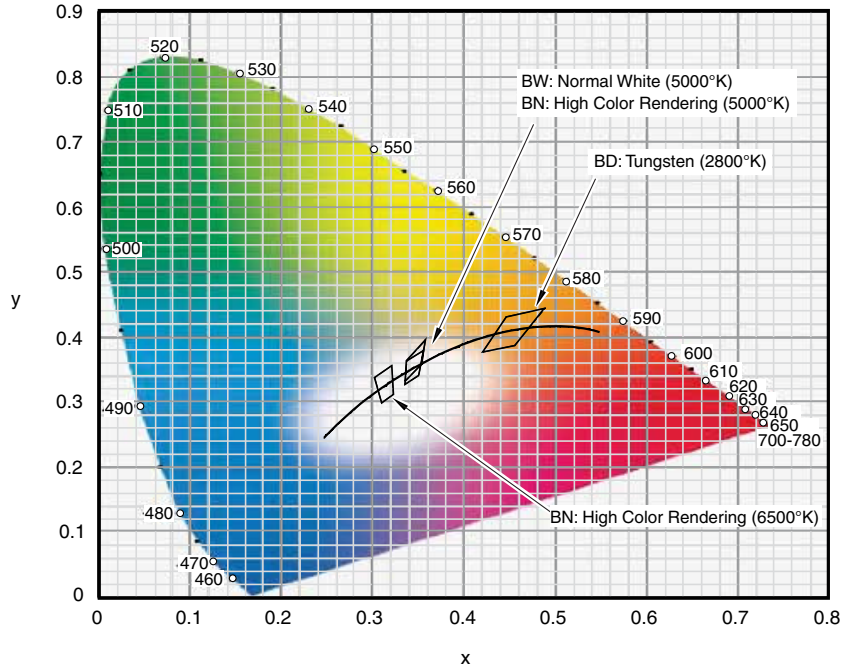
Zenigata Optical Design

Zenigata's output can be managed through lenses and reflectors. The photos show some examples.





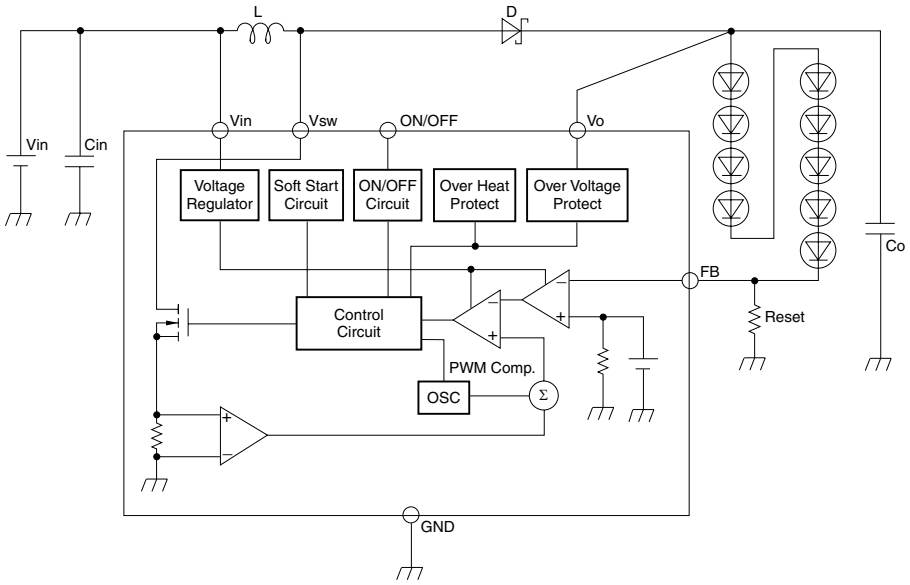
Zenigata Chromaticity



Circuit Design Notes

Sharp recommends optimizing the drive circuitry for each application. Constant-voltage circuits should be avoided as they will allow currents outside of specified limits due to lowered Vf, caused by normal temperature rise.

Constant-current supplies are recommended, with precautions made so that no reverse voltages are applied to the LED module at any time. When connecting multiple modules in series, use protection such as a zener diode across each module.



Zenigata Cautions

Usage

Sharp recommends confirming the part's performance, reliability, and resistance to any of these conditions, if it is to be used in any of these environments:

- Direct sunlight, outdoor exposure, dusty conditions
- In water, oil, medical fluids, and organic solvents
- Excessive moisture, such as dew or condensation
- Corrosive (salt) air or corrosive gases, such as Cl, H_2S, NH_3, SO_2, NO_X

Installation

1. Sharp recommends taking particular notice of the installation method, as the mounting board's material is aluminized ceramic. If incorrectly installed, problems with non-radiation may occur due to cracking of the mounting board.
2. Use screws, adhesives, or both when mounting this device to its heatsink. When using only adhesives, be sure to check their effectiveness. Use thread locking materials to prevent screws from loosening due to thermal cycling. If the part is separated from its heatsink, a catastrophic temperature rise may occur, causing self-desoldering, device deterioration if not destruction, and smoke emission.
3. When screw mounting:

- Screw torque: within 0.2 N▪m.
- Use thread locking materials.
- Use materials with low galvanic action, such as stainless steel.
- Do not use flathead screws, which can cause substrate cracks due to stress at the screw holes.
- Do not install the part into a board which is warped in a convex direction. This part can be easily damaged by torquing it to a convexedly-warped mounting surface.
- To maximize thermal efficiency between the device and its heatsink, Sharp recommends a thermally-conductive sheet and conductive grease.
- Circuit board cracks can be caused when screws are tightened; be sure to check the actual conditions carefully.

Connection

Solder the part with a thermocontrolled iron, (tip temperature 380°C), within 10 seconds per pad. Use a backer material whose thermal conductivity will not radiate the heat from soldering.

Avoid touching the yellow phosphor with soldering iron.

This product is not designed for reflow and flow soldering.

Safety

This part has a very high light output. Looking directly at it during full power output can cause injury.

If current is in excess of the rated maximum are supplied to this part, hazardous conditions may be created, including excess heating, smoke emission, or a possible fire. Take appropriate measures to control excess current and voltage.

If the lead wire to the part comes loose, it could contact the case or heatsink, thereby creating a short circuit and possible shock hazard. Take appropriate measures to prevent the lead wire from coming into contact with other parts.

Always follow appropriate safety standards and regulations for the end application.

NORTH AMERICA
Sharp Microelectronics of the Americas
5700 NW Pacific Rim Blvd.
Camas, WA 98607, U.S.A.
Phone: (1) 360-834-2500
Fax: (1) 360-834-8903
www.sharpsma.com

TAIWAN
Sharp Electronic Components
(Taiwan) Corporation
8F-A, No. 16, Sec. 4, Nanking E. Rd.
Taipei, Taiwan, Republic of China
Phone: (886) 2-2577-7341
Fax: (886) 2-2577-7326/2-2577-7328

CHINA
Sharp Microelectronics of China
(Shanghai) Co., Ltd.
28 Xin Jin Qiao Road King Tower 16F
Pudong Shanghai, 201206 P.R. China
Phone: (86) 21-5854-7710/21-5834-6056
Fax: (86) 21-5854-4340/21-5834-6057
Head Office:
No. 360, Bashen Road,
Xin Development Bldg. 22
Waigaoqiao Free Trade Zone Shanghai
200131 P.R. China
Email: smc@china.global.sharp.co.jp

EUROPE
Sharp Microelectronics Europe
Division of Sharp Electronics (Europe) GmbH
Sonninstrasse 3
20097 Hamburg, Germany
Phone: (49) 40-2376-2286
Fax: (49) 40-2376-2232
www.sharpsme.com

SINGAPORE
Sharp Electronics (Singapore) PTE., Ltd.
438A, Alexandra Road, #05-01/02
Alexandra Technopark,
Singapore 119967
Phone: (65) 271-3566
Fax: (65) 271-3855

KOREA
Sharp Electronic Components
(Korea) Corporation
RM 501 Geosung B/D, 541
Dohwa-dong, Mapo-ku
Seoul 121-701, Korea
Phone: (82) 2-711-5813 ~ 8
Fax: (82) 2-711-5819

JAPAN
Sharp Corporation
Electronic Components & Devices
22-22 Nagaike-cho, Abeno-Ku
Osaka 545-8522, Japan
Phone: (81) 6-6621-1221
Fax: (81) 6117-725300/6117-725301
www.sharp-world.com

HONG KONG
Sharp-Roxy (Hong Kong) Ltd.
3rd Business Division,
17/F, Admiralty Centre, Tower 1
18 Harcourt Road, Hong Kong
Phone: (852) 28229311
Fax: (852) 28660779
www.sharp.com.hk
Shenzhen Representative Office:
Room 13B1, Tower C,
Electronics Science & Technology Building
Shen Nan Zhong Road
Shenzhen, P.R. China
Phone: (86) 755-3273731
Fax: (86) 755-3273735

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