

REFERENCE

ISSUE : Oct. 28, 2015

TO ;
_____**S P E C I F I C A T I O N S**Product Name ULTRAVIOLET RAY ILLUMINANCE SENSORModel No. GA1AUV100WP

These specifications contain 30 pages including the cover and appendix.
This specification sheets and attached sheets shall be both side copy.
After confirmation of the contents, please be sure to send back _____ copy of the
Specifications with approving signature on each.
If you have any objections, please contact us before issuing purchasing order.

Accepted by:

Sharp Corporation

By : _____

Name : _____

Title : _____

Date : _____

By : _____

Name : _____

Title : _____

Date : _____

By : T. Ichinose

Name : T. Ichinose,

Title : General Manager, Head of

Development Dept. II

System Device Business Unit

Electronic Components and Devices Company

Date : Oct 28, 2015

Reviewed by :

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Title : Senior Manager

Date : Oct. 28, 2015

Prepared by :

By : J. Oka

Name : J. Oka

Title : Assistant Manager

Date : Oct. 28, 2015

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

(Precautions)

- (1) In making catalogue or instruction manual based on the specification sheets, please verify the validity of the catalogue or instruction manuals after assembling Sharp products in customer's products at the responsibility of customer.
- (2) This Sharp product is designed for use in the following application areas ;
 - Computers • OA equipment • Telecommunication equipment (Terminal) • Measuring equipment
 - Tooling machines • Audio visual equipment • Home appliancesIf the use of the Sharp product in the above application areas is for equipment listed in paragraphs (3) or (4), please be sure to observe the precautions given in those respective paragraphs.
- (3) 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 Sharp product is used for equipment in responsibility of customer 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
- (4) Sharp product is designed for consumer goods and controlled as consumer goods in production and quality.
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
- (5) Please contact and consult with a Sharp sales representative if there are any question regarding interpretation of the above four paragraphs.

3. Disclaimer

The warranty period for Sharp product is one (1) year after shipment.
During the period, if there are any products problem, Sharp will repair (if applicable), replace or refund.
Except the above, both parties will discuss to cope with the problems.

The failed Sharp product after the above one (1) year period will be coped with by Sharp, provided that both parties shall discuss and determine on sharing responsibility based on the analysis results thereof subject to the above scope of warranty.

The warranty described herein is only for Sharp product itself which are purchased by or delivered to customer.
Damages arising from Sharp product malfunction or failure shall be excepted.

Sharp will not be responsible for the Sharp product due to the malfunction or failures thereof which are caused by:

- (1) storage keep trouble during the inventory in the marketing channel.
- (2) intentional act, negligence or wrong/poor handling.
- (3) equipment which Sharp products are connected to or mounted in.
- (4) disassembling, reforming or changing Sharp products.
- (5) installation problem.
- (6) act of God or other disaster (natural disaster, fire, flood, etc.)
- (7) external factors (abnormal voltage, abnormal electromagnetic wave, fire, etc.)
- (8) special environment (factory, coastal areas, hotspring area, etc.)
- (9) phenomenon which cannot be foreseen based on the practical technologies at the time of shipment.
- (10) the factors not included in the product specification sheet.

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

1. Application
This specification applies to the outline and characteristics of Ultraviolet ray illuminance Sensor; Model No. GA1AUV100WP.
2. Outline
Refer to the attached drawing No. CY15276L02.
3. Ratings and characteristics
Refer to the attached sheet, page 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 8.
 - (6-2) Packing
Refer to the attached sheet, attachment -2-1 to 2-4.
 - (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) This product does not contain specific brominated flame retardants such as the PBB and PBDE .
 - (6-6) Compliance with each regulation
 - 6.6.1 The RoHS directive(2011/65/EU)
This product complies with the RoHS directive(2011/65/EU) .
Object substances: mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBB)
and polybrominated diphenyl ethers (PBDE)
 - 6.6.2 Content of 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).

Marking Styles for the Names and Contents of the Hazardous Substances

Category	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr ⁶⁺)	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Ultraviolet ray illuminance Sensor	○	○	○	○	○	○

This table is prepared in accordance with the provisions of SJ/T 11364.

○ : Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572

(6-7) Product mass (Piece) : Approximately 3.5mg

7. Notes

(7-1) Notes concerning receiver surface

Please note enough that it is likely to malfunction when a receiver surface is dirty with garbage and dust, etc.

Moreover, please do not touch a receiver surface.

(7-2) Cleaning conditions :

Solvent cleaning : Solvent temperature : 45°C or less , Immersion time : 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

(7-3) Soldering

(7-3-1) Solder reflow

Please do two times or less soldering at the temperature and the time within the temperature profile in attachment-1.

(7-3-2) Case of other soldering

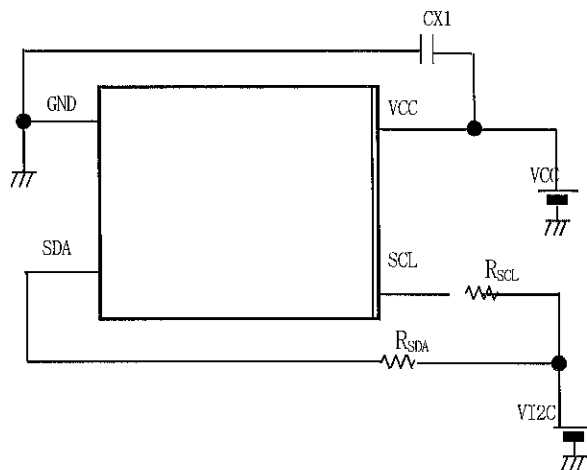
Other soldering methods such as dip soldering and VPS and soldering by hand should not be used.

Please use (7-3-1).

(7-4) Please take proper methods to prevent ESD. The IC built in GA1AUV100WP is ESD-sensitive because it is fabricated by sub-micron CMOS process. For example, in handling GA1AUV100WP, human body and soldering iron etc. should be grounded.

(7-5) After being mounted and soldered, if GA1AUV100WP is deformed by external force or impact, e.g. something falls onto the device, it may result in defective implementation such as lift-off of the terminals. Careful handling should be taken.

8. Recommended external circuit

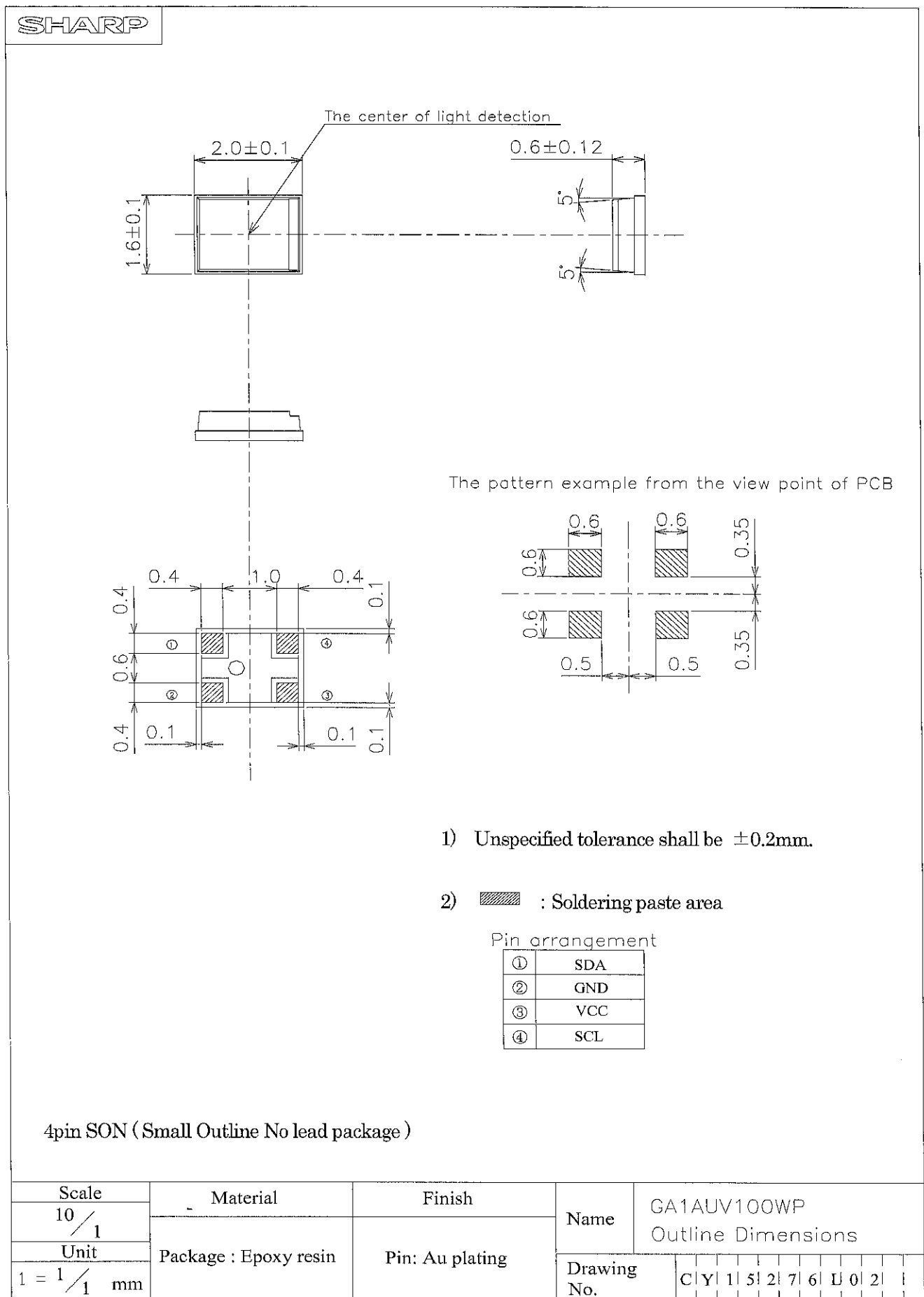


Components	Recommended values
CX1	1.0 μ F
R _{SDA}	10k Ω
R _{SCL}	10k Ω

In order to reduce the influence of the power supply noise, please arrange CX1 within 5mm from VCC terminal. Please evaluate with the actual electrical implementation, and carefully make sure that there is no problem.

SDA terminal (as output) is NMOS open-drain output.

2. Outline



3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25°C(unless otherwise specified)

Parameter	Symbol	Rating	Unit	Remarks
Power supply voltage	VCC	-0.3 to 5.7	V	
I2C voltage	VI2C	-0.3 to 5.7	V	
Operating temperature	Topr	-35 to 85	°C	
Storage temperature	Tstg	-40 to 85	°C	
Soldering temperature	Tsol	250	°C	peak temperature duration:10s

Recommended operating conditions

Ta=25°C(unless otherwise specified)

Parameter	Symbol	Rating	Unit	Remarks
Power supply voltage	VCC	2.2 to 5.5	V	
I2C voltage	VI2C	1.7 to VCC	V	
Operating temperature	Topr	-35 to 85	°C	
SCL, SDA input low level	VIL	-0.3 to 0.54	V	
SCL, SDA input high level	VIH	1.26 to VI2C+0.2	V	

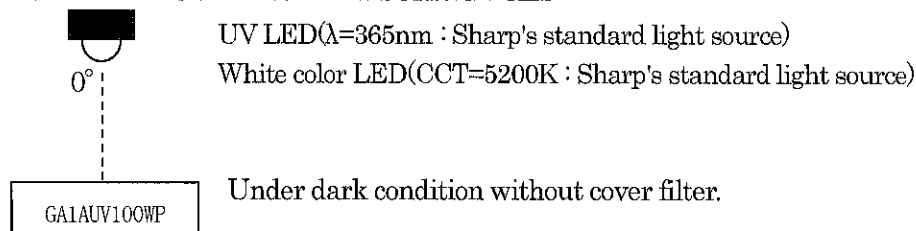
3.3 Electrical and Optical Characteristics

Ta=25°C, VCC=VI2C=3.0V

(unless otherwise specified. The external circuit constants follow the recommended external circuit of page 3.)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Current consumption	I _{CC}	—	65	100	μA	RANGE[3:0]=0111
Current consumption (Power Down)	I _{CC-S}	—	—	5	μA	
Internal Oscillator Frequency	f _{osc}	2.13	2.62	3.46	MHz	
I2C clock frequency	f	1	—	400	kHz	
SDA output low level voltage	V _{OL,SDA}	0	—	0.4	V	I _{OL,SDA} =3mA
ADC Conversion Time (16bit ADC)	T _{int}	18.75	25	31.25	ms	
Full scale ADC code	Data_F	—	—	65535	counts	
Dark count (UV)	Data_0_UV	—	—	5	counts	UV LED at 0mW/cm2 RES[2:0]=101,RANGE[3:0]=0111
Dark count (ALS)	Data_0_ALS	—	—	10	counts	Ev=0lx, RES[2:0]=101,RANGE[3:0]=0001
UV Intensity Output	UV	0.08	0.1	0.12	mW/cm ²	UV LED λ=365nm at 0.1mW/cm2 ,[*1]
Illumination Output	ALS	800	1000	1200	lx	White color LED 5200K at 1000lx ,[*2]

* 1/* 2 ULTRAVIOLET ILLUMINANCE MEASURING / ALS



It is necessary to convert ADC counts output to get UV intensity Output and Illumination Output.

Please contact Sharp about conversion equation.

We recommend using the program we offer because the measurement accuracy is not good under the sunlight.

4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%

LTPD : 10 or 20

Test Items	Test Conditions	Failure Judgment Criteria	Samples (n)
			Defective(C)
Temperature cycling	1 cycle -40°C $\longleftrightarrow$ +85°C (30min) (30min) 20 cycles test	$I_{cc} < L \times 0.8$ $I_{cc} > U \times 1.2$ $UV < L \times 0.8$ $UV > U \times 1.2$ $ALS < L \times 0.8$ $ALS > U \times 1.2$ U: Upper specification limit L: Lower specification limit	n=22, C=0
High temp. and high humidity storage	+60°C, 90%RH, 500h		n=22, C=0
High temp. storage	+85°C, 500h		n=22, C=0
Low temp. storage	-40°C, 500h		n=22, C=0
Operation test	V _{CC} =3.6V, T _a =25°C, E _v =0.1mW/cm ² 500h		n=22, C=0
Mechanical shock	15,000m/s ² , 0.5ms, Half sine wave 3 times/ $\pm X$, $\pm Y$, $\pm Z$ direction		n=11, C=0
Variable frequency vibration	100 to 2000 to 100Hz/Sweep for 4min 200m/s ² , 48min/X, Y, Z direction		n=11, C=0
Soldering heat	250°C, 10 s, 2 times The temperature profile is according to the precautions for soldering (attachment-1).		n=11, C=0

5. Outgoing inspection

(1) Inspection lot

Inspection shall be carried out per each delivery lot.

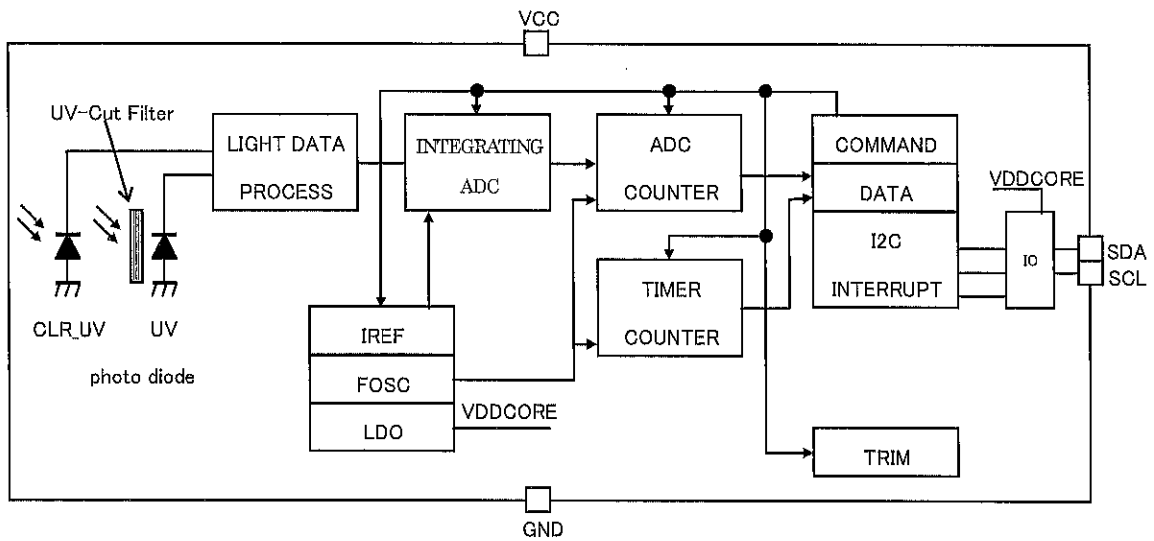
(2) Inspection method

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				0.1	
	2	Inverse polarity on terminal					
	3	Characteristics defect					
		Parameter	Symbol	Judgment criteria			Unit
				MIN.	MAX.		
		Current consumption	Icc	—	100		μ A
		UV Intensity Output	UV	0.08	0.12		mW/cm ²
	Illumination Output	ALS	800	1200	Lx		
Measurement conditions are described in 3.3.							
Minor defect	1	Appearance defect				0.25	
		Parameter	Judgment criteria				
		Split, Chip,Scratch,Stain	One which affects the characteristics of paragraph 3.3. shall be defect.				
	Bubble, Foreign matter(One on resin surface which can wipe off shall not be applied.)	One which is more than ϕ 1.0mm or one which affects the characteristics of paragraph 3.3. , shall be defect.					

6. Supplement

(6-1) Circuit block diagram

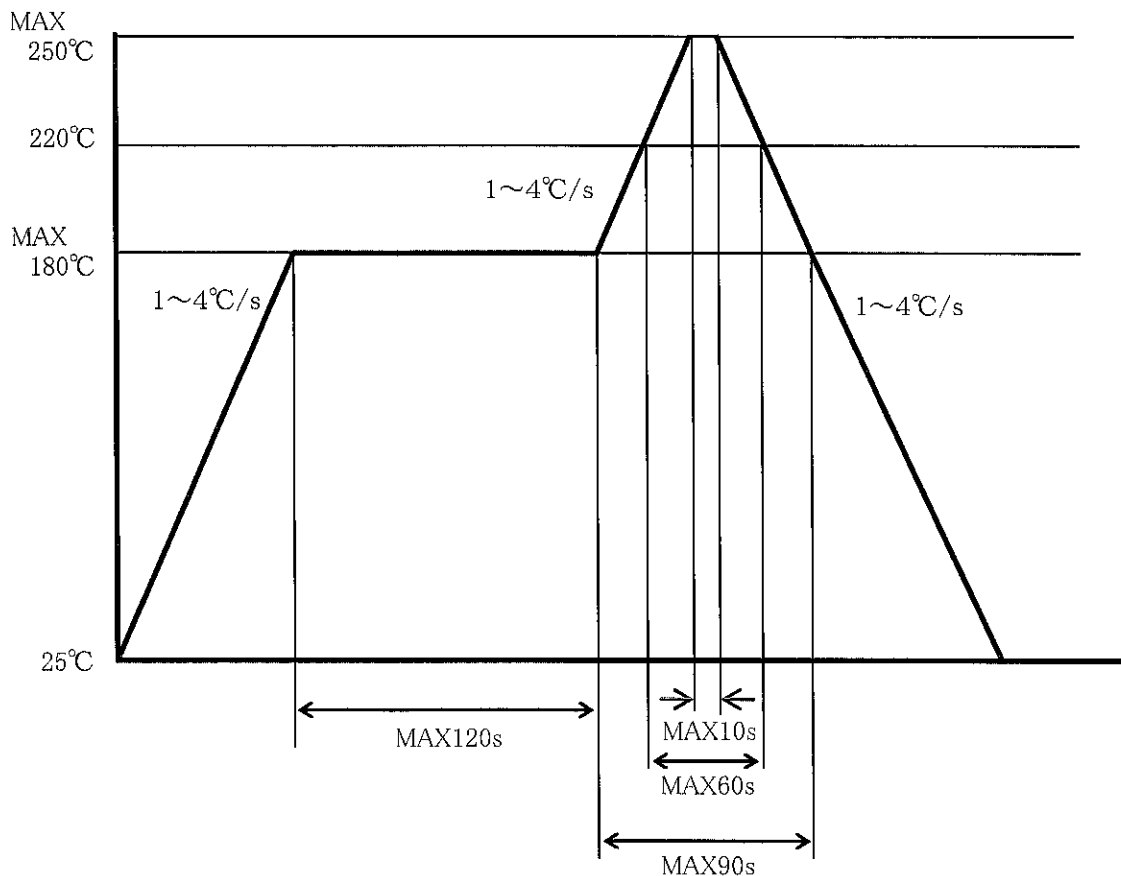


(Attachment-1)

Precautions for Soldering GA1AUV100WP

1. In case, solder reflow

Please do two times or less soldering at the temperature and the time within the temperature profile as shown in the figure below.



2. Other precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin.

So keep the package temperature within that specified in Item 1.

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

Even if within the temperature profile above, there is the possibility that the gold wire in package is broken in case that the deformation of PCB gives the affection to terminals.

Please use after confirming the conditions fully by actual solder reflow machine.

3. Storage and management after opening the package

3.1 Storage condition : Storage shall be in accordance with the below conditions.

Storage temp. : 5 to 30°C

Storage humidity : 70%RH or less

3.2 Treatment after opening the package

- (1) After opening the package, please mount at the conditions of humidity 60%RH or less and temperature 5 to 25°C within 3 days.
- (2) In case of long time storage after opening the package, please mount within 2 weeks at the conditions of (A) or (B).
 - (A) after resealing with desiccant in moisture-proof sack by sealer, keeping in the condition of humidity 70%RH or less and temperature 5 to 30°C
 - (B) keeping in the dry box (humidity 20% or less, temperature 5 to 25°C)

3.3 Baking before mounting

In case that it could not be carried out the above treatment, or the humidity indicator card turned pink when opening the package, it is able to mount by baking treatment. However baking treatment shall be limited only 1 time.

Recommended conditions : 125°C, 16 to 24 hours

- ※ In the case baking at the packaged condition, please hang the reel in the oven using the spindle through the center hall of the reel. Please do not put the reel across the oven.

(Attachment-2-1)

Package specifications (ϕ 180mm reel)

1. Application

This specification applies to the taping specifications and the relation items for the GA1AUV100WP.

2. Taping method

(2.1) Tape structure and Dimensions (Refer to the attached sheet-2-2)

The tape shall have a structure in which a cover tape is sealed heat-pressed on the carrier tape made by electrically conductive polycarbonate to protect against static electricity.

(2.2) Reel structure and Dimensions (Refer to the attached sheet-2-3)

The reel shall be made of plastic.

(2.3) Direction of product insertion (Refer to the attached sheet-2-3)

Product direction in carrier tape shall direct to the SCL and Vcc terminal (= the part of the cutout of the package) at the hole side on the tape, shall direct to the terminal part of the product at the bottom side of the rectangle hole on the tape, shall direct to the detecting part at the upside of the rectangle hole on the tape.

(2-4) Inclusion correction

In case correcting inclusion failing products, these products can be cut out from the carrier tape and the cutting parts can be sealed. At this time, the products are not included at the same places.

3. Adhesiveness of cover tape

The exhalation force between carrier tape and cover tape shall be 0.1N to 1.0N for the angle from 160° to 180° .

4. Rolling method and quantity

Wind the tape back on the reel so that the cover tape will be outside the tape.

Attach more than 16cm of blank tape to the trailer and 40cm to the leader of the tape and fix the both ends with adhesive tape.

One reel shall contain 2000 pcs, but in the case products by failing to seal are cut out(refer to the 2-4), the number is less.

5. Label indication

The indication is complying with EIAJ C-3 label. It is shown following information.

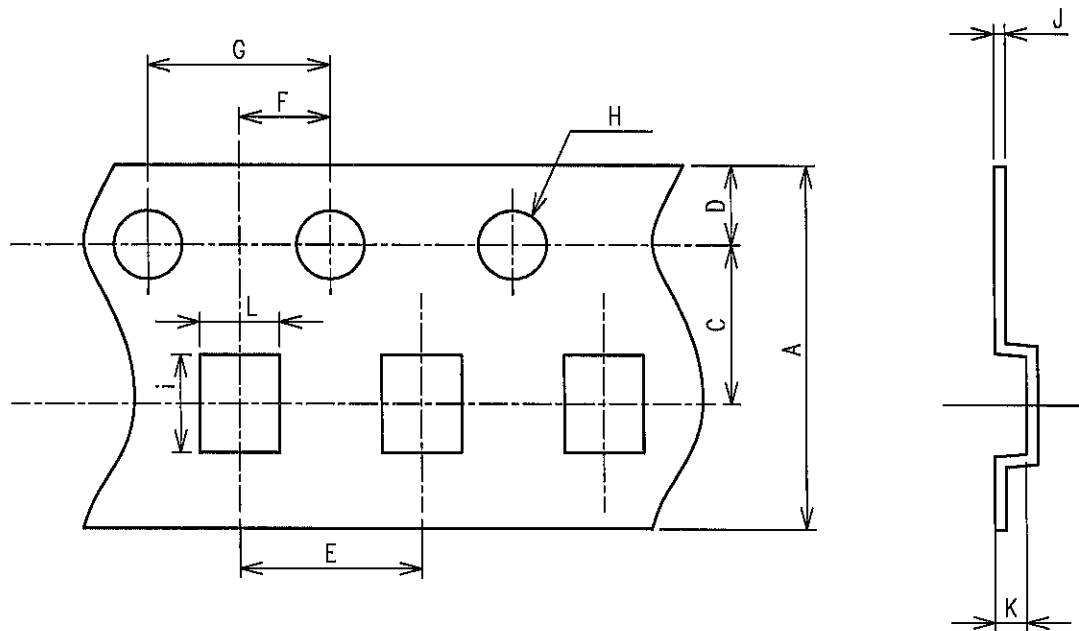
* Model No. * Quantity *Packaging date

6. Safety protection during shipping

There shall be no deformation of component or degradation of electrical characteristics due to shipping.

(Attachment 2-2)

Tape structure and Dimensions

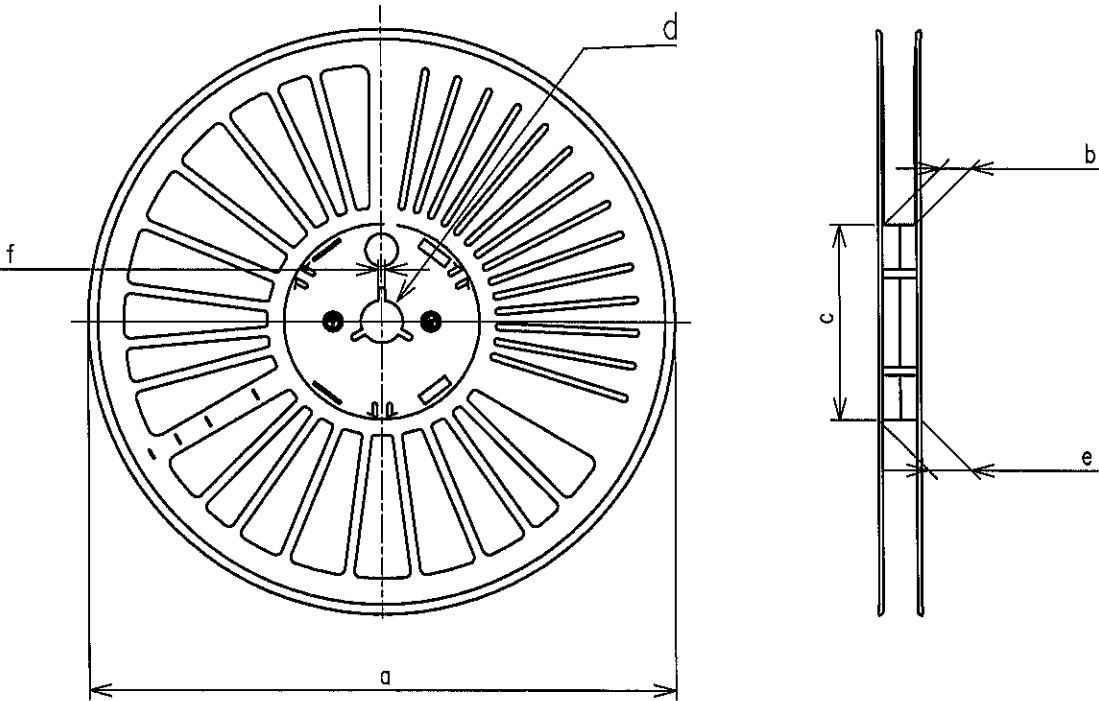


Unit \ Symbol	A	C	D	E	F	G
mm	8.00 ^{+0.30} _{-0.10}	3.50 ^{+0.10} _{-0.10}	1.75 ^{+0.10} _{-0.10}	4.00 ^{+0.10} _{-0.10}	2.00 ^{+0.10} _{-0.10}	4.00 ^{+0.10} _{-0.10}

Unit \ Symbol	H	i	J	K	L
mm	φ 1.5 ^{+0.1} ₋₀	2.12 ^{+0.10} _{-0.10}	0.25 ^{+0.10} _{-0.10}	0.70 ^{+0.10} _{-0.10}	1.70 ^{+0.10} _{-0.10}

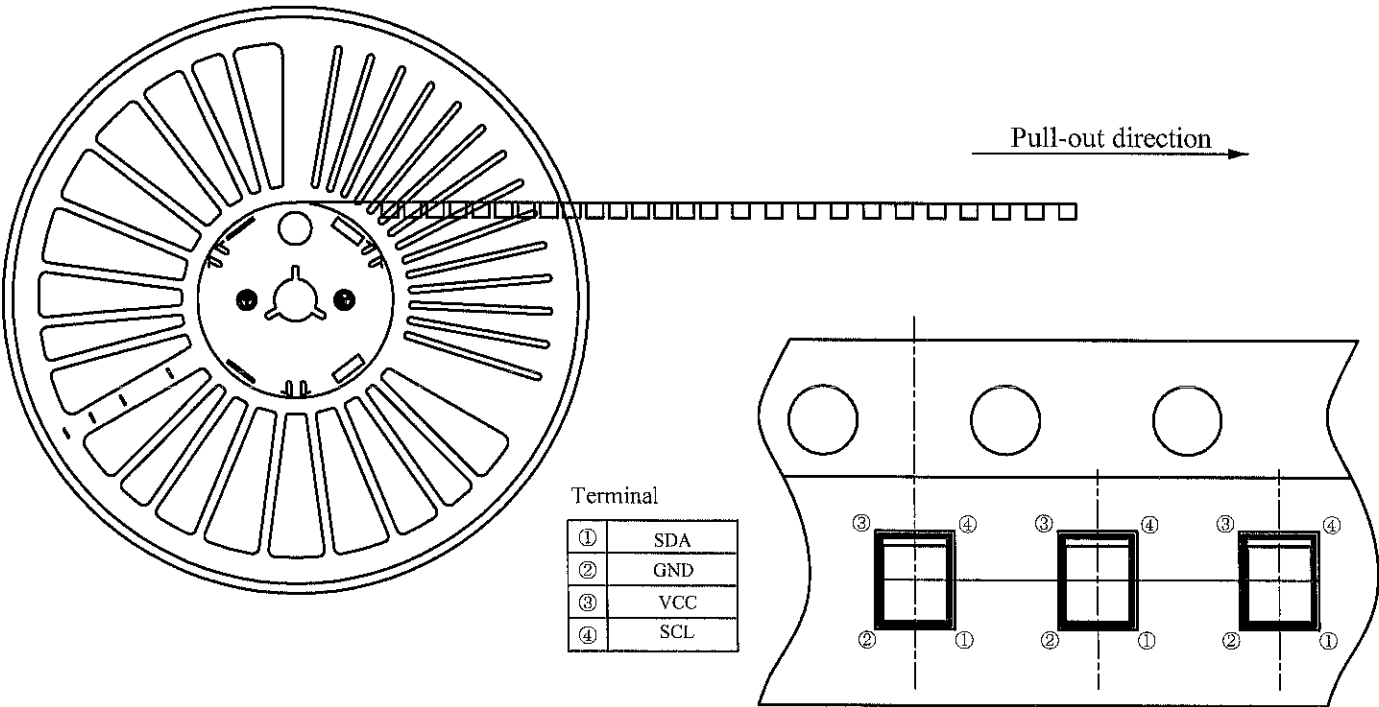
(Attachment 2-3)

Reel structure and Dimensions



unit \ symbol	a	b	c	d	e	f
mm	$\phi 180.0^{+1.0}$	$9.5^{+1.0}$	$\phi 60.0^{+1.0}$	$\phi 13.0^{+0.2}$	$13.1^{+1.0}$	$2.0^{+0.5}$

Direction of product insertion



(Attachment-2-4)

Moisture-proof package specification (φ 180mm reel)

1. Application

This specification applies to the products which Sharp delivers to customer.

2. Packing specifications

2.1 Packaging material

Name	Material	Quantity
Aluminum laminated bag	Aluminum polyethylene	Refer to 2.2
EIAJ C-3 Label	Paper(-made)	
Silica gel	—	
Packing case	Paper(-made)	
Humidity indicator card	Paper(-made)	

2.2 Packaging method

- (1) Seal tape-reel pasted up EIAJ C-3 label and a humidity indicator and silica gel with the aluminum laminated bag.
- (2) Paste up EIAJ C-3 label on an aluminum laminated bag.
- (3) Put the moisture-proof laminated bag in the ruled case

Package shape	Product	Quantity	Moisture-proof sack Quantity
Tape-reel (φ 180mm)	1ch. type	2000pcs. / reel	1 reel / bag

Minimum order Quantity : 1 reel / bag

- (4) Packing case is closed by craft tape. And EIAJ C-3 label is pasted on the case.
(Quantity: 10,000pcs./case) *Except the case products by failing to seal are cut out.

3. Storage and management after opening the package

3.1 Storage condition : Storage shall be in accordance with the below conditions.

Storage temp. : 5 to 30°C

Storage humidity : 70%RH or less

3.2 Treatment after opening the package

- (1) After opening the package, please mount at the conditions of humidity 60%RH or less and temperature 5 to 25°C within 3 days.
- (2) In case of long time storage after opening the package, please mount within 2 weeks at the conditions of (A) or (B).
(A) after resealing with desiccant in moisture-proof sack by sealer, keeping in the condition of humidity 70%RH or less and temperature 5 to 30°C
(B) keeping in the dry box (humidity 20% or less, temperature 5 to 25°C)

3.3 Baking before mounting

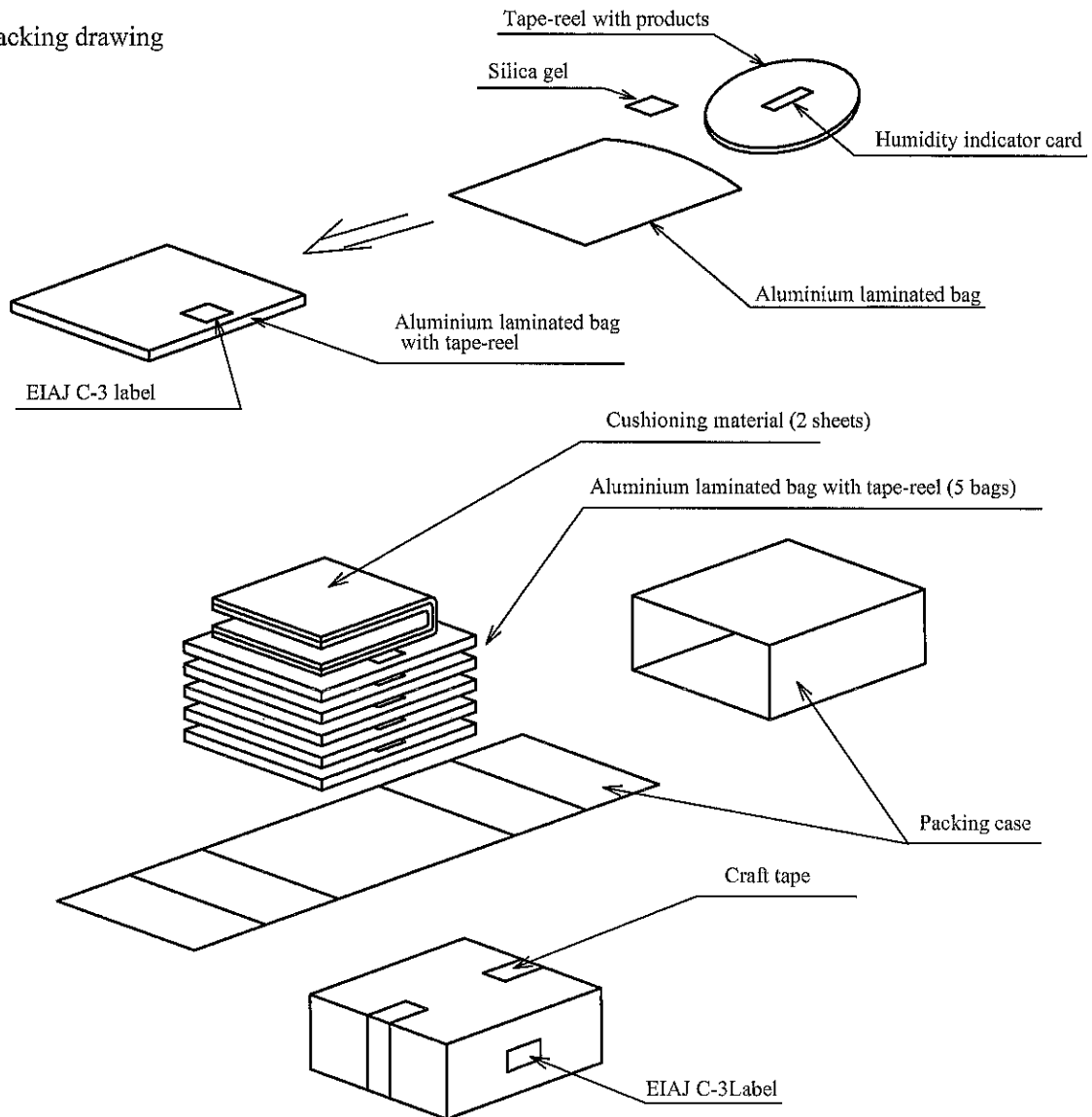
In case that it could not be carried out the above treatment, or the humidity indicator card turned pink when opening the package, it is able to mount by baking treatment. However baking treatment shall be limited only 1 time.

Recommended conditions : 125°C, 16 to 24 hours

- ※ In the case baking at the packaged condition, please hang the reel in the oven using the spindle through the center hall of the reel. Please do not put the reel across the oven.

4 Packaging

① Outer packing drawing



- ② Outer packing material: Packing case(Corrugated cardboard), Cushioning material (Urethane)
 Aluminium laminated bag (Alumi-Polyethylene)
 Humidity indicator card (paper), EIAJ C-3 Label(paper), silica gel, craft tape
- ③ Quantity: 10,000pcs./box
- ④ Label indication: The indication is complying with EIAJ C-3 label. It is shown following information.
 * Model No. * Quantity *Packaging date
- ⑤ Regular packaged mass: Approximately 600g