

**SHARP**

OPTO-ELECTRONIC DEVICES DIVISION  
ELECTRONIC COMPONENTS GROUP  
SHARP CORPORATION

**SPECIFICATION**

DEVICE SPECIFICATION FOR

OPIC LIGHT DETECTOR

MODEL No.

GA220T2L1IZ

Specified for \_\_\_\_\_

Enclosed please find copies of the Specifications which consists of 11 pages including cover.  
After confirmation of the contents, please be sure to send back ☐ copies of the Specifications  
with approving signature on each.

CUSTOMER'S APPROVAL

DATE \_\_\_\_\_

BY \_\_\_\_\_

PRESENTED

DATE \_\_\_\_\_

BY H. O

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Department General Manager of  
Engineering Dept., V  
Opto-Electronic Devices Div.  
ELECOM Group  
SHARP CORPORATION

Product name : OPIC LIGHT DETECTOR

Model No. : GA220T2L1IZ

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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 product is designed for use in the following application areas ;

( · OA equipment   · Audio visual equipment   · Home appliances  
 · Telecommunication equipment (Terminal)   · Measuring equipment  
 · Tooling machines   · Computers   etc.

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   etc.

- (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   etc.

- (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.

## 1. Application

This specification applies to the outline and characteristics of OPIC light detecting device Model No. GA220T2L1IZ.

## 2. Outline

Refer to the attached drawing No. CY11648L02.

## 3. Ratings and characteristics

Refer to the attached sheet, page 4, 5.

## 4. Reliability

Refer to the attached sheet, page 6.

## 5. Outgoing inspection

Refer to the attached sheet, page 7.

## 6. Supplement

### (6-1) Circuit block diagram

Refer to the attached sheet, page 9.

### (6-2) Packing specifications shall be referred to attached drawing.

Packing materials of this model are used materials excepting corrugated cardboard materials.

Regarding disposal of this packing materials, please handle with care.

### (6-3) This product is not designed against electromagnetic and ionized-particle irradiation.

### (6-4) This product shall not contain the following materials.

Also, the following materials shall not be used in the production process for this product.

Materials for ODS : CFCs, Halon, Carbon tetrachloride

1.1.1-Trichloroethane (Methyl chloroform)

### (6-5) Product mass (Piece): Approximately 117mg

## 7. Notes

### (7-1) By-pass capacitors

In order to stabilize power supply line, connect some by-pass capacitors of 0.01 to 0.1  $\mu$ F between Vcc and GND within 1cm from lead pins.

### (7-2) Cleaning conditions :

Solvent cleaning : Solvent temperature 45°C or less Immersion for 3 min or less

Ultrasonic cleaning : The effect to device by ultrasonic cleaning differs by cleaning bath size, ultrasonic power output, cleaning time, PCB size or device mounting condition etc.

Please test it in actual using condition and confirm that doesn't occur any defect before starting the ultrasonic cleaning.

The cleaning shall be carried out with solvent below.

Solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol

### (7-2) Soldering

#### (1) Solder reflow

Temperature profile etc. is set up later.

#### (2) Soldering by hand

To solder onto lead pins, please solder at 260°C for 3 seconds or less.

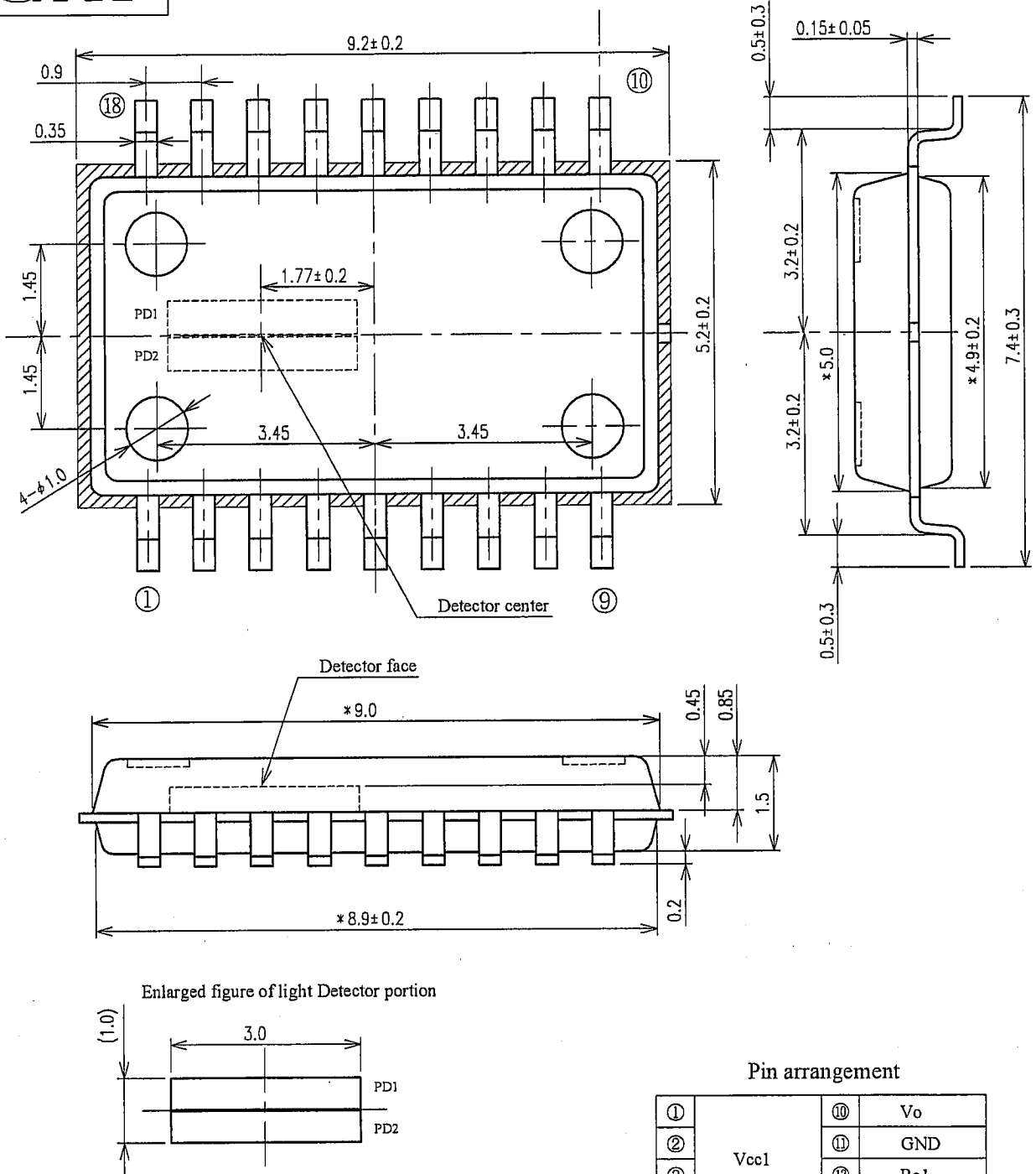
Please be careful not to give the mechanical stress to the package when soldering because it may cause the deformation or defect due to the plated connection.

#### (3) Case of other soldering

Other soldering methods such as dip soldering and VPS shall not be used.

Please use (1) and (2).

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- 1) Unspecified tolerance shall be  $\pm 0.1$ .
- 2) Dimensions in parenthesis are shown for reference.
- 3) : Burr
- 4) Resin burr shall not be included in outline dimensions.
- 5) Package taper :  $15^\circ$
- 6) Dimensions of \* mark are excluded the parting surface.
- 7) Chip positioning tolerance :  $\pm 0.2$   
Chip rotation tolerance :  $\pm 3^\circ$
- 8) Lead pin Horizontal tolerance : MAX. 0.15.  
Vertical tolerance : MAX. 0.2.

Pin arrangement

①		⑩	Vo
②		⑪	GND
③	Vcc1	⑫	Ro1
④		⑬	Vcc2
⑤	[IN (PD2)]	⑭	[IN (PD1)]
⑥	Ro2	⑮	
⑦	GND	⑯	Vcc1
⑧	Vext	⑰	
⑨	GND	⑱	

Scale	Material	Finish	Name	GA220T2L1IZ Outline Dimensions									
10 / 1	Lead : 42 Alloy Package : Epoxy resin	Lead pin: Solder dip	Drawing No.										
Unit		Lead-free solder use Composition(Standard value) Sn96.5%,Ag3.0%,Cu0.5%											
1 = 1 / 1 mm				C	Y	1	1	6	4	8	L	0	2

3. Ratings and characteristics

3.1 Absolute maximum ratings

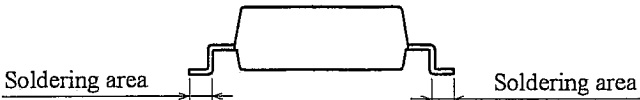
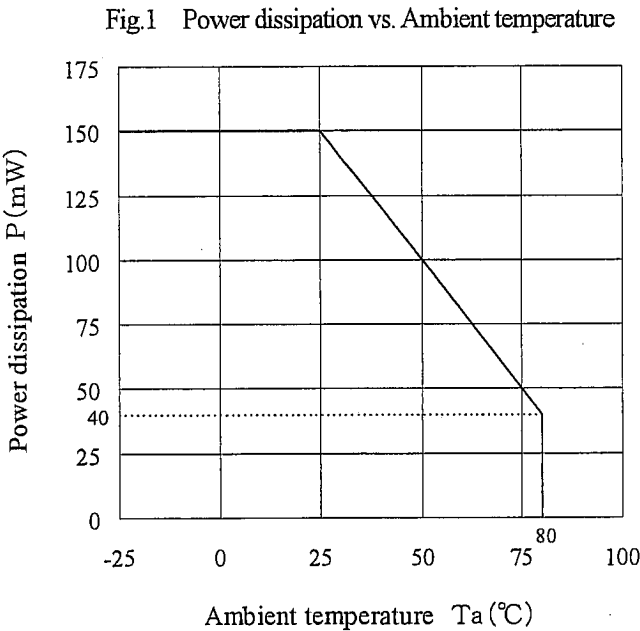
Ta=25°C,Vcc1=Vcc2

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	0 to +7.0	V
External input voltage	V <sub>ext</sub>	-0.5 to V <sub>CC</sub> +0.5	V
Output voltage	V <sub>O</sub>	-0.5 to V <sub>CC</sub>	V
Low level output current	I <sub>OL</sub>	20	mA
Ro1 terminal current	I <sub>RO1</sub>	5	mA
Ro2 terminal current	I <sub>RO2</sub>	5	mA
Incident light intensity *1	P <sub>i</sub>	5	mW
Radiant intensity *1	E <sub>e</sub>	60	W/cm <sup>2</sup>
Power dissipation *2	P	150	mW
Operating temperature	T <sub>opr</sub>	-25 to +80	°C
Storage temperature	T <sub>stg</sub>	-40 to +85	°C
Soldering temperature *3	T <sub>sol</sub>	260	°C

\*1 Maximum allowable incident light intensity and radiant intensity of laser beam (λ =780nm) to the device.

\*2 Refer to Fig.1

\*3 For 3 seconds MAX. at the position shown in the following drawing.



### 3.2 Recommended operating conditions

Parameter	Symbol	MIN.	MAX.	Unit
Operating supply voltage	$V_{CC}$	4.5	5.5	V
Incident light intensity ( $\lambda = 780\text{nm}$ )	$P_I$	-	1.0	mW

### 3.2 Electro-optical characteristics

(Unless otherwise specified  $T_a=25^\circ\text{C}$ ,  $\lambda = 780\text{nm}$ ,  $V_{CC1}=V_{CC2}=5\text{V}$ ,  $R_{O1}=R_{O2}=5.1\text{k}\Omega$ )

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Conditions
High level output voltage	$V_{OH}$	4.9	-	-	V	$P_I=0$
Low level output voltage	$V_{OL}$	-	0.4	0.6	V	$P_I=200\mu\text{W}$ (Vext=L) $P_I=130\mu\text{W}$ (Vext=H) $I_{OL}=10\text{mA}$
High level supply current	$I_{CCH}$	-	4.0	7.0	mA	$P_I=0$ , Vext=L,H
Low level supply current	$I_{CCL}$	-	6.0	9.0	mA	$P_I=200\mu\text{W}$ (Vext=L)
“High→Low” threshold incident light intensity 1	$P_{IHL1}$	40	55	70	$\mu\text{W}$	Vext=L
“High→Low” threshold incident light intensity 2	$P_{IHL2}$	25	35	45	$\mu\text{W}$	Vext=H
“High→Low” propagation delay time variation	$\Delta T_{PHL}$	-	-	$\pm 8.5$	ns	$P_I=200\mu\text{W}$ at center (Vext=L) $P_I=130\mu\text{W}$ at center (Vext=H) $\Delta P_I=\pm 10\%$ *4
Response time (Rise)	$t_r$	-	60	180	ns	$R_L=510\Omega$ $C_L=15\text{pF}$
Response time (Fall)	$t_f$	-	20	100	ns	

\*4 Beam diameter  $\Phi=100\mu\text{m}$ , scan speed= $0.5\text{mm}/\mu\text{s}$

Not including jitter caused by polygon mirror non-uniformity, etc.

Fig.2 Gain resistor ( $R_o$ ) vs. "High→Low" threshold incident light intensity

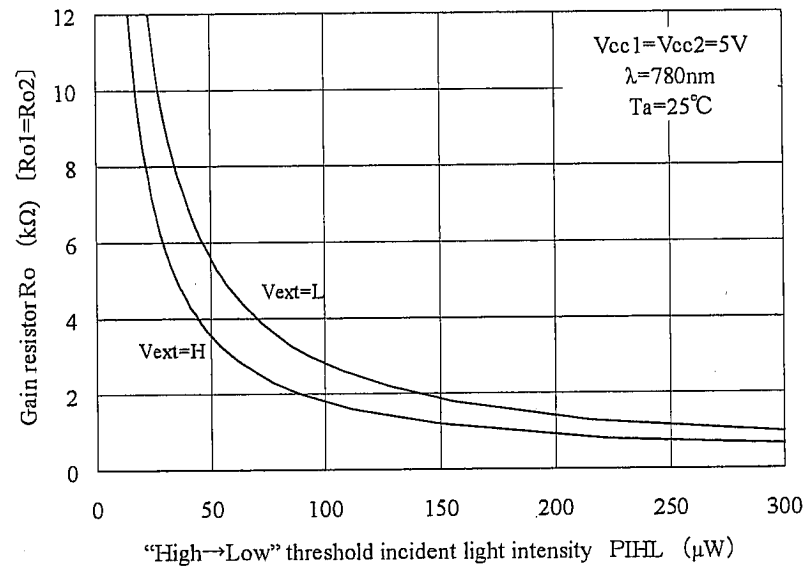
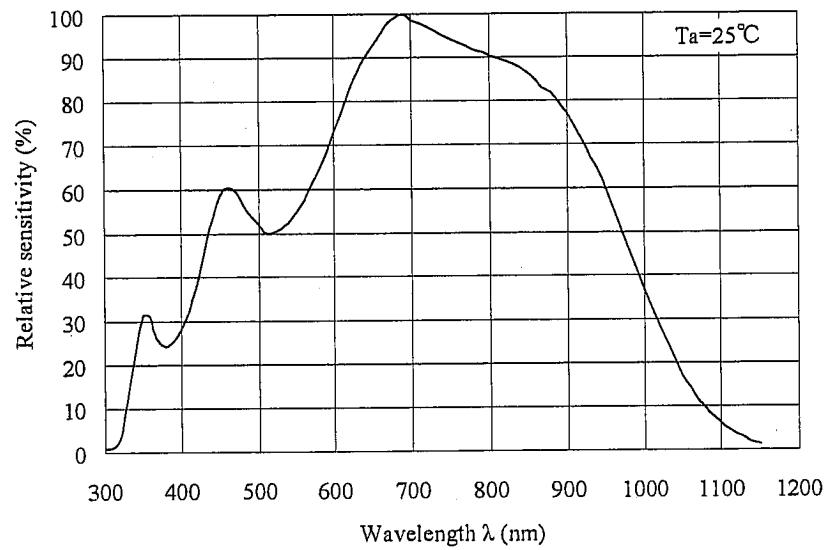


Fig.3 Spectral sensitivity (reference)

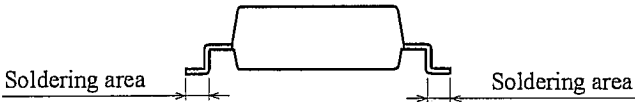


4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%  
LTPD : 10 or 20

Test Items	Test Conditions	Failure Judgement Criteria	Samples (n)
			Defective(C)
Temperature cycling	1 cycle -40℃ $\longleftrightarrow$ +85℃ (30min) (30min) 20 cycles test	$V_{OH} < L \times 0.8$ $V_{OH} > U \times 1.2$ $I_{CCH} > U \times 1.2$ $I_{CCL} > U \times 1.2$ $P_{IHL1} > U \times 1.2$ $P_{IHL2} > U \times 1.2$ $\Delta T_{PHL} > U \times 1.2$  U: Upper specification limit L: Lower specification limit	n=22, C=0
High temp. and high humidity storage	+60℃,90%RH, 500h		n=22, C=0
High temp. storage	+85℃, 500h		n=22, C=0
Low temp. storage	-40℃, 500h		n=22, C=0
Operation life	Vcc1=Vcc2=5V, Ta=25℃, 500h		n=22, C=0
Mechanical shock	1000m/s <sup>2</sup> , 6ms, Half sine wave 3 times/±X, ±Y, ±Z direction		n=11, C=0
Variable frequency vibration	200m/s <sup>2</sup> 100 to 2000 to 100Hz / Sweep for 4min 48min/X, Y, Z direction		n=11, C=0
Terminal strength (Tension)	Weight: 2.5N 10 s/each terminal		n=11, C=0
Terminal strength (Bending)	Weight: 1.25N 0° →90° →0° →-90° →0° The one test should be performed.		n=11, C=0
Soldering heat	260±5℃, 3±0.5 s Position of below.		n=11, C=0
Solderability	245±5℃, 5±1 s Position of below. Flux:EC-19S-8 (Tamura kaken corporation) No pretreatment	Solder shall adhere at less than 95% area of dipped portion.	n=11, C=0





5. Outgoing inspection

(1) Inspection lot

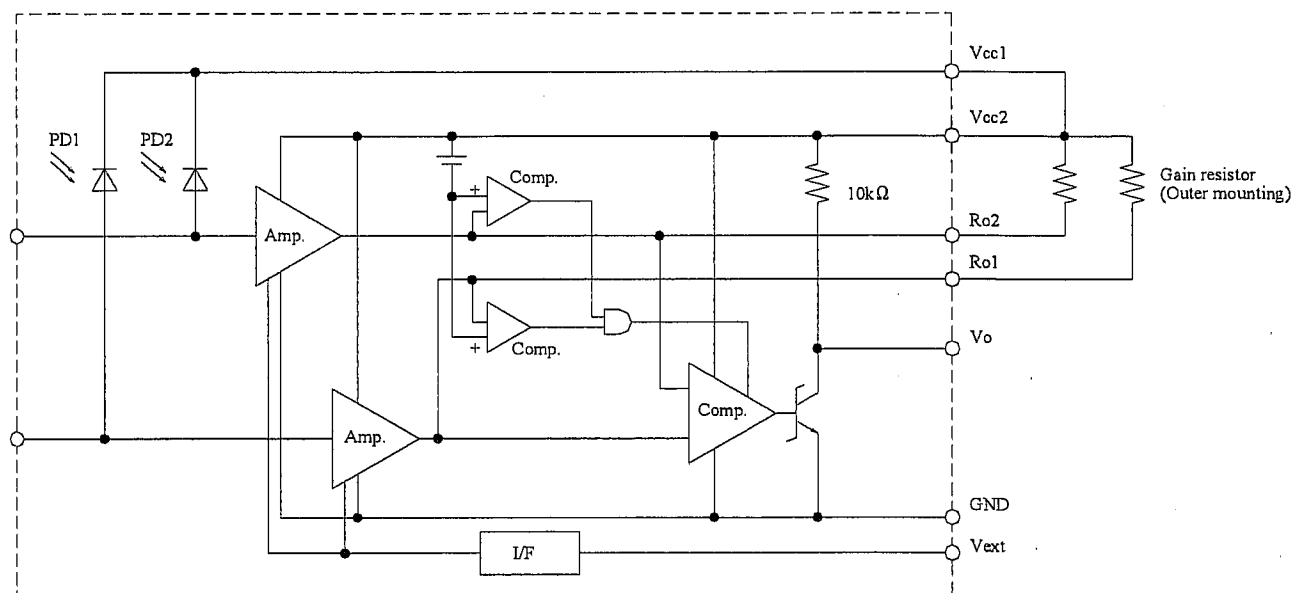
Inspection shall be carried out per each delivery lot.

(2) Inspection method

A single sampling plan, normal inspection level II based on ISO2859 shall be adopted.

Parameter		Inspection items and test method				AQL(%)	
Major defect	1	Disconnection, short				0.065	
	2	Inverse polarity on terminal					
	3	Characteristics defect					
		Parameter	Symbol	Judgement criteria			Unit
				MIN.	MAX.		
		High level output voltage	V <sub>OH</sub>	4.9	-		V
		Low level output voltage	V <sub>OL</sub>	-	0.6		V
		High level supply current	I <sub>CCH</sub>	-	7.0		mA
		Low level supply current	I <sub>CCL</sub>	-	9.0		mA
		“High→Low” threshold incident light intensity 1	P <sub>IHL1</sub>	40	70		μ W
		“High→Low” threshold incident light intensity 2	P <sub>IHL2</sub>	25	45		μ W
		“High→Low” propagation delay time variation	Δ T <sub>PHL</sub>	-	±8.5		ns
		Response time (Rise)	tr	-	180		ns
		Response time (Fall)	tf	-	100		ns
Test conditions refer to parameter 3.2.							
Minor defect	1	Appearance defect				0.25	
		Parameter	Judgement criteria				
		Crack	Visible crack irrespective of its position shall be defect.				
		Split, Chip, Scratch, Stain, Blur	One which affects the characteristics of parameter 3.2 shall be defect.				
		Bubble, Foreign matter (One on resin surface which can wipe off shall not be applied.)	1. On light detector 0.2mm ϕ or more shall be defect. 2. Area excepting on light detector 0.4mm ϕ or more shall be defect.				

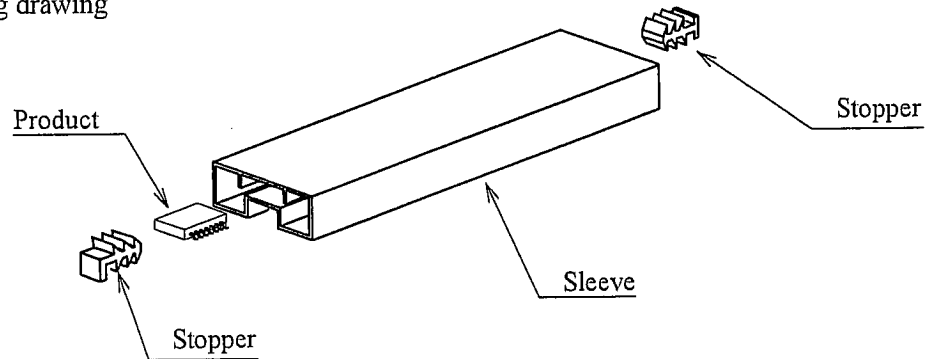
6. Supplement  
(6-1) Circuit block diagram



## 6-1 Packaging

### 6-1-1 Inner packing

#### ① Inner packing drawing

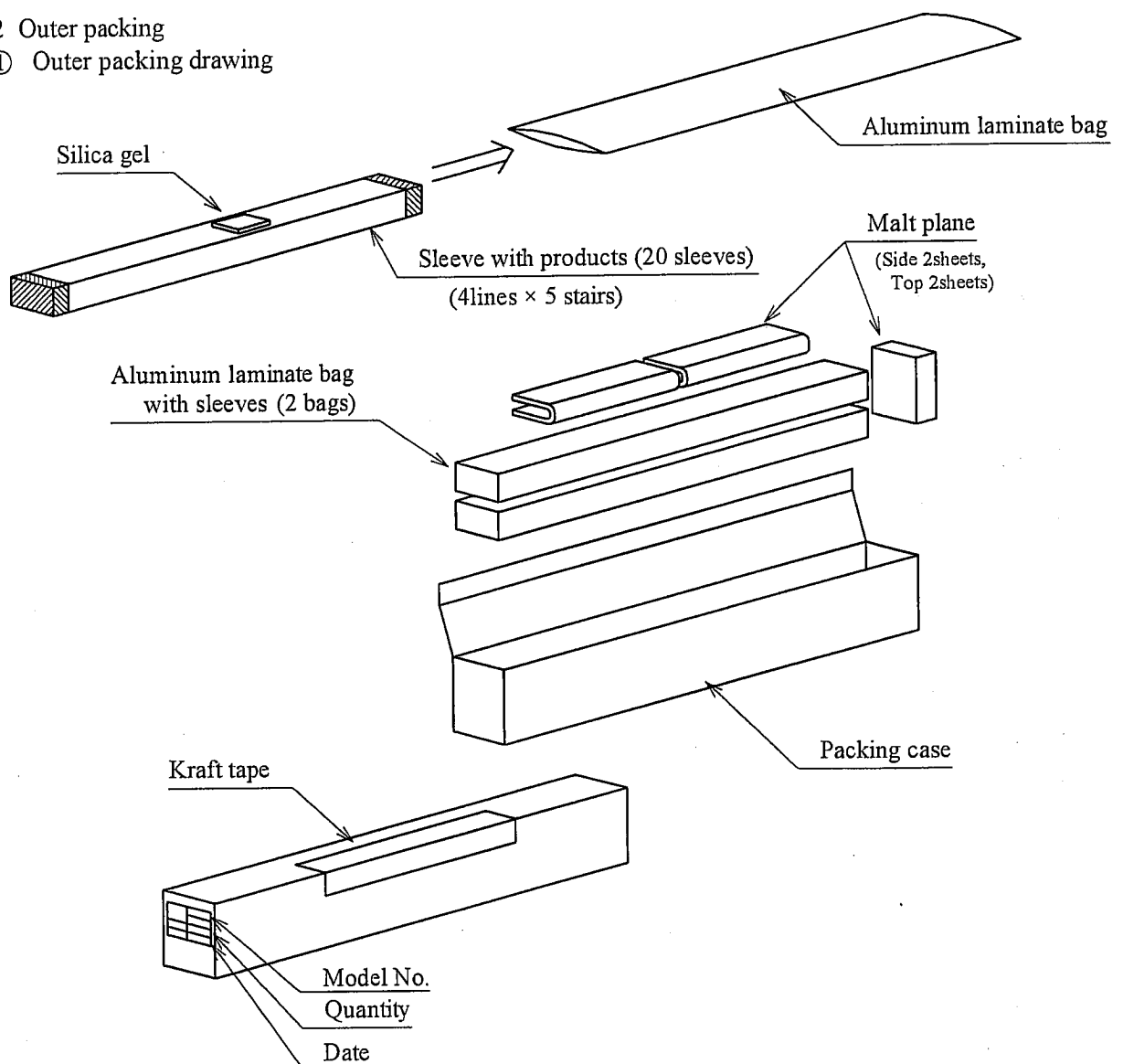


② Inner packing material : Sleeve (HIPS) , Stopper (SBR)

③ Quantity : 50pcs./sleeve

### 6-1-2 Outer packing

#### ① Outer packing drawing



② Outer material : Packing case (Corrugated cardboard) , Malt plane (Urethane), Kraft tape, Cellophane tape, Aluminum laminate bag

③ Quantity : 2000pcs./box

④ Indication : Model No., quantity and date