

# GA1A2S100SS/ GA1A2S100LY

## OPIC™ Linear Output Ambient Light Sensor



### ■ Features

1. Linear output, suitable for indoor or outdoor use
2. Light sensitivity and response curve similar to that of the human eye
3. OPIC light detector: integrated photodiode and signal processing circuit
4. Lead frame packages:  
Straight leads: GA1A2S100SS  
L-bend: GA1A2S100LY
5. Stable over specified temperature range
6. Lead-free and RoHS-directive compliant

### ■ Agency Approvals/Compliance

1. Compliant with RoHS directive (2002/95/EC)
2. Content information about the six substances specified in "Management Methods for Control of Pollution Caused by Electronic Information Products Regulation" (popular name: China RoHS) (Chinese: 电子信息产品污染控制管理办法); refer to page 7.

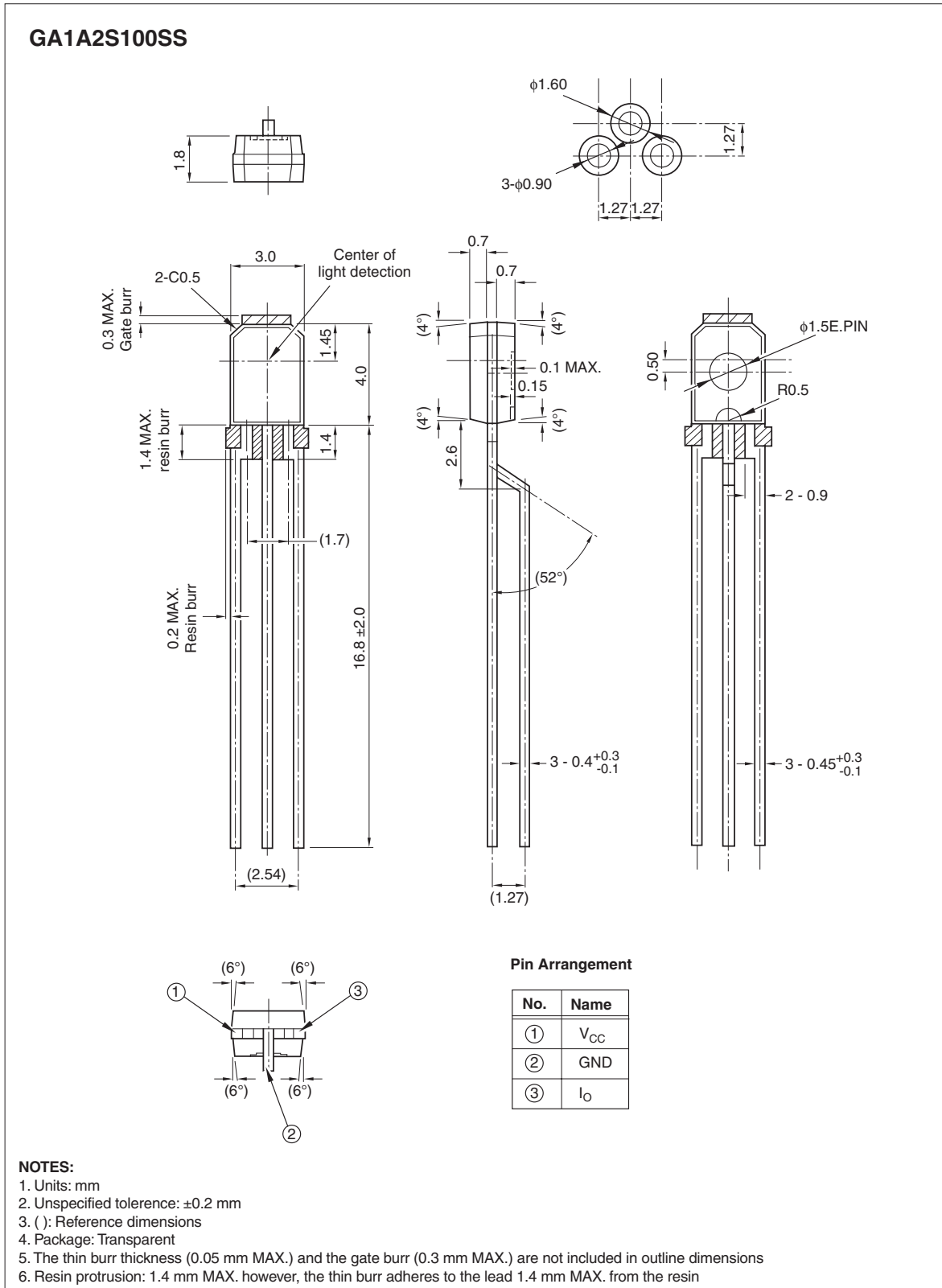
### ■ Applications

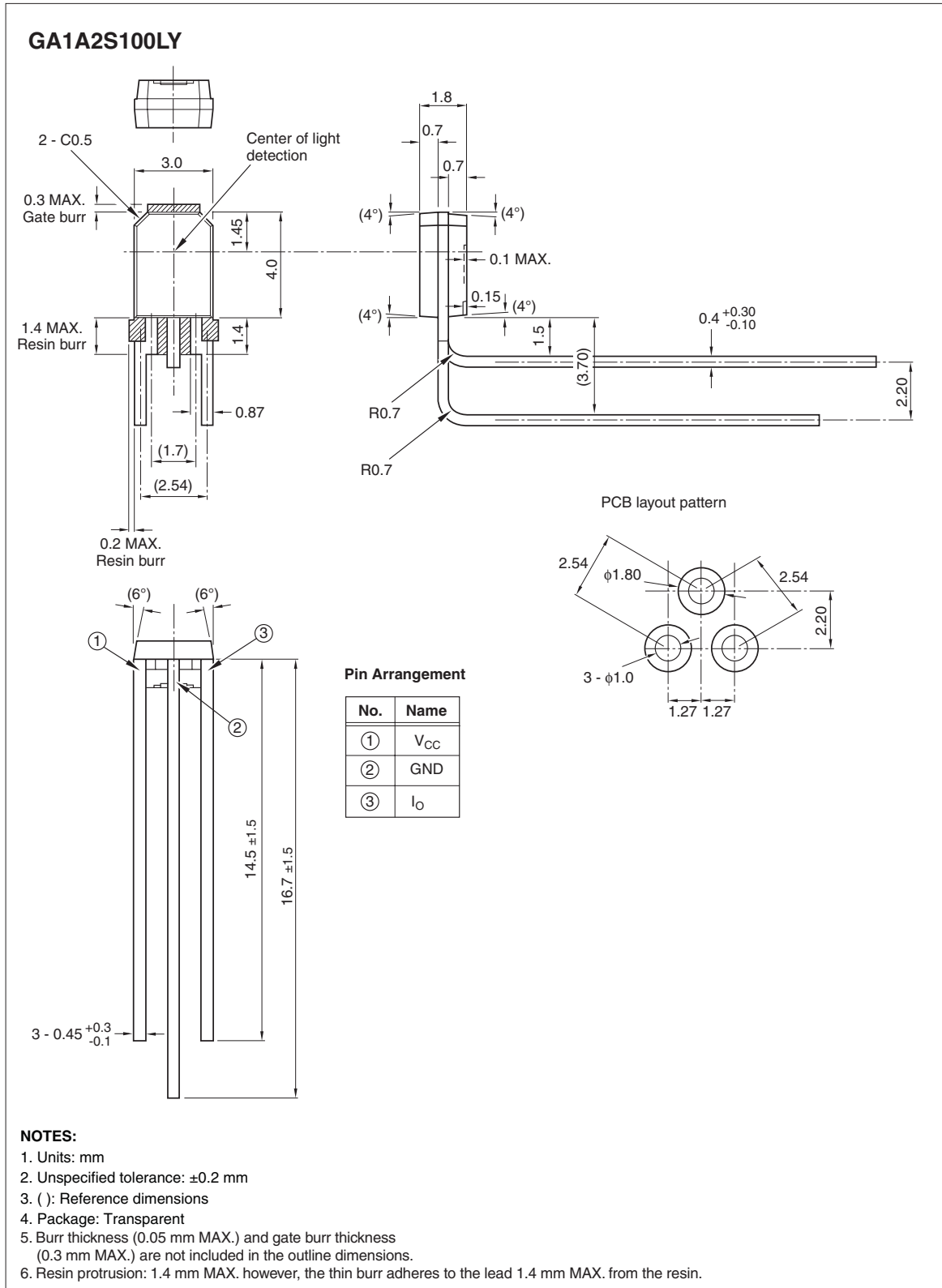
1. Auto-dimming circuits
2. Office automation equipment
3. Audio visual equipment
4. Home appliances
5. Touch panels

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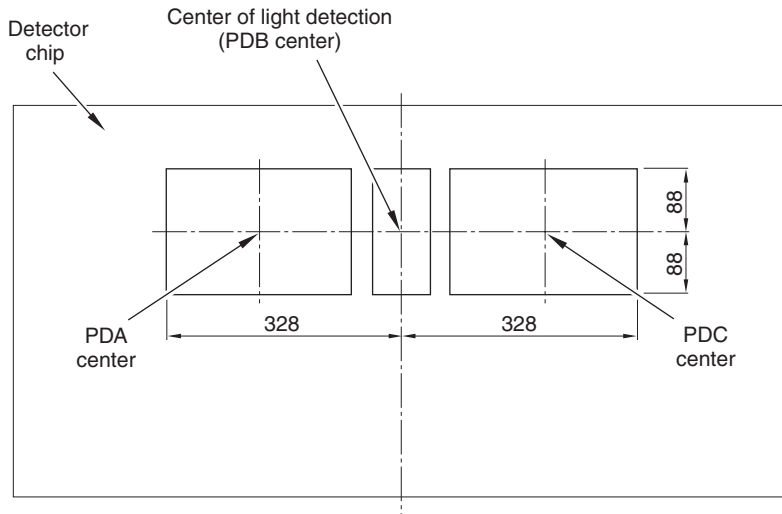
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■ External Dimensions





**Detector Shape**



NOTE: Unit:  $\mu\text{m}$

**Absolute Maximum Ratings** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	-0.3 to +7.0	V
Output current	$I_O$	5	mA
Operating temperature	$T_{opr}$	-40 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-40 to +85	$^\circ\text{C}$
Soldering temperature *1	$T_{sol}$	260	$^\circ\text{C}$

\*1 Within 5 s (MAX.), no closer than 1.4 mm from edge.

**Recommended Operating Conditions** ( $T_a = 0^\circ\text{C}$  to  $70^\circ\text{C}$ )

Parameter	Symbol	MIN.	MAX.	Unit
Operating Supply Voltage	$V_{CC}$	2.7	3.6	V
Output Voltage	$V_{OUT}$	0	$V_{CC} - 1.0$	V
Illuminance Range	$E_V$	10	10000	lx

**■ Electro-optical Characteristics**

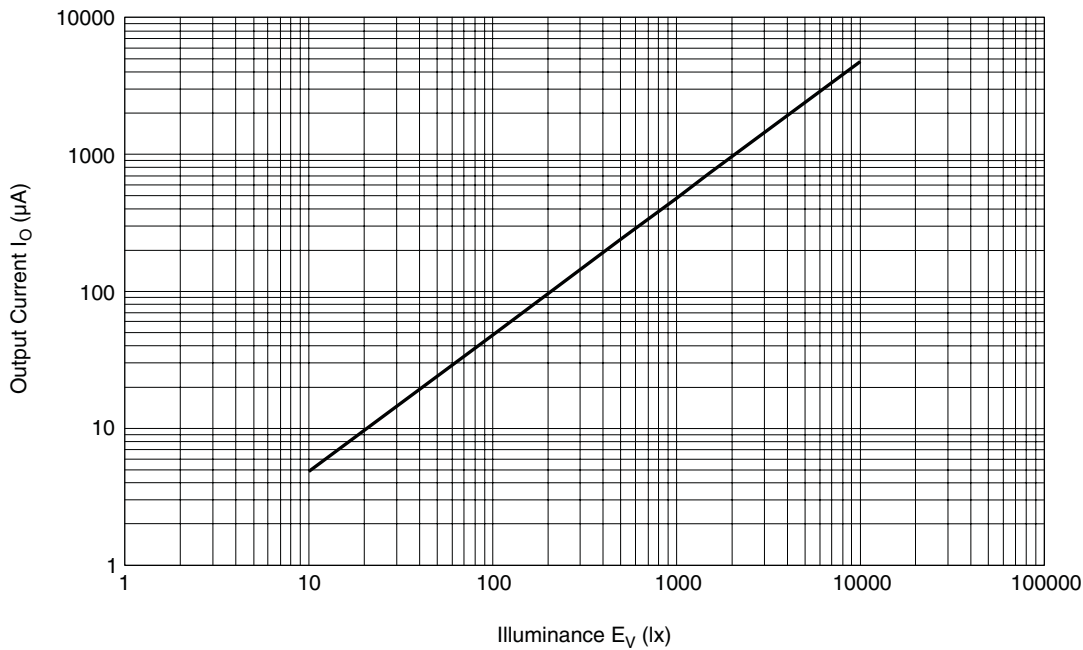
(Ta = 25°C, V<sub>CC</sub> = 3.3 V)

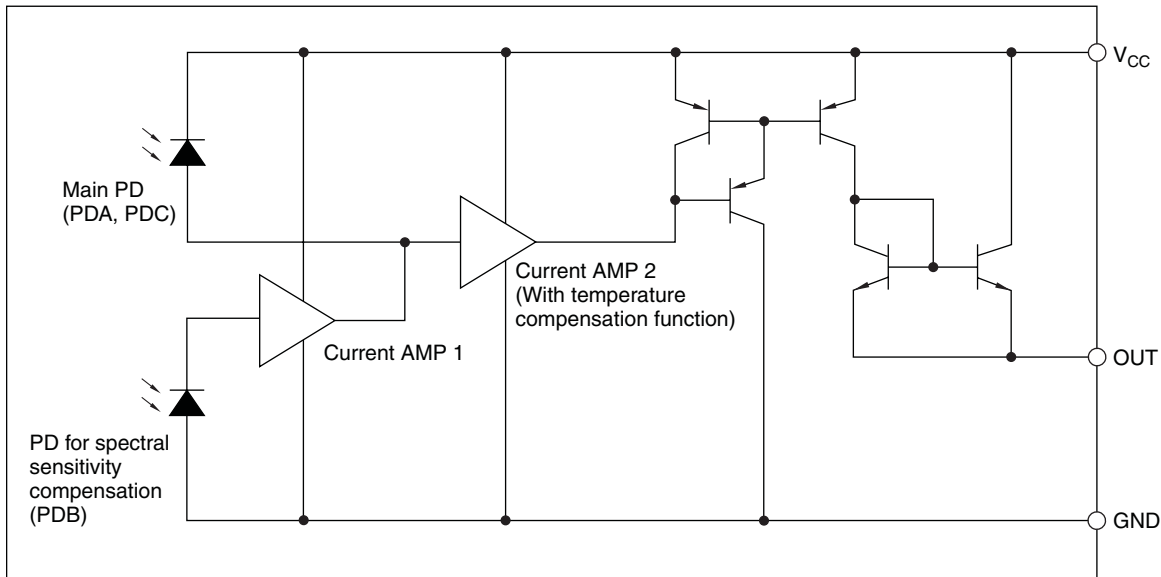
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply current	I <sub>CC</sub>	E <sub>V</sub> = 1000 lx	325	500	675	μA
Output current *1	I <sub>O1</sub>	E <sub>V</sub> = 1000 lx	312	480	648	μA
	I <sub>O2</sub>	E <sub>V</sub> = 100 lx	31.2	48	64.8	μA
	I <sub>O3</sub>	E <sub>V</sub> = 10 lx	3.12	4.8	6.48	μA
	I <sub>O4</sub>	E <sub>V</sub> = 0 lx	—	—	1	μA
Output current temperature coefficient *2		E <sub>V</sub> = 1000 lx Ta = -20°C to +60°C	-10	—	+10	%
Peak sensitivity	λ <sub>p</sub>		—	555	—	nm
Rise time (10% to 90%)*2	tr1	E <sub>V</sub> = 10 to 100 lx, R <sub>L</sub> = 1 kΩ	—	—	10	ms
	tr2	E <sub>V</sub> = 100 to 1000 lx, R <sub>L</sub> = 1 kΩ	—	—	2	ms
	tr3	E <sub>V</sub> = 1000 to 10000 lx, R <sub>L</sub> = 100 kΩ	—	—	500	μs
Fall time (10% to 90%)*2	tf1	E <sub>V</sub> = 10 to 100 lx, R <sub>L</sub> = 1 kΩ	—	—	10	ms
	tf2	E <sub>V</sub> = 100 to 1000 lx, R <sub>L</sub> = 1 kΩ	—	—	1	ms
	tf3	E <sub>V</sub> = 1000 to 10000 lx, R <sub>L</sub> = 100 Ω	—	—	250	μs

\*1 E<sub>V</sub> = Illuminance by CIE standard light source A (tungsten lamp).

\*2 Illuminance is white LED.

**Fig. 1 Output Current Characteristics (Typ.)**



**Fig. 2 Block Diagram (Equivalent Circuit)**

## ■ Design Considerations

### Design Guidelines

1. This product is not designed to be electromagnetic- and ionized-particle-radiation resistant.
2. Sharp recommends bypass capacitors of at least 0.01  $\mu\text{F}$  between  $V_{CC}$  and ground, as close as possible to the device.
3. This device contains three photodiodes and amplifies the differential of the photocurrent in each diode. Sharp recommends that the light which falls on the device illuminate it as uniformly as possible.
4. For the most reliable sensing, Sharp recommends guarding the device from stray incident light.

## ■ Manufacturing Guidelines

### Soldering Instructions

1. Sharp does not recommend soldering this part using methods that include preheat or solder reflow.
2. When mounting, care should be taken to avoid boundary exfoliation (pad lifting) between the solder and the circuit board.
3. If hand soldering, use temperatures  $\leq 260^{\circ}\text{C}$  for  $\leq 5$  seconds.
4. 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.

### Cleaning Instructions

1. Confirm this device's resistance to process chemicals before use, as certain process chemicals may affect the optical characteristics.
2. Solvent cleaning: Solvent temperature should be  $45^{\circ}\text{C}$  or below. Immersion time should be 3 minutes or less.
3. Ultrasonic cleaning: The effect upon devices varies due to cleaning bath size, ultrasonic power output, cleaning time, PCB size and device mounting circumstances. Sharp recommends testing using actual production conditions to confirm the harmlessness of the ultrasonic cleaning methods.
4. Recommended solvent materials: Ethyl alcohol, Methyl alcohol, and Isopropyl alcohol.

**■ Presence of ODCs (RoHS Compliance)**

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).
- Content information about the six substances specified in “Management Methods for Control of Pollution Caused by Electronic Information Products Regulation” (Chinese: 电子信息产品污染控制管理办法)

Category	Toxic and Hazardous Substances					
	Lead (Pb)	mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr <sup>6+</sup> )	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
OPIC Light Sensors	✓	✓	✓	✓	✓	✓

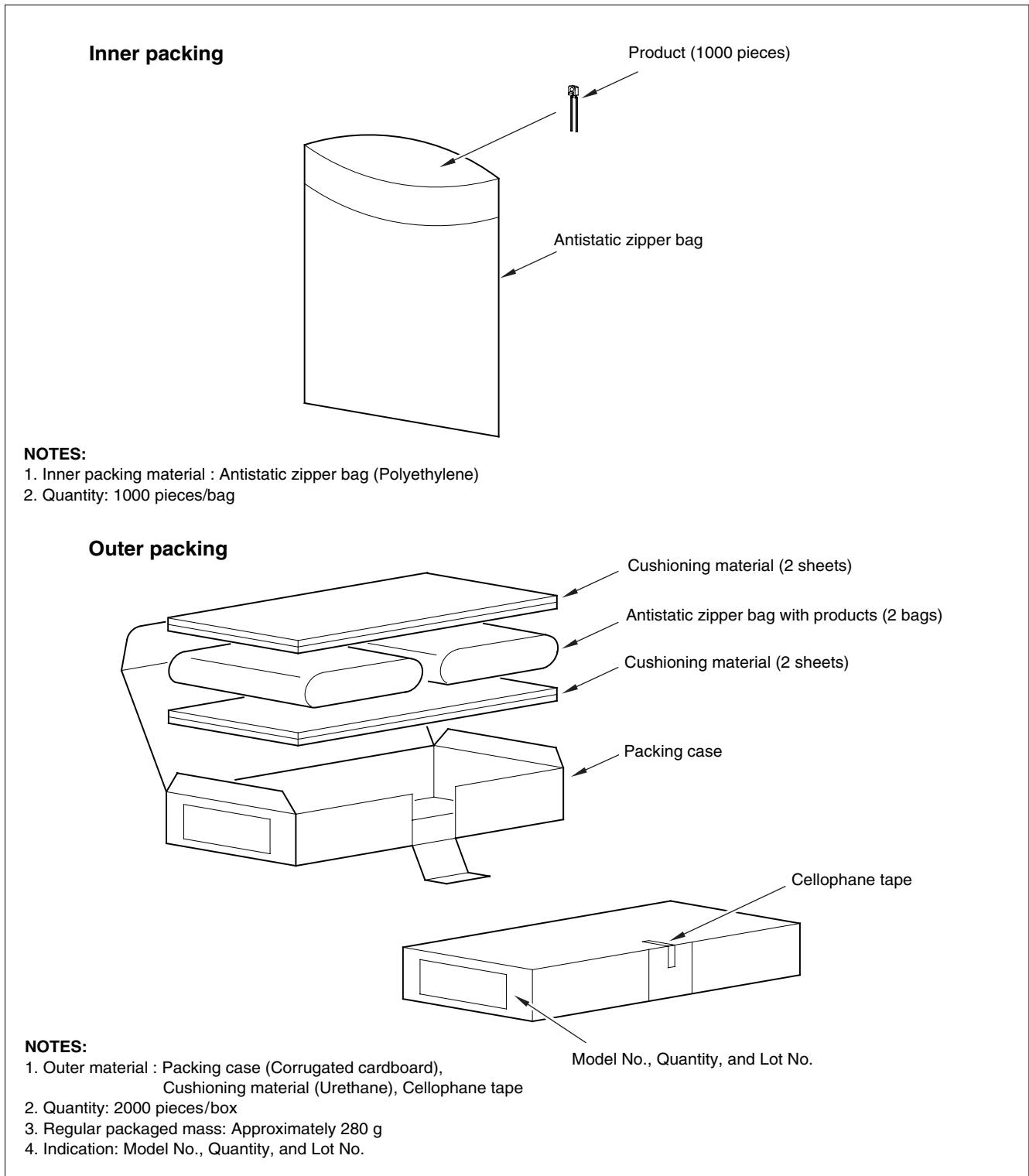
NOTE: ✓ indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006 standard.

**■ Packing Specifications**

1. Box shape and general dimensions for GA1A2S100SS conform to those shown in Fig. 3, and to those shown in Fig. 4 for GA1A2S100LY.
2. Inner packing is as shown in the Figures.
3. For GA1A2S100SS:  
Average quantity per bag = 1000 pcs.  
Average quantity per box = 2000 pcs.
4. For GA1A2S100LY:  
Average quantity per sleeve = 100 pcs.  
Average quantity per box = 2000 pcs.
5. Product mass: 0.1 g (approximately)

■ Packing Specification

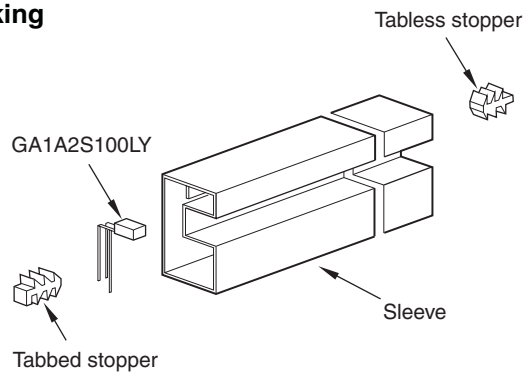
Fig. 3 GA1A2S100SS Packing Composition





**Fig. 4 GA1A2S100LY Packing Composition**

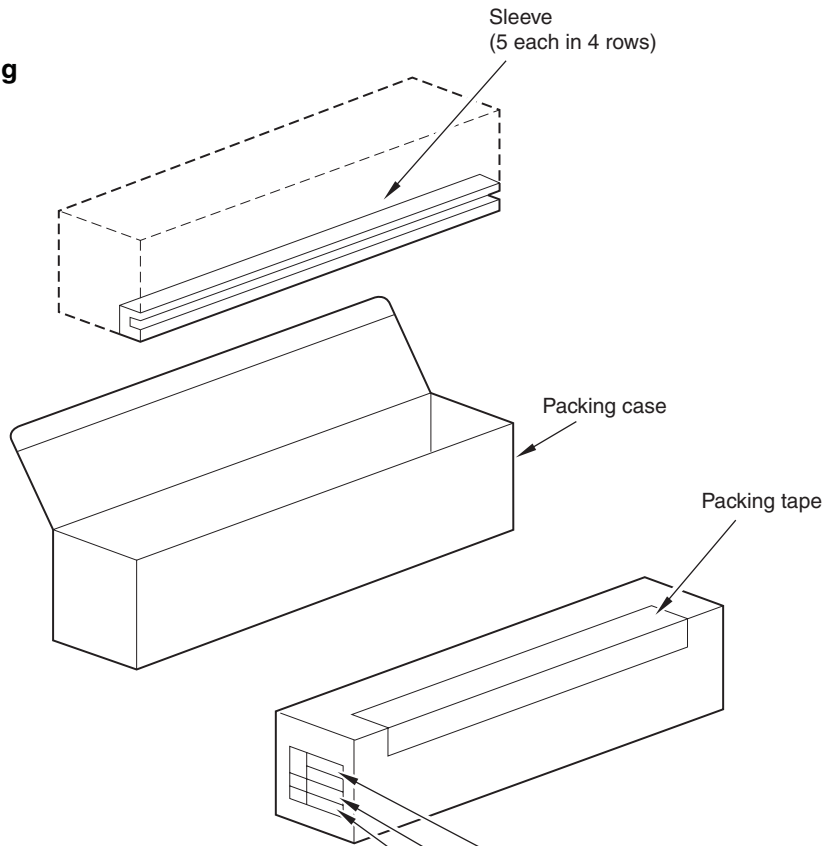
**Inner packing**



**NOTES:**

1. Inner packing material: Sleeve (HIPS), Stopper (SBR)
2. Quantity: 100 pieces/sleeve

**Outer packing**



**NOTES:**

1. Outer material: Packing case (Corrugated cardboard), Packing tape
2. Quantity: 2000 pieces/box
3. Label: Model number, quantity, and inspection date

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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 reliability such as:

- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
- Traffic signals
- Gas leakage sensor breakers
- Alarm equipment
- Various safety devices, etc.

(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:

- Space applications
- Telecommunication equipment (trunk lines)
- Nuclear power control equipment
- Medical and other life support equipment (e.g. scuba)

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