GM5GC96270A

Light Emitting Diode

■ Features

1. High brightness (1300 mcd @ I_F = 20 mA)
2. Green (color derived from InGaN LED)

■ Agency Approvals/Compliance

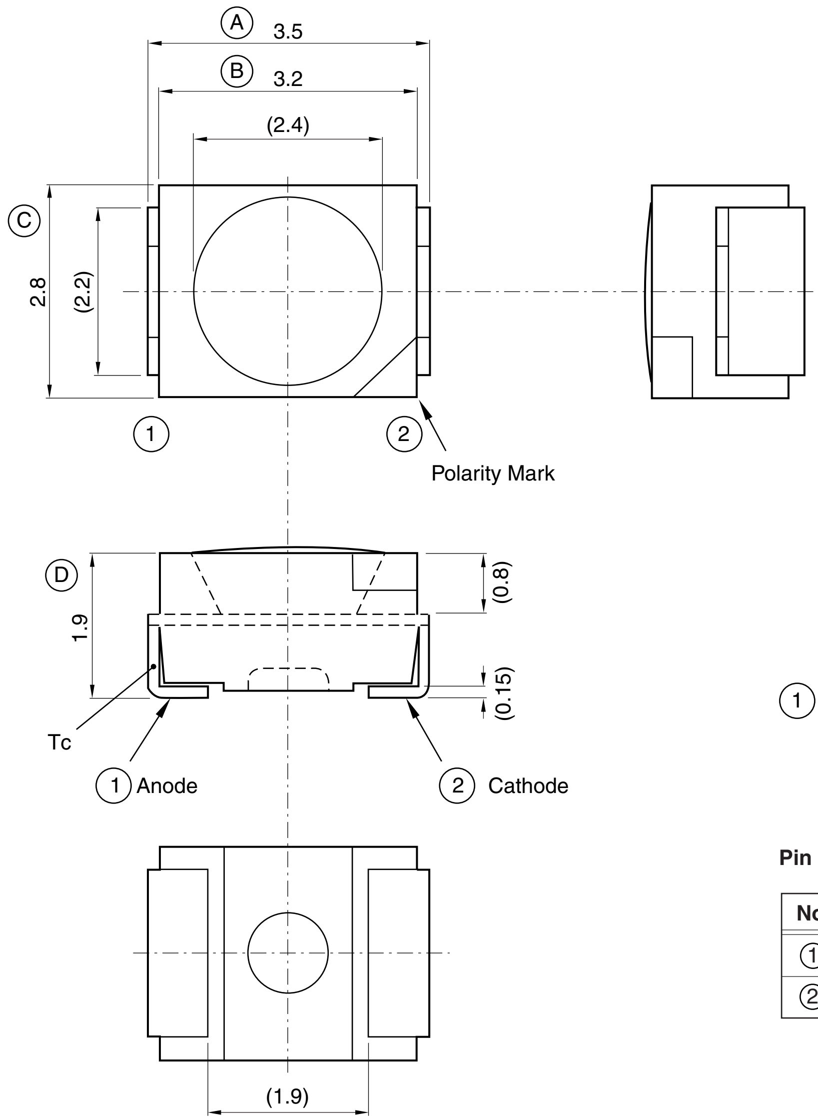
1. RoHS compliant

■ Applications

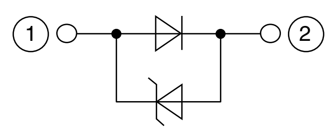
1. General indication
2. Audio visual equipment
3. Home appliances
4. Telecommunications equipment
5. Tooling machines/Factory automation

Sheet No.: DG-072009
Date February 20, 2007

■ External Dimensions



Equivalent Circuit



Pin Arrangement

No.	Name
①	Anode
②	Cathode

NOTES:
1. Units: mm
2. Unspecified tolerence: ±0.3 mm
3. ( ): Reference dimensions
4. Case temperature (Tc) measurement point

■ Absolute Maximum Ratings

(Tc = 25°C)

Parameter	Symbol	Rating	Unit
Power dissipation	P	120	mW
Forward current	I_F	30	mA
Peak pulsed forward current *1	I_{FM}	100	mA
Forward current derating factor	DC	0.6	mA/°C
	Pulse	2.0	mA/°C
Reverse current	I_R	70	mA
Operating temperature *2	Tc	-40 to +100	°C
Storage temperature	Tstg	-40 to +100	°C
Soldering temperature *3	Tsol	295	°C

*1 Duty ratio = 1/10, Pulse width = 0.1 ms
*2 Case temperature (See Outline Dimensions on page 2)
*3 Each terminal must be soldered with a 30 W soldering iron within 3 seconds under 295°C. For Reflow Soldering information, see Fig. 13.
*4 Operating current values here follow the derating curves shown in Fig. 1 through Fig. 3.
*5 This device uses the leads for heat sinking, therefore the Operating Temperature range is prescribed by Tc.

■ Electro-optical Characteristics

(Tc = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Forward voltage	V_F	I_F = 20 mA	–	3.3	4.0	V
Luminous intensity *1, 3	I_V		*2	1300	*2	mcd
Dominant wavelength *4	λd		–	527	–	nm

*1 Measured by EG&G Model 550 (Radiometer/Photometer) after 20 ms drive (Tolerance: ±15%)
*2 Measured by Ohtsuka Electronics Model MCPD-2000 after 20 ms drive (Tolerance: x,y: ±0.02)
*3 See Luminous Intensity Rank table on page 8.
*4 See Dominant Wavelength Rank table on page 8.

■ Derating Curves

Fig. 1 Forward Current vs. Case Temperature

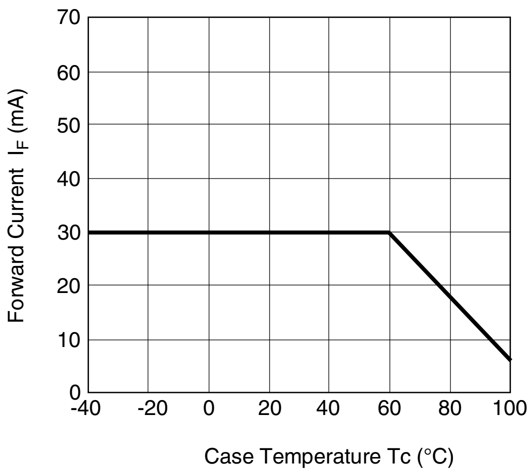


Fig. 2 Peak Forward Current vs. Duty Ratio

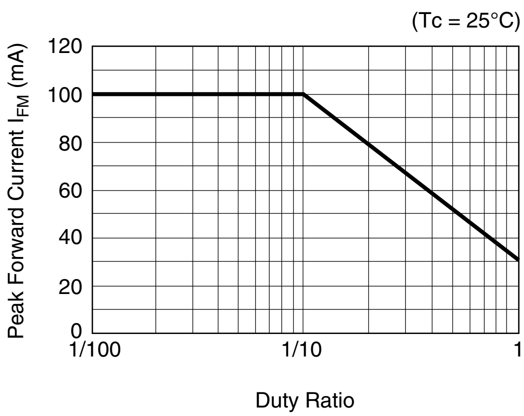
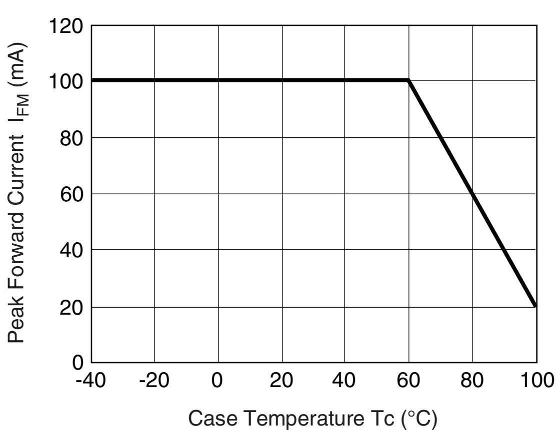


Fig. 3 Peak Forward Current vs. Case Temperature



■ Characteristic Diagrams (TYP.*)

*Characteristics data are typical data and are not guaranteed data.

Fig. 4 Relative Luminous Intensity vs. Forward Current

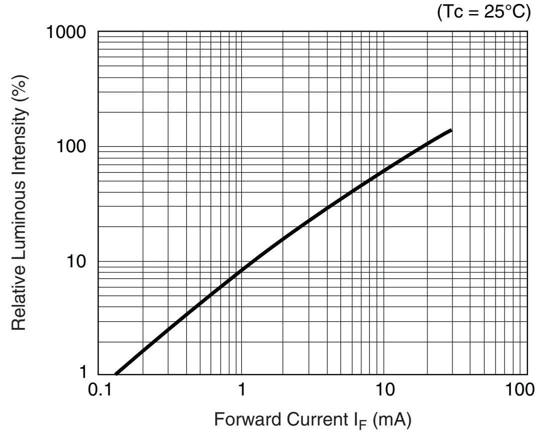


Fig. 5 Forward Current vs. Forward Voltage

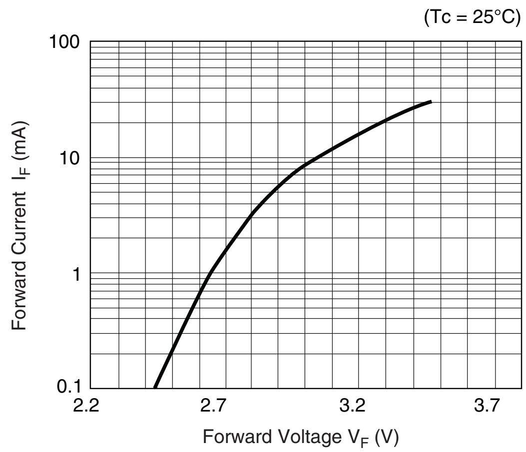
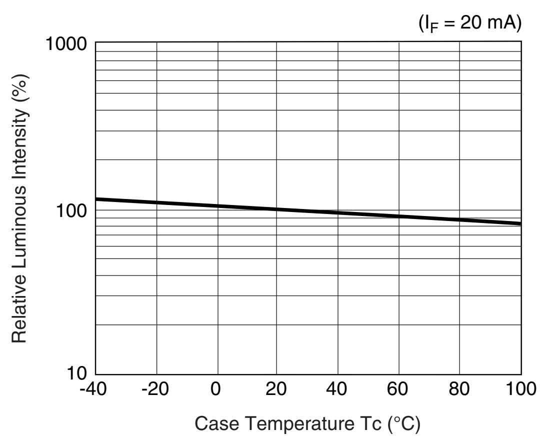
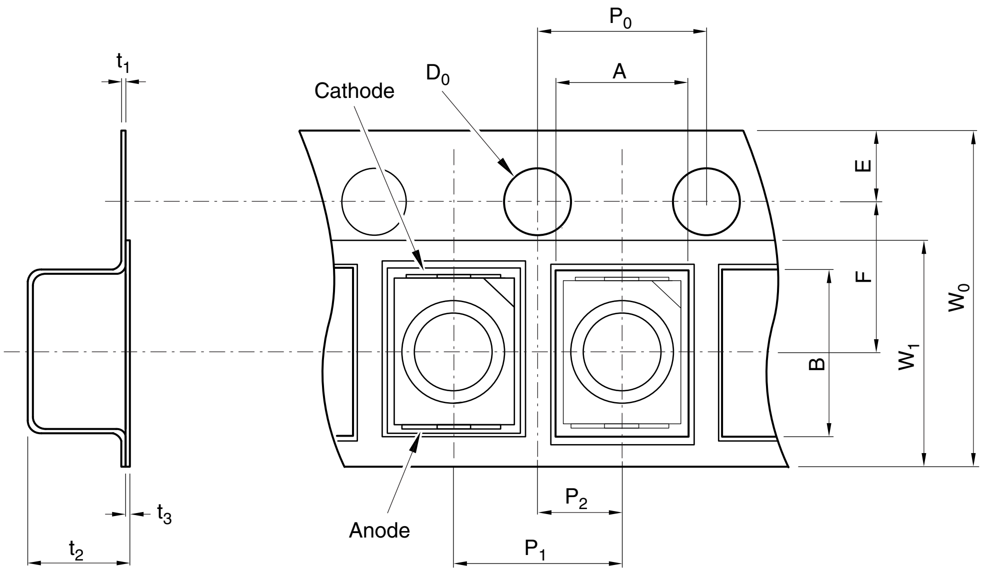


Fig. 6 Relative Luminous Intensity vs. Case Temperature



■ Tape Specifications

Fig. 7 Tape Shape and Dimensions

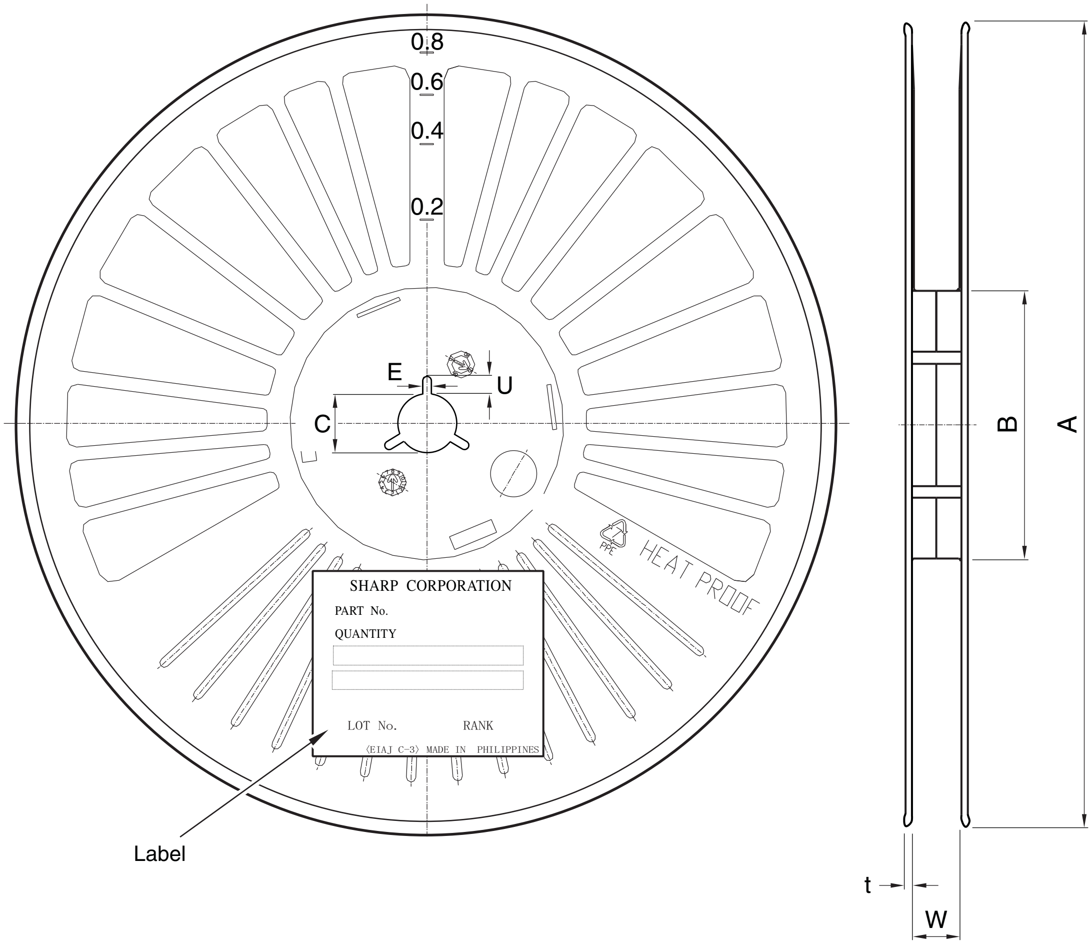


■ Tape Dimension Specifications

Parameter		Symbol	Dimension (mm)	Remarks
Concave square hole for parts insertion	Vertical	A	3.0	Dimension excluded corner R at the bottom inside
	Horizontal	B	3.7	
	Pitch	P_1	4.0	
Round sprocket hole	Diameter	D_0	1.5	
	Pitch	P_0	4.0	Accumulated error ±0.5 mm/10 pitch
	Position	E	1.75	Distance between the edge of the tape and center of the hole
Center to center distance	Vertical	P_2	2.0	Distance between center line of the concave square hole and round sprocket hole
	Horizontal	F	3.5	
Cover tape	Width	W_1	5.4	
	Thickness	t_3	0.1	
Carrier tape	Width	W_0	8.0	
	Thickness	t_1	0.3	
Thickness of entire unit		t_2	2.6	With cover tape and carrier tape combined

■ Reel Specifications

Fig. 8 Reel Shape and Dimensions



■ Reel Dimension Specifications

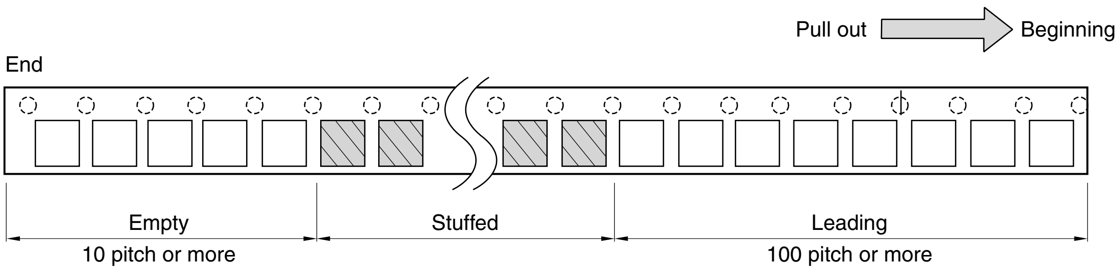
Parameter		Symbol	Dimension (mm)	Remarks
Flange	Diameter	A	ϕ180	
	Thickness	t	1.3	
	Inner space direction	W	9.5	Shaft core dimension
Hub	External diameter	B	ϕ60	
	Spindle hole diameter	C	ϕ13	
	Key slit width	E	2.0	
	Key slit depth	U	4	

*1 Label on side of flange: part number, quantity, lot number, and rank.
*2 Material: described on flange.

■ Taping Specifications

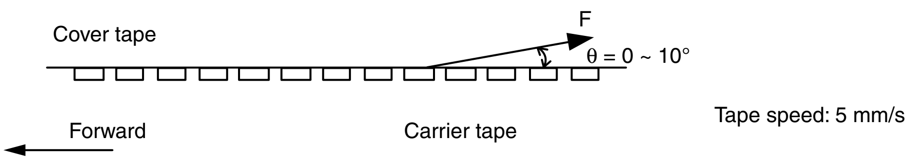
1. Leader tape standard: JIS C0806

Fig. 9 Leader Tape



2. Cover tape peel resistance: F = 0.1 to 1.0 N (θ = 10° or less). See Fig. 10.

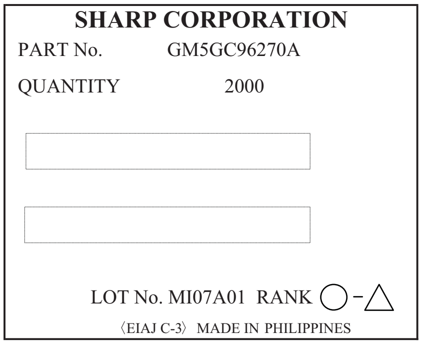
Fig. 10 Tape Separation



3. Tape bending resistance: Cover tape will remain in place on radii of 30 mm or more. Under 30 mm radii, the cover may separate.
4. Joints are not allowed in the cover tape.
5. Parts are packed with an average quantity of 2000 pieces per reel.
6. Product mass: 30 mg (approximately)
7. Sharp guarantees the following:
   a. No contiguous empty spaces in the tape
   b. Missing parts will not make up more than 0.1% of the total quantity.
   c. Parts will be easily removed from the packing.
8. Parts will not stick to the cover tape as it is peeled.

■ Label and Marking Information

Fig. 11 Label Contents



← Part number
← Quantity
← EIAJ C-3 Bar code
← EIAJ C-3 Bar code
← Indication (example) of lot number and rank
← Indication (example) of production country

LOT Number

M I 07 A 01
① ② ③ ④ ⑤

① Production plant code (alphabetically)
② Production lot (single or double digits)
③ Production year (the last two digits of the year)
④ Production month
(to be indicated alphabetically with January corresponding to A)
⑤ Production date (01 ~ 31)

Rank ○ △ : ○: Luminous intensity rank
△: Dominant Wavelength rank

■ Luminous Intensity Rank Table (Tc = 25°C)

Rank	Luminous Intensity	Unit	Condition
M	795 ~ 1548	mcd	I_F = 20 mA
N	1144 ~ 2229		
O	1648 ~ 3210		

*1 Parts are marked to the highest rank of their tested luminosity level.
*2 Quantity of each rank is decided by Sharp.

■ Dominant Wavelength Ranking (Tc = 25°C)

Rank	Dominant Wavelength	Unit	Condition
a	517.0 ~ 523.0	nm	I_F = 20 mA
b	522.0 ~ 528.0		
c	527.0 ~ 533.0		
d	532.0 ~ 538.0		

*1 Table rankings are based upon table conditions, and as such are not guaranteed data
*2 Quantity of each rank is decided by Sharp.

■ Design Notes

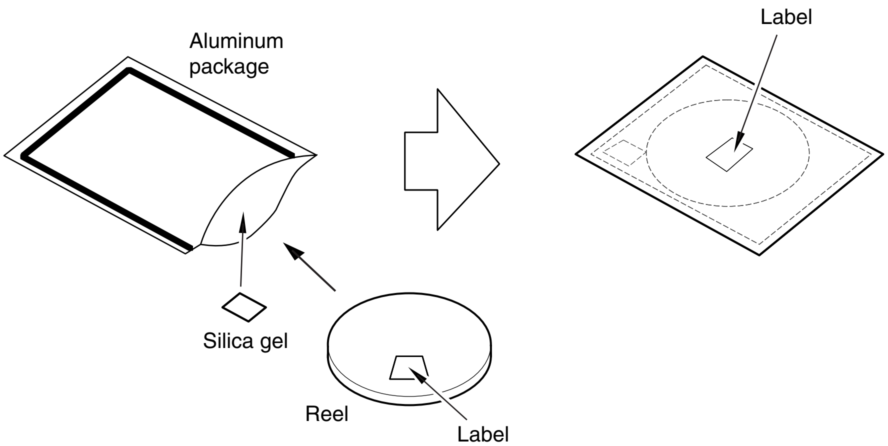
1. This product is not designed to resist electromagnetic and ionized-particle radiation. Moreover, it is not designed to directly resist excessive moisture, such as dew or condensation; or corrosive (salt) air or corrosive gases, such as Cl, H_2S, NH_3, SO_2, NO_X.
2. Do not allow the circuit design to apply any reverse voltage to the LEDs.
3. This part can be easily damaged by external stress. Make sure they are not mechanically stressed during or after assembly.
4. This part has a very high light output. Looking directly at it during full power output can cause injury.
5. Sharp recommends taking proper personal and environmental static control precautions when handling this part.
6. Materials of high thermal conductivity are incorporated in this device to allow generated heat to be effectively transferred from it to the circuit board. For best reliability, Sharp recommends against locating other sources of heat near the LED, and to design the circuit board in such a way that heat can easily escape from the circuit board. Sharp also recommends designing the circuit board so that the part's case temperature is always kept under 100°C (when the LED is turned on) including self-heating.
7. Sharp recommends handling these parts in a clean, non-dusty environment since surface dust may be difficult to remove and can affect the optical performance of the part.
8. 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

■ Manufacturing Guidelines

● Storage and Handling

1. Moisture-proofing: These parts are shipped in vacuum-sealed packaging to keep them dry and ready for use. See Fig. 12.

Fig. 12 Factory Moisture-proof Packaging



2. Store these parts between 5°C and 30°C, at a relative humidity of less than 60%.
3. After breaking the package seal, maintain the environment within 5°C to 30°C, at a relative humidity of less than 60%. Solder the parts within 3 days.
4. If the parts will not be used immediately, repack them in a dry box, or re-vacuum-seal them with a desiccant.
5. If the parts are exposed to air for more than 3 days, or if the silica gel telltale indicates moisture contamination, bake the parts:
   - When in the tape carrier, bake them at a temperature of 95°C to 100°C, for 16 to 24 hours.
   - When loose (in a metal tray) or on a PCB, bake them at a temperature of 110°C to 120°C, for 8 to 12 hours.
   - Note that the reels may become distorted if they are in a stack when baking. Confirm that the parts have cooled to room temperature after baking.

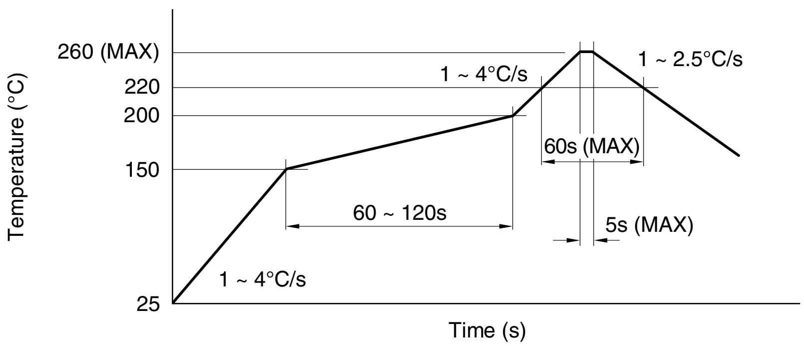
● Cleaning Instructions

1. Sharp does not recommend cleaning printed circuit boards containing this device. Process chemicals will affect the structural and optical characteristics of this device.
2. Use solder paste that does not require cleaning. Avoid using ultrasonic cleaning if possible.
3. If ultrasonic cleaning cannot be avoided, verify the process before beginning production. Compatible solvents are water and isopropyl alcohol.
4. This device can be affected by ultrasonic cleaning; factors to be considered are the size of the bath, ultrasonic output, duration, size of PCB, and the device’s mounting method.

● Soldering Instructions

1. When soldering with reflow methods, Sharp recommends following the soldering profile in Fig. 13.
2. Do not subject the package to excessive mechanical force during soldering as it may cause deformation or defects in plated connections. Internal connections may be severed due to mechanical force placed on the package due to the PCB flexing during the soldering process.
3. When using a second reflow, the second process should be carried out as soon as possible after the first.
4. Electrodes on this part are silver-plated. If the part is exposed to a corrosive environment, the plating may be damaged, thereby affecting solderability.
5. The Reflow Profile shown in Fig. 13 should be considered as a set of maximum parameters. Since this part uses the leads for heatsinking, the peak temperature should be kept as cool as possible and the cooldown period lengthened as much as possible. Thermal conduction into the LED will be affected by the performance of the reflow process, so verification of the reflow process is recommended. These parts may be used in a nitrogen reflow process.

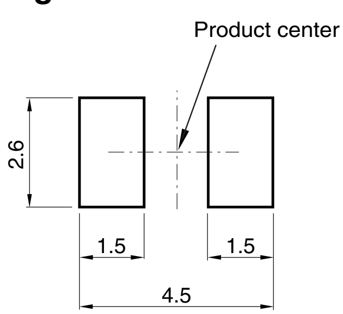
Fig. 13 Temperature Profile



● Recommended Solder Pad Design

1. Solderability depends on reflow conditions, solder paste, and circuit board materials. Check the entire process before production commences.
2. Fig. 14 shows the recommended solder pattern for this part.
3. When using back side dip methods, Sharp recommends checking the process carefully: board warping from heat can cause mechanical failure in these parts, in addition to the high heat conducted into the part through the leads. Performing reflow after dip is recommended, with the interval between the two as short as possible.

Fig. 14 Recommended Solder Pattern



NOTE: Unit: mm

● Presence of ODCs

This product shall not contain the following materials, and they are not used in the production process for this product:

- Regulated substances: CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform). Specific brominated flame retardants such as the PBBOs and PBBs are not used in this product at all.

This product shall not contain the following materials banned in the RoHS Directive (2002/95/EC).

- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).

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--- Personal computers
--- Office automation equipment
--- Telecommunication equipment (terminal)
--- Test and measurement equipment
--- Industrial control
--- Audio visual equipment
--- Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliabilty such as:

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--- Traffic signals
--- Gas leakage sensor breakers
--- Alarm equipment
--- Various safety devices, etc.

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