

TECHNICAL LITERATURE  
FOR  
Light Emitting Diode

参考

MODEL No.

GM5WT95200A

DATE

28-Jan-99

1. These Technical literature include materials protected under the copyright of Sharp Corporation ("Sharp"). Please do not reproduce or cause anyone to reproduce them without Sharp's consent.
2. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets, as well as the precautions mentioned below. Sharp assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets, and the precautions mentioned below.

## (Precautions)

- (1) This products is designed for use in the following application areas;

\* OA equipment \* Audio visual equipment \* Home appliance  
\* Telecommunication equipment (Terminal) \* Measuring equipment  
\* Tooling machines \* Computers

If the use of the product in the above application areas is for equipment listed in paragraphs (2) or (3), please be sure to observe the precautions given in those respective paragraphs.

- (2) Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when this product is used for equipment which demands high reliability and safety in function and precision, such as ;

\* Transportation control and safety equipment (aircraft, train, automobile etc.)  
\* Traffic signals \* Gas leakage sensor breakers \* Rescue and security equipment  
\* Other safety equipment

- (3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

\* Space equipment \* Telecommunication equipment (for trunk lines)  
\* Nuclear power control equipment \* Medical equipment

- (4) Please contact and consult with a Sharp sales representative if there are any questions regarding interpretation of the above three paragraphs.

3. Please contact and consult with a Sharp sales representative for any questions about this product.

\*\* The technical literature is subject to be changed without notice \*\*

Opto-Electronic Devices Division  
Electronic Components Group  
SHARP CORPORATION

|             |           |
|-------------|-----------|
| DG-991015   | Jan/28/99 |
| MODEL No.   | PAGE      |
| GM5WT95200A | 1/13      |

**SHARP**

GM5WT95200A technical literature

1. Application

This technical literature applies to the light emitting diode device Model No. GM5WT95200A.

1 Chip type white LED (GaN chip LED device)

2. Outline dimensions and terminal connections ..... Refer to the attached sheet Page 2.

3. Ratings and characteristics ..... Refer to the attached sheet Page 3~5

3-1. Absolute maximum ratings

3-2. Electro characteristics

3-3. Optical characteristics

3-4. Luminous intensity rank

3-5. Color coordinates ranks

3-6. Derating curve

3-7. Characteristics chart

4. Reliability ..... Refer to the attached sheet Page 6.

4-1. Test items and test conditions

4-2. Failure judgement criteria

5. Incoming inspection ..... Refer to the attached sheet Page 7.

5-1. Inspection method

5-2. Description of inspection and criteria

6. Taping specification ..... Refer to the attached sheet Page 8~11.

6-1. Taping

6-2. Label

6-3. Dampproof package

7. Soldering ..... Refer to the attached sheet Page 12.

7-1. Reflow soldering

7-2. Manual soldering

7-3. Dip soldering method

8. Precautions for use ..... Refer to the attached sheet Page 13.

8-1. Precautions matters for designing circuit

8-2. Cleaning method

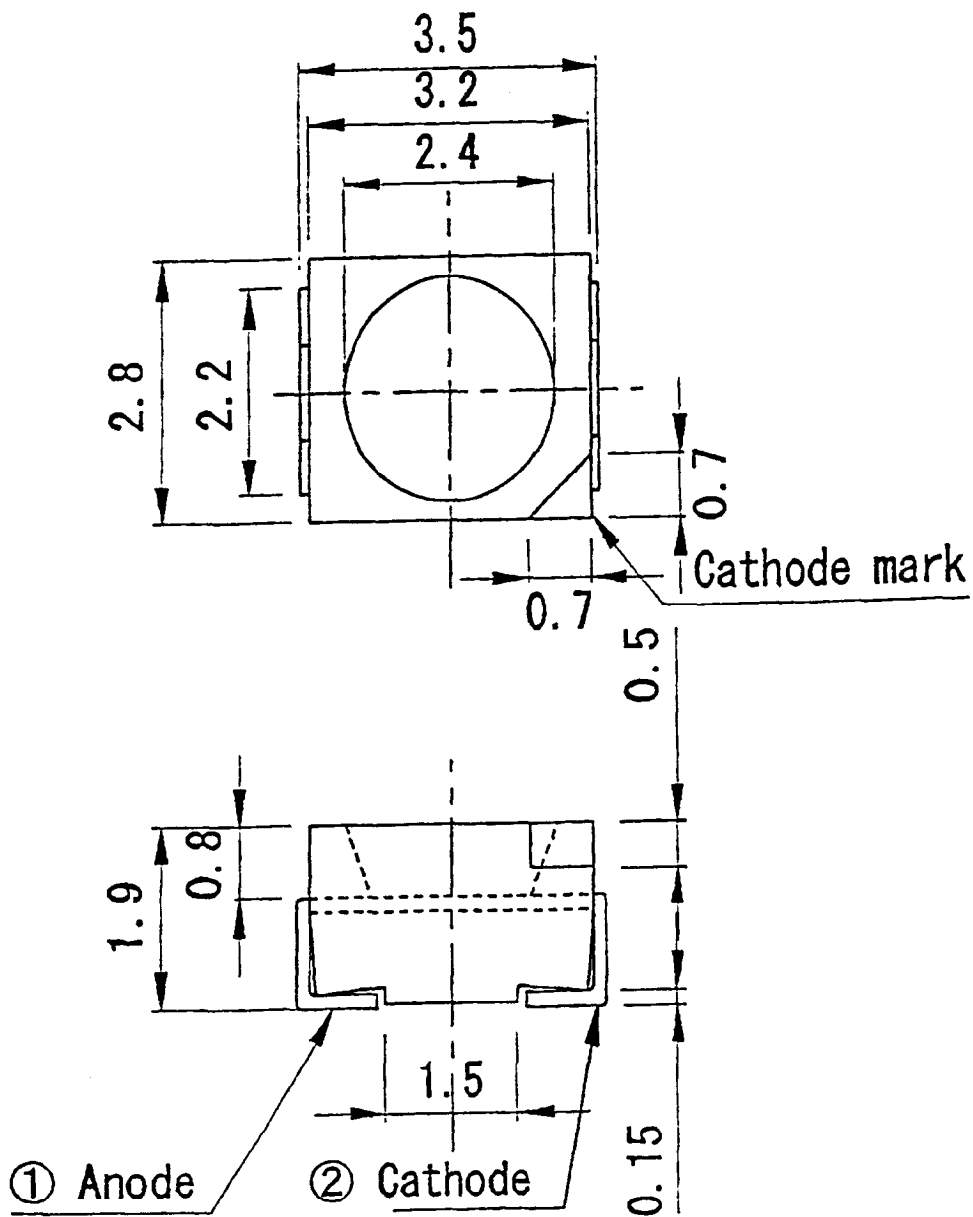
9. Environment ..... Refer to the attached sheet Page 13.

9-1. Ozonosphere destructive chemicals.

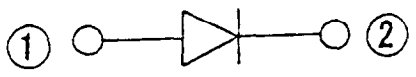
9-2. Bromic non-burning materials

**SHARP**

2. Outline dimensions and terminal connections



- Note.
1. It is not include the flash in this dimension.
  2. Pin Connection    ① Anode            ② Cathode
  3. Unspecified tolerance to be  $\pm 0.2$



| Unit | Scale | Applicable Model | Drawing No. |
|------|-------|------------------|-------------|
| mm   | Free  | GM5WT95200.A     | 51101014    |



### 3. Ratings and characteristics

#### 3-1. Absolute maximum ratings

(Ta=25°C)

| Parameter                      | Symbol           | Rating      | Unit |       |
|--------------------------------|------------------|-------------|------|-------|
| Power dissipation              | P                | 135         | mW   |       |
| Continuous forward current     | I <sub>F</sub>   | 30          | mA   |       |
| Peak forward current (Note 1)  | I <sub>FM</sub>  | 50          | mA   |       |
| Derating factor                | DC               | -           | 0.40 | mA/°C |
|                                | Pulse            | -           | 0.67 | mA/°C |
| Reverse voltage                | V <sub>R</sub>   | 5           | V    |       |
| Operating temperature          | T <sub>opr</sub> | -40 to +100 | °C   |       |
| Storage temperature            | T <sub>stg</sub> | -40 to +100 | °C   |       |
| Soldering temperature (Note 2) | T <sub>sol</sub> | 295         | °C   |       |

(Note1) Duty ratio=1/10,Pulse width=0.1ms

(Note2) Manual soldering Max.3second

#### 3-2. Electro characteristics

(Ta=25°C)

| Parameter       | Symbol         | Conditions           | MIN. | TYP. | MAX. | Unit |
|-----------------|----------------|----------------------|------|------|------|------|
| Forward voltage | V <sub>F</sub> | I <sub>F</sub> =20mA | -    | 3.8  | 4.5  | V    |
| Reverse current | I <sub>R</sub> | V <sub>R</sub> =4V   | -    | -    | 100  | μA   |

#### 3-3. Optical characteristics

(Ta=25°C)

| Model No.   | Condition            | Luminous intensity *3<br>I <sub>v</sub> (mcd)TYP. | luminous intensity rank |   |   |   | Color coordinates ranks |   |   |
|-------------|----------------------|---|-------------------------|---|---|---|-------------------------|---|---|
|             |                      |   | G                       | H | I | J | O                       | P | Q |
| GMSWT9S200A | I <sub>F</sub> =20mA | 200   | G                       | H | I | J | O                       | P | Q |

(Note3) Measured by SHARP EG&G MODEL550(Radiometer/Photometersystem)

#### 3-4. Luminous intensity rank

(Ta=25°C)

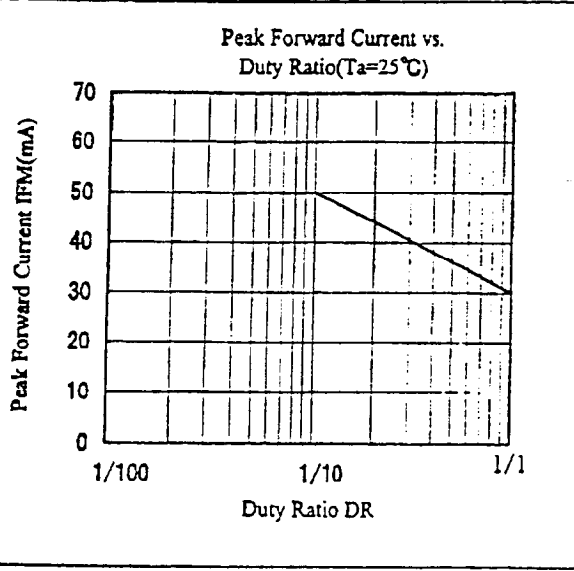
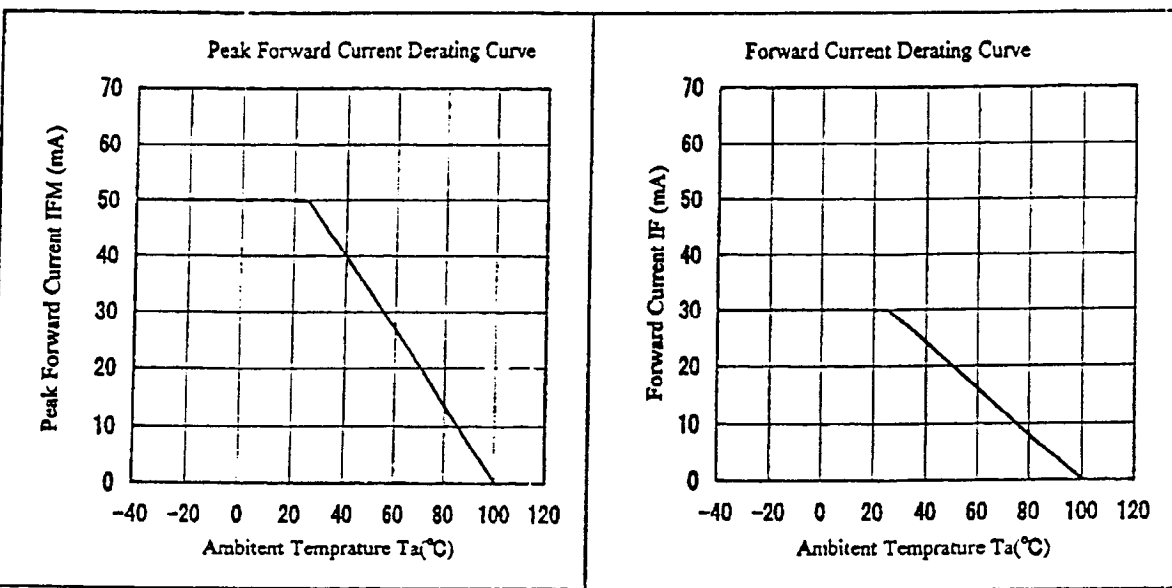
| Rank : Luminous intensity | Rank : Luminous intensity | Unit | Condition            |                    |
|---------------------------|---------------------------|------|----------------------|--------------------|
| b : 4.8 ~ 9.2             | E : 43 ~ 84               | mcd  | I <sub>F</sub> =20mA | Tolerance:<br>±15% |
| a : 6.9 ~ 13.2            | F : 62 ~ 121              |      |                      |                    |
| A : 10 ~ 19               | G : 89 ~ 174              |      |                      |                    |
| B : 14 ~ 28               | H : 128 ~ 250             |      |                      |                    |
| C : 21 ~ 40               | I : 185 ~ 360             |      |                      |                    |
| D : 30 ~ 58               | J : 266 ~ 518             |      |                      |                    |



3-5. Color coordinates ranks

| Rank : Color coordinates |             |             |
|--------------------------|-------------|-------------|
| Rank                     | X           | Y           |
| O                        | 0.26 ~ 0.32 | 0.2 ~ 0.38  |
| P                        | 0.3 ~ 0.36  | 0.22 ~ 0.40 |
| Q                        | 0.34 ~ 0.40 | 0.26 ~ 0.44 |

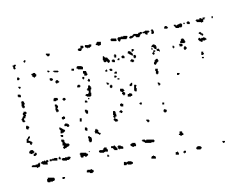
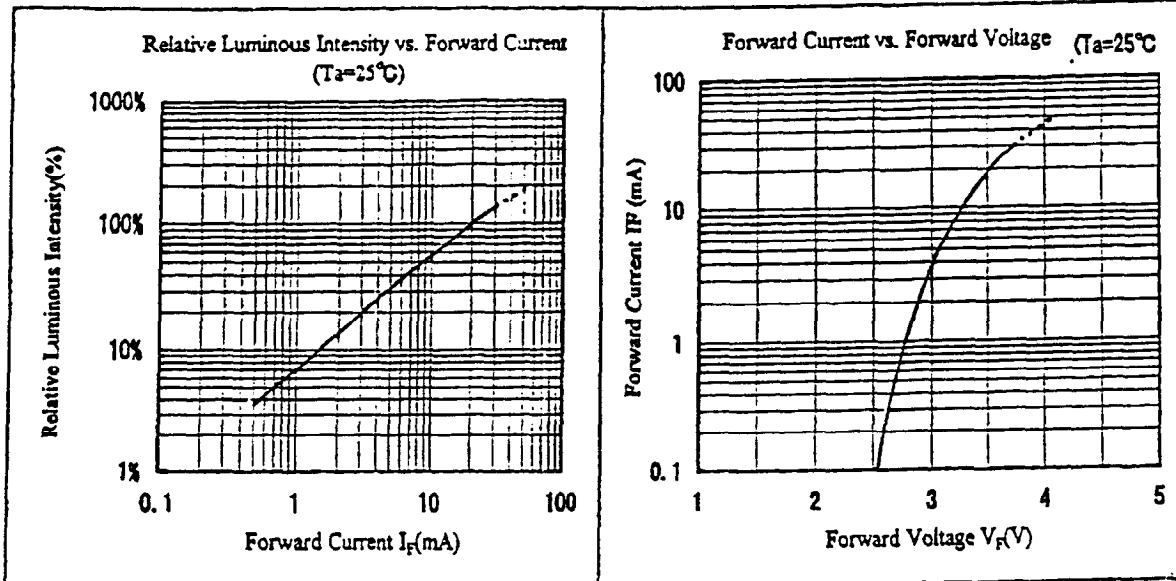
3-6. Derating curve



(Note) Above characteristic data are typical data and not guaranteed data.

**SHARP**

3-7. Characteristics chart



(Note) Above characteristic data are typical data and not guaranteed data.

WT9S



#### 4. Reliability

The reliability of products shall be satisfied with items listed below.

##### 4-1. Test items and test conditions

Confidence level: 90%

| Test items                           | Test conditions   | Samples (n)<br>Defective (C) | LTPD (%) |
|--------------------------------------|---|------------------------------|----------|
| temperature cycling                  | -40°C(30min)~+100°C(30min),100cy  | n=22, C=0                    | 10       |
| High temp. and high humidity storage | Ta=+60°C, 90%RH, t=1000h  | n=22, C=0                    | 10       |
| High temperature storage             | Ta=(Tstg_maximum ratings),t=1000h   | n=22, C=0                    | 10       |
| Low temperature storage              | Ta=(Tstg_minimum ratings),t=1000h   | n=22, C=0                    | 10       |
| Operating test                       | Ta=25°C, I <sub>F</sub> =(I <sub>F</sub> _maximum ratings),t=1000h              | n=22, C=0                    | 10       |
| Mechanical shock                     | 15 000m/s <sup>2</sup> , 0.5ms, 3times / ±X, ±Y, ±Z direction                   | n=11, C=0                    | 20       |
| Variable frequency vibration         | 200m/s <sup>2</sup> , 100~2 000~100Hz/sweepfor 20min., 4times/X, Y, Z direction | n=11, C=0                    | 20       |
| Soldering heat                       | Refer to the attached sheet, Page 12/13 1 time                                  | n=11, C=0                    | 20       |

##### 5-2. Failure judgement criteria (Note1)

| Parameter          | Symbol         | Failure judgement criteria (Note2)   |
|--------------------|----------------|--|
| Forward voltage    | V <sub>F</sub> | V <sub>F</sub> > U.S.L. × 1.2  |
| Reverse current    | I <sub>R</sub> | I <sub>R</sub> > U.S.L. × 2.0  |
| Luminous intensity | I <sub>v</sub> | I <sub>v</sub> > The first stage value × 1.5 or The first stage value × 0.5 > I <sub>v</sub> |

(Note1) Measuring condition is in accordance with specification.

(Note2) U.S.L. is shown by Upper Specification Limit.

**SHARP**

5. Incoming inspection

5-1. Inspection method

A single sampling plan, normal inspection level II based on ISO 2859-1 shall be adopted.

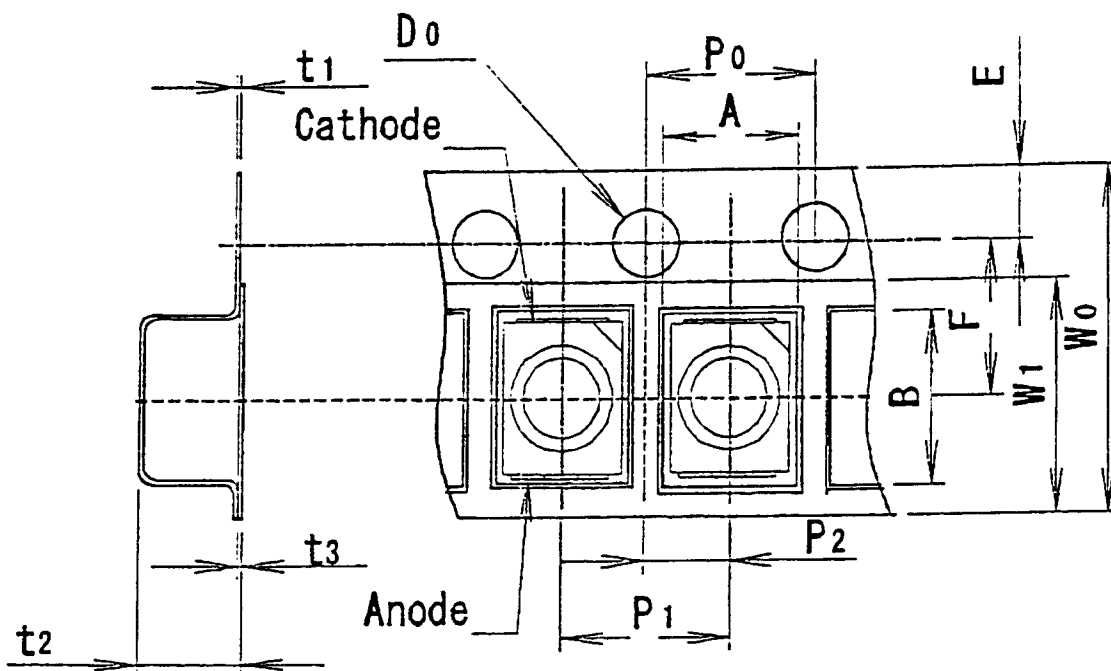
5-2. Description of inspection and criteria

| No. | Inspection items                | Criteria                                   | Defect       | AQL  |
|-----|---------------------------------|--|--------------|------|
| 1   | Open/Short                      | No light emission                          | Major defect | 0.1% |
| 2   | Radiation color                 | Not correct                                |              |      |
| 3   | Taping                          | Product inserted in reverse direction      |              |      |
| 4   | Label                           | Model number is not printed, or misprinted |              |      |
| 5   | Electro-optical characteristics | Not conforming to the specification        | Minor defect | 0.4% |
| 6   | Outline dimensions              | Not conforming to the specification        |              |      |
| 7   | Dust and flaw                   | Effect to the specification                |              |      |
| 8   | Resin flash                     | 0.3mm or greater from the product          |              |      |



**SHARP**

6. Taping  
 6-1 Taping  
 6-1-1. Shape and dimension of tape(TYP.)

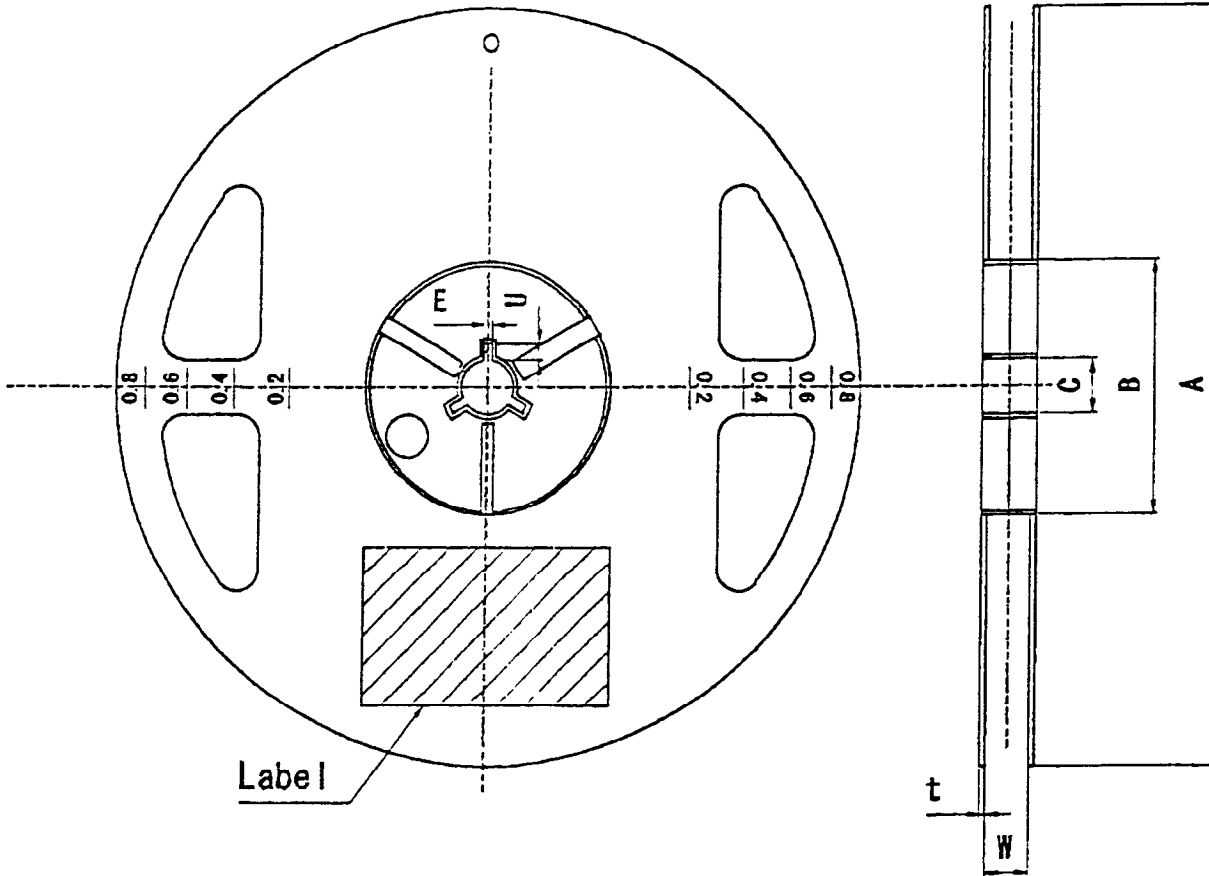


| Parameter                              | Symbol     | Dimension [mm](TYP.) | Remarks                                   |  |
|--|------------|----------------------|---|--|
| Concave square hole for part insertion | Vertical   | A                    | 3.2                                       | Dimension excludes corner R at inside bottom                   |
|  | Horizontal | B                    | 3.8                                       |  |
|  | Pitch      | $P_1$                | 4.0                                       |  |
| Round sprocket hole                    | Diameter   | $D_0$                | 1.55                                      |  |
|  | Pitch      | $P_0$                | 4.0                                       | Accumulated error $\pm 0.5\text{mm}/10$ pitch                  |
|  | Position   | E                    | 1.75                                      | Distance between tape edge and hole center                     |
| Center to center dimension             | Vert.dir   | $P_2$                | 2.0                                       | Center line of the concave square hole and round sprocket hole |
|  | Hori.dir   | F                    | 3.5                                       |  |
| Cover tape                             | Width      | $W_1$                | 5.5                                       |  |
|  | Thickness  | $t_3$                | 0.1                                       |  |
| Carrier tape                           | Width      | $W_0$                | 8.0                                       |  |
|  | Thickness  | $t_1$                | 0.3                                       |  |
| Thickness of the entire unit           | $t_2$      | 2.3                  | With cover tape and carrier tape combined |  |

※ Material : Carrier tape...PS, Cover tape...Polyester

**SHARP**

6-1-2.Shape and dimension of reel(TYP.)



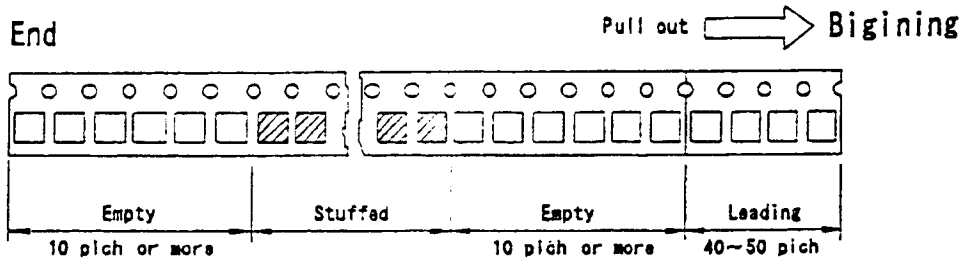
| Parameter                   |                       | Symbol   | Dimension [mm](TYP.) | Remarks                 |
|-----------------------------|-----------------------|--|----------------------|-------------------------|
| Flange                      | Diameter              | A  | φ 178                |                         |
|                             | Thickness             | t  | 1.5                  |                         |
|                             | Inner space direction | W  | 10                   | Dimension of shaft core |
| Hub                         | External diameter     | B  | φ 60                 |                         |
|                             | Spindle hole diameter | C  | φ 13                 |                         |
|                             | Key slit              |  |                      |                         |
|                             | Width                 | E  | 2.0                  |                         |
|                             | Depth                 | U  | 4.5                  |                         |
| Notation for part name etc. |                       | Labeling on one side of flange. (part name, quantity, lot No.) |                      |                         |

※ Material : Reel...Polystyrene

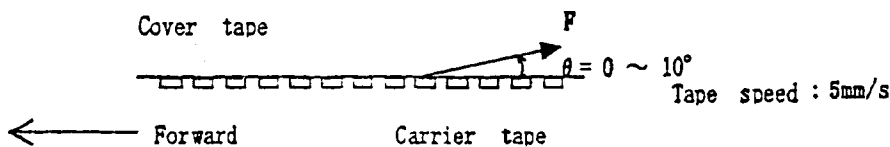
**SHARP**

6-1-3. Taping specification

(1) Lead tape:



(2) Cover tape strength against peeling:  $F=0.1\sim0.3N$  ( $\theta = 10^\circ$  or less)



(3) Tape strength against bending:

The radius of bending circle should be 30mm or more.

If it is less than 30mm, the cover may peel.

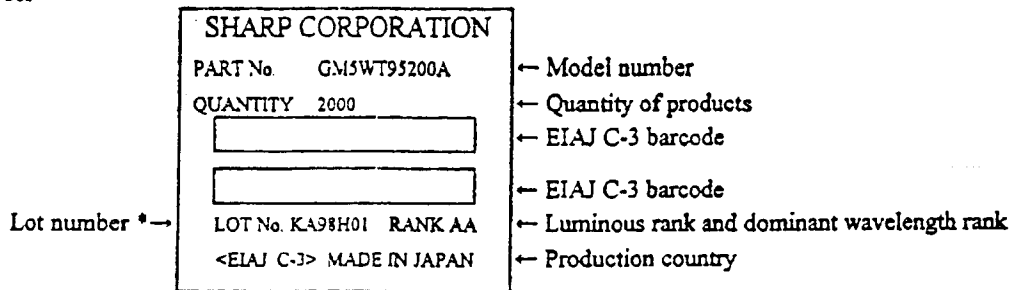
(4) Jointing of tape: There should not be joint of cover tape or carrier tape.

(5) Quantity per reel: Average 2,000pcs. per reel

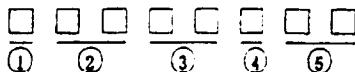
(6) Product weight: Approx. 0.03 g

- (7) Others:
- ① Apparent defect of product should not be packed and product should not upset.
  - ② There should not be missing above continuous three products.
  - ③ Products should be easily taken out.
  - ④ Products should not be attached to the cover tape at peeling.

6-2. Label for reel



\*: Lot number indication

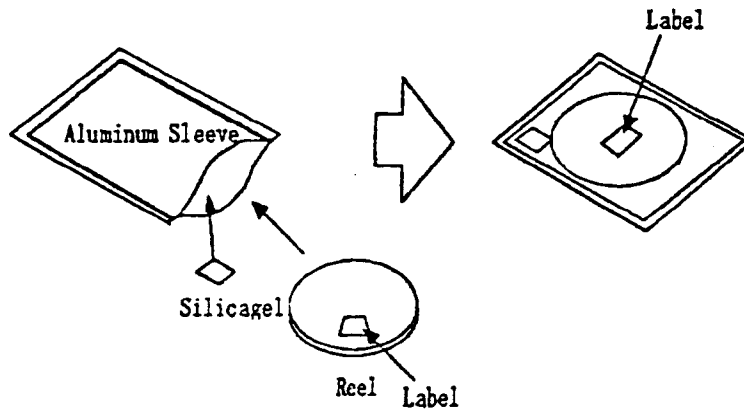


- ① Production plant code (to be indicated alphabetically)
- ② Production lot (single or double figures)
- ③ Year of production (the last two figures of the year)
- ④ Month of production  
(to be indicated alphabetically with January corresponding to A)
- ⑤ Date of production (01 ~ 31)

**SHARP**

### 6-3. Dampproof package

In order to avoid the absorption of humidity in transport and storage, the devices are packed in aluminum sleeve.



#### 6-3-1. Storage conditions

Temperature : 5 to 30°C Humidity : less than 60%RH

#### 6-3-2. Treatment after opening

(1) Please make a soldering within 2 days after opening under following condition;

Temperature : 5 to 30°C Humidity : less than 60%RH

(2) In case the devices are not used for a long time after opening, the storage in dry box is recommendable.

Or it is better to repack the devices with a desiccative by the sealer and put them in the same storage conditions as 7-3-1. Then they should be used within 2 days.

(3) Please make a soldering after a following baking treatment if unused term should be over the conditions of (2)

Recommendable conditions:

① in taping

Temperature: 60°C to 65°C, Time: 36 to 48 hours

② in individual (on PWB or metallic tray)

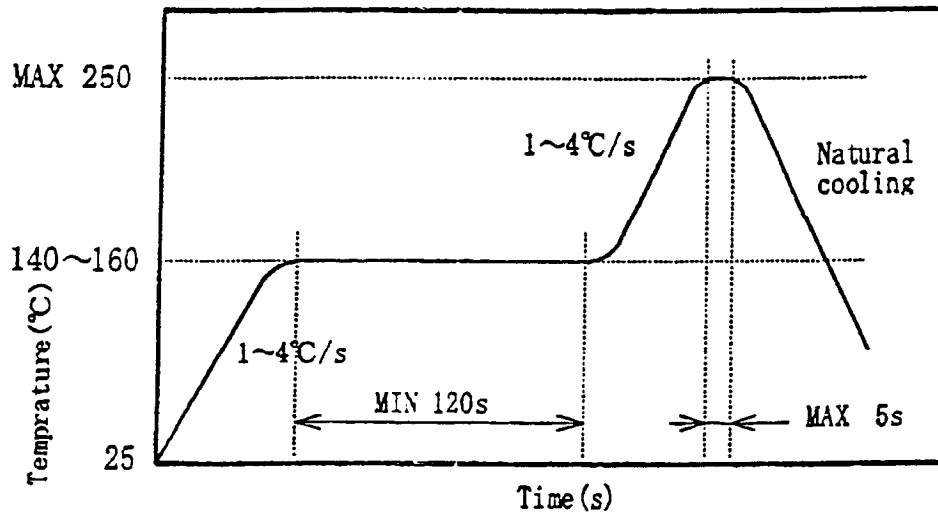
Temperature: 100°C, Time: 2 to 3 hours

**SHARP****7. Soldering****7-1. Reflow soldering**

(1) It is not recommended to exceed the soldering temperature and time shown below.

Caused by substrate bend or the other mechanical stress during reflow soldering may happen gold wire disconnection etc. Therefore please check and study your solder reflow machine's best condition.

(2) Reflow soldering temperature profile to be done under the following condition. to be done under the following condition.

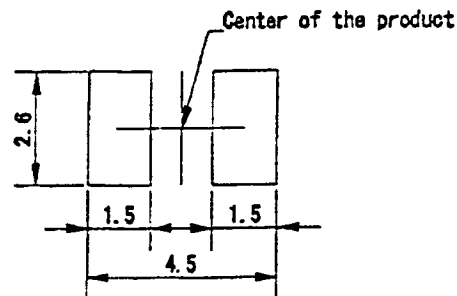


Recommendable Thermal Model

(4) Recommendable Metal Mask pattern for screen print

Recommend 0.2mm to 0.3mm thickness metal mask for screen print. Caused by solder reflow condition, solder paste, substrate and the other material etc., may change solderability.

Please check and study actual solderability before usage.



Recommended solder pattern

**7-2. Manual soldering**

(1) It is recommended to keep the soldering iron temperature at 295°C (soldering iron power consumption 20W) and not to solder more than once or for over 3 seconds.

(2) When using a soldering iron, care must be taken not to damage the package.

(Pay attention not to allow any under stress or heat on package.)

**7-3. Dip soldering method**

To be done under the following condition.

Pre-heat temp. : 80 to 120 °C

time : 30 to 120 seconds

Soldering temp. : Max. 260°C

time : within 5 seconds

|                          |               |
|--------------------------|---------------|
| DG-991015                | Jan/28/99     |
| MODEL No.<br>GMSWT95200A | PAGE<br>13/13 |

**SHARP**

## 8. Precautions for use

### 8-1. Precautions matters for designing circuit

- (1) This product is not designed as electromagnetic and ionized-particle radiation resistant.
- (2) This LED device applies blue LED & florescent material to emit white light. Therefore, depending on the value of operation current, tone of the color may change slightly. Please check the tone under actual usage condition in advance.

### 8-2. Cleaning method

#### (1) Solvent cleaning

Recommend conditions: ① Solvent temperature is not more than 45 °C. ② Immersion up to 3 minutes.

#### (2) Ultrasonic cleaning

The affect on the device from ultrasonic bath, ultrasonic output, duration, board size and device mounting method. Test the cleaning method under actual conditions and check for abnormalities before actual use.

#### (3) Solvents

Use only the following types of solvent.

water, alcohol, chlorofluorocarbon-based solvent when cleaning is necessary.

Recommend conditions: R.T. 40KHz, 30W/l, 3 to 5 minutes

## 9. Environment

### 9-1. Ozonosphere destructive chemicals.

- (1) The device doesn't contain following substance.
- (2) The device doesn't have a production line whose process requires following substance.  
Restricted part: CFCs, halones, CCl<sub>4</sub>, Trichloroethane (Methychloroform)

### 9-2. Bromic non-burning materials

The device doesn't contain bromic non-burning materials (PBBOs, PBBs)