SHARP

REFERENCE

SPEC No.	ED-06G017A

ISSUE : December 6 , 2024

TO ;

S P E C I F I C A T I O N S

Product Name OPIC LIGHT DETECTOR

Model No. IS488FME

These specifications contain 12 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:

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Title:
Date:

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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 appliances
If 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 (or six (6) months in case of generalized product) 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 (or six (6) month for generalized product) period will be coped with by Sharp, provided that both parties shall discuss and determine on sharing responsibility based on the analysis results there of 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.

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1. Application

This specification applies to the outline and characteristics of OPIC light detecting device; Model No. IS488FME.

2. Outline

Refer to the attached drawing No. : CY13345L02.

3. Ratings and characteristics

Refer to the attached sheet, page 5,6,7.

4. Reliability

Refer to the attached sheet, page 8.

5. Outgoing inspection

Refer to the attached sheet, page 9.

6. Supplement

(6-1) Equivalent circuit and Operating refer to the attached sheet, page10.

(6-2) Packing refer to the attached sheet, page 11.

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

(6-4) ODS materials

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 : CFC_S, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)

(6-5) Specified brominated flame retardants

Specified brominated flame retardants (PBB and PBDE) are not used in this device at all.

(6-6) Compliance with each regulation

6-6-1 This product complies with EU RoHS Directive (2011/65/EU) and Commission Delegated Directive (EU)2015/863

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)
OPIC light detector	○	○	○	○	○	○

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 : Approx. 0.12g

(6-8) Country of origin : China

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7. Notes

(7-1) By-pass capacitor

In order to stabilize power supply line, connect a by-pass capacitor of more than 0.01μF between Vcc and GND near the device.

(7-2) Cleaning conditions :

Solvent cleaning : Solvent temperature 45℃ 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

(7-3) Soldering

The lead pins should be soldered according to the absolute maximum ratings.
While or after soldering, the lead pins shall be free from external force.
This device shall not be soldered with preheat or reflow.
The terminal covering of this device consists of lead free solder.
In case of mounting this device in a lead free soldering process,
special care should be taken to avoid any boundary exfoliation (Lift-off phenomenon) between the solder and the solder pad on the printed circuit board

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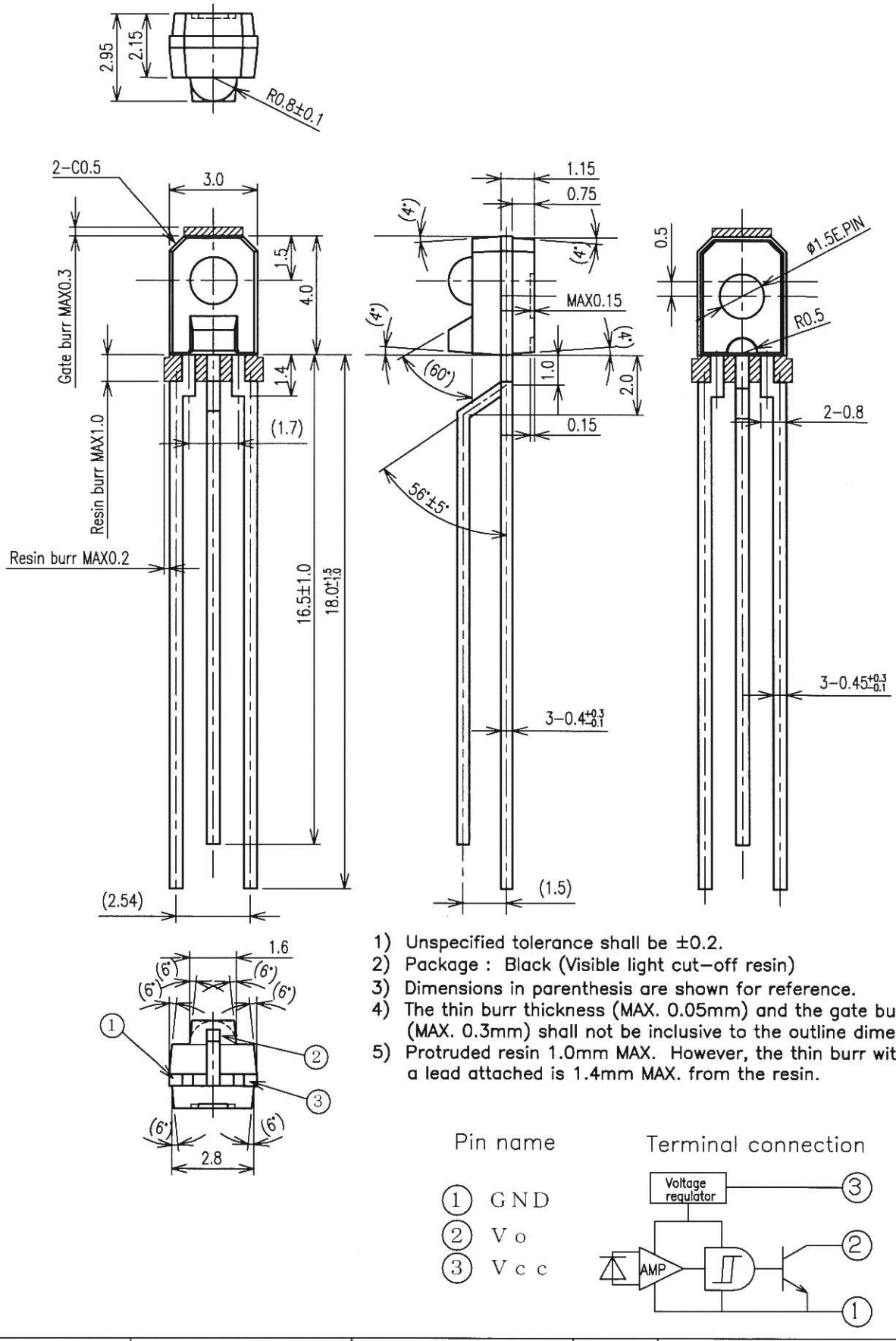

1) Unspecified tolerance shall be ±0.2.
2) Package : Black (Visible light cut-off resin)
3) Dimensions in parenthesis are shown for reference.
4) The thin burr thickness (MAX. 0.05mm) and the gate burr (MAX. 0.3mm) shall not be inclusive to the outline dimensions.
5) Protruded resin 1.0mm MAX. However, the thin burr with a lead attached is 1.4mm MAX. from the resin.

Pin name

① GND
② Vo
③ Vcc

Terminal connection

尺度 SCALE	材質 MATERIAL	仕上 FINISH	名称 NAME	IS488FME Outline Dimensions
5/1	Lead : Fe	Lead pin: Solder dip		
単位 UNIT	Package : Epoxy resin	(Lead-free solder use Composition(Standard value) Sn96.5%,Ag3.0%,Cu0.5%)	図番 DRAWING No.	CY13345L02
1 = 1/1 mm				

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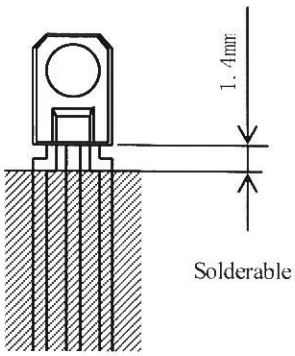
3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25℃

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.5～ 35	V
Output current	I_O	50	mA
Total Power dissipation	P	175	mW
Operating temperature	T_{opr}	-25 ～ +85	℃
Storage temperature	T_{stg}	-40 ～ +100	℃
* Soldering temperature	T_{sol}	260	℃

* For 5 seconds MAX at the position of 1.4mm from the resin edge.



3.2 Recommended Operating Conditions

(When Ta=0～70℃)

Parameter	Symbol	MIN	MAX	Unit
Supply voltage	V_{CC}	4.5	17	V
Output current	I_O	-	16	mA

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3.3 Electro-optical characteristics

(Unless otherwise specified Ta=0~70℃ , Vcc=5V)

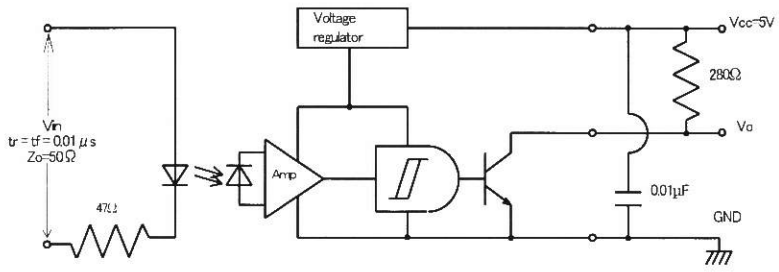
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Low level output voltage		V_{OL}	I_{OL}=16mA Ev=0 lx	-	0.15	0.4	V
High level output current		I_{OH}	Ev=100 lx Vo=30V Vcc=20V	-	-	100	μA
Low level supply current		I_{CCL}	Ev=0 lx	-	1.3	3.4	mA
High level supply current		I_{CCH}	Ev=100 lx	-	0.7	2.2	mA
*1 " L→H " threshold illuminance		E_{VLH}	R_L=280Ω Ta=25℃	-	15	53	lx
			R_L=280Ω	-	-	75	
*2 " H→L " threshold illuminance		E_{VHL}	R_L=280Ω Ta=25℃	2.3	10	-	lx
			R_L=280Ω	1.5	-	-	
*3 Hysteresis		E_{VHL} /E_{VLH}	R_L=280Ω Ta=25℃	0.50	0.65	0.90	-
*4 Response time	"L→H " propagation time	t_{PLH}	Ev=100 lx R_L=280Ω Ta=25℃	-	3	9	μs
	"H→L " propagation time	t_{PHL}		-	5	15	
	Rise time	t_r		-	0.1	0.5	
	Fall time	t_f		-	0.05	0.5	
Peak sensitivity wavelength		λ_P	-	-	910	-	nm

*1 E_{VLH} represents illuminance by CIE standard light source A (tungsten lamp) when output goes from "L" to " H"

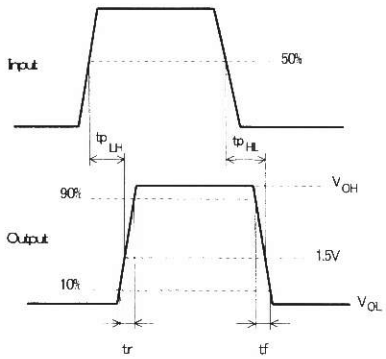
*2 E_{VHL} represents illuminance by CIE standard light source A (tungsten lamp) when output goes from "H" to " L"

*3 Hysteresis stands for E_{VHL} /E_{VLH}

*4 Test circuit for response time is shown below.



Test circuit diagram



Timing chart

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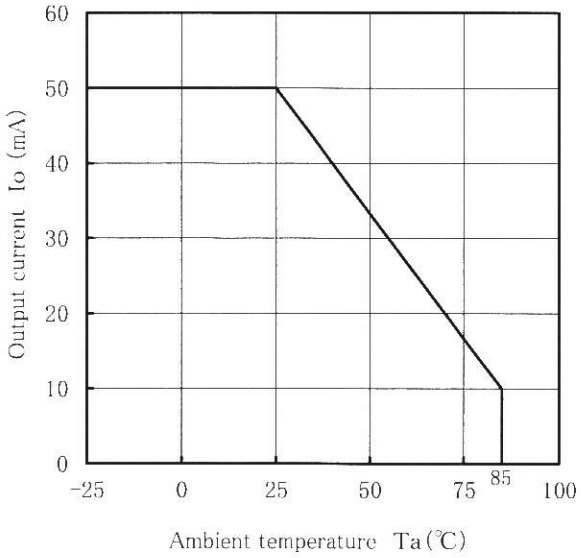
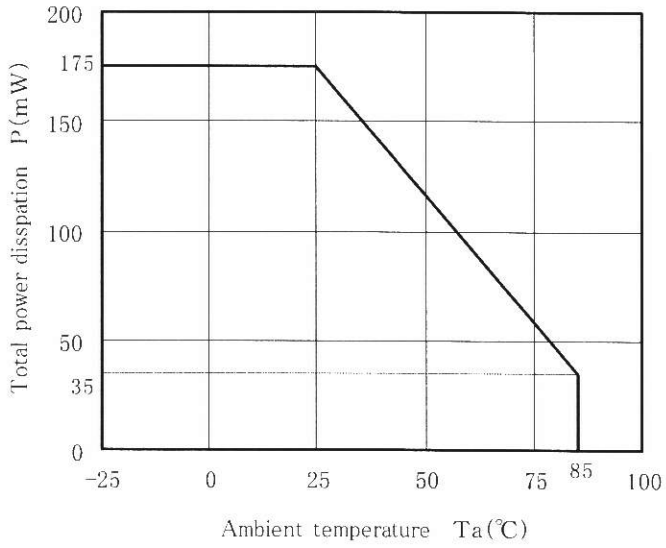
(Fig.1) Output current vs. ambient temperature

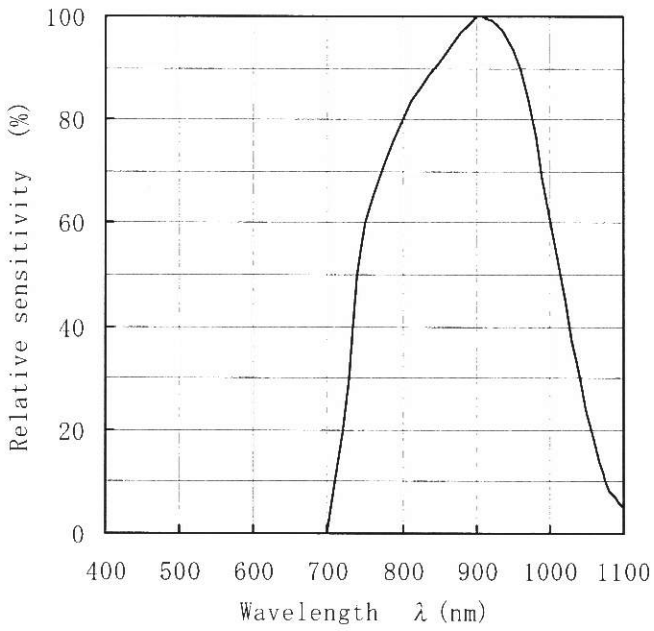


(Fig.2) Total power dissipation vs. ambient temperature



(Fig.3) Spectral sensitivity (TYP)

Ta=25℃



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4. Reliability

The reliability of the products is confirmed by the items below.

Confidence level : 90%
LTPD : 10 or 20

Test Items		Test Conditions	Failure Judgement Criteria	Samples (n) Defective(C)
Temperature cycling		1 cycle -40℃←→+100℃ (30min) (30min) 20 cycles test	$V_{OL}>U\times1.2$ $I_{OH}>U\times1.2$ $I_{CCL}>U\times1.2$ $I_{CCH}>U\times1.2$ $E_{VLH}>U\times1.2$ $E_{VHL}<L\times0.8$ $E_{VHL}/E_{VLH}>U+0.04$ $E_{VHL}/E_{VLH}<L-0.04$ U: Upper specification limit L: Lower specification limit	n=22, C=0
High temp. and high humidity storage		+60℃, 90%RH, 1000h		n=22, C=0
High temp. storage		+100℃, 1000h		n=22, C=0
Low temp. storage		-40℃, 1000h		n=22, C=0
Operation life	A	Ta=85℃ , Vcc=10V , I_{OL}=10mA E_V=0 lx , 1000h		n=22, C=0
	B	Ta=25℃ , Vcc=17V , I_{OL}=50mA E_V=0 lx , 1000h		
	C	Ta=25℃ , Vcc=17V , E_V=100 lx 1000h		
	D	Ta=-25℃ , Vcc=17V , E_V=100 lx 1000h		
Mechanical shock		1000m/s², 6ms, Half sine wave 3 times/±X, ±Y, ±Z direction		n=11, C=0
Variable frequency vibration		100 to 2000 to 100Hz/Sweep for approx. 4min 200m/s² , 48min/X, Y, Z direction		n=11, C=0
Terminal strength (Tension)		Weight: 5.0N 10 s/each terminal		n=11, C=0
Terminal strength (Bending)		Weight: 2.5N 0° →90° →0° →-90° →0° The one test should be performed.		
Soldering heat		260±5℃ , 5±0.5 s Position of 1.4mm from the resin edge.		n=11, C=0
Solderability		245±5℃, 5±1 s Flux:EC-19S (Tamura kaken corporation) No pretreatment Position of 1.4mm from the resin edge.	Solder shall adhere at less than 95% area of dipped portion.	n=11, C=0

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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.

<table>
<tr><th colspan="2">Defect</th><th>Inspection items and test method</th><th>AQL(%)</th></tr>
<tr><td rowspan="3">Major defect</td><td>1</td><td>Disconnection, short</td><td rowspan="3">0.1</td></tr>
<tr><td>2</td><td>Inverse polarity on terminal</td></tr>
<tr><td>3</td><td>Characteristics defect (Ta=25°C)
<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Symbol</th><th colspan="2">Judgement criteria</th><th rowspan="2">Unit</th></tr>
<tr><th>MIN.</th><th>MAX.</th></tr>
<tr><td>Low level output voltage</td><td>V_{OL}</td><td>-</td><td>0.4</td><td>V</td></tr>
<tr><td>High level output current</td><td>I_{OH}</td><td>-</td><td>100</td><td>μA</td></tr>
<tr><td>Low level supply current</td><td>I_{CCL}</td><td>-</td><td>3.4</td><td>mA</td></tr>
<tr><td>High level supply current</td><td>I_{CCH}</td><td>-</td><td>2.2</td><td>mA</td></tr>
<tr><td>“L→H” threshold illuminance</td><td>E_{VLH}</td><td>-</td><td>53</td><td>lx</td></tr>
<tr><td>“H→L” threshold illuminance</td><td>E_{VHL}</td><td>2.3</td><td>-</td><td>lx</td></tr>
<tr><td>Hysteresis</td><td>E_{VHL}/E_{VLH}</td><td>0.5</td><td>0.9</td><td>-</td></tr>
<tr><td>“L→H” propagation time</td><td>t_{PLH}</td><td>-</td><td>9</td><td>μs</td></tr>
<tr><td>“H→L” propagation time</td><td>t_{PHL}</td><td>-</td><td>15</td><td>μs</td></tr>
</table>
Test conditions refer to paragraph 3.3.</td></tr>
<tr><td>Minor defect</td><td>1</td><td>Appearance defect
<table>
<tr><th>Parameter</th><th>Judgement criteria</th></tr>
<tr><td>Crack</td><td>All of crack irrespective of its position and dimension shall be defect.</td></tr>
<tr><td>Split, Chip, Scratch, Stain, Blur</td><td>One which affects the characteristics of paragraph 3.3 shall be defect.</td></tr>
<tr><td>Bubble
Foreign matter
(One on resin surface which can wipe off shall not be applied.)</td><td>・On light detector
0.4mm ϕ or more shall be defect.
・Area excepting on light detector
1.0mm ϕ or more shall be defect.</td></tr>
</table></td><td>0.25</td></tr>
</table>

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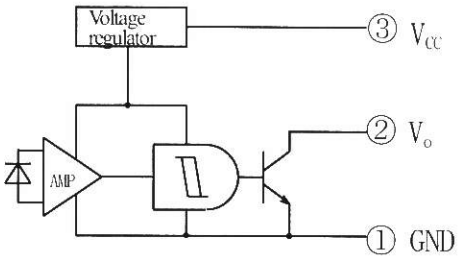
6. Supplement

(6-1) Equivalent circuit and Operating



Equivalent circuit

Input	Output
Light ON	High level
Light OFF	Low level

Operating

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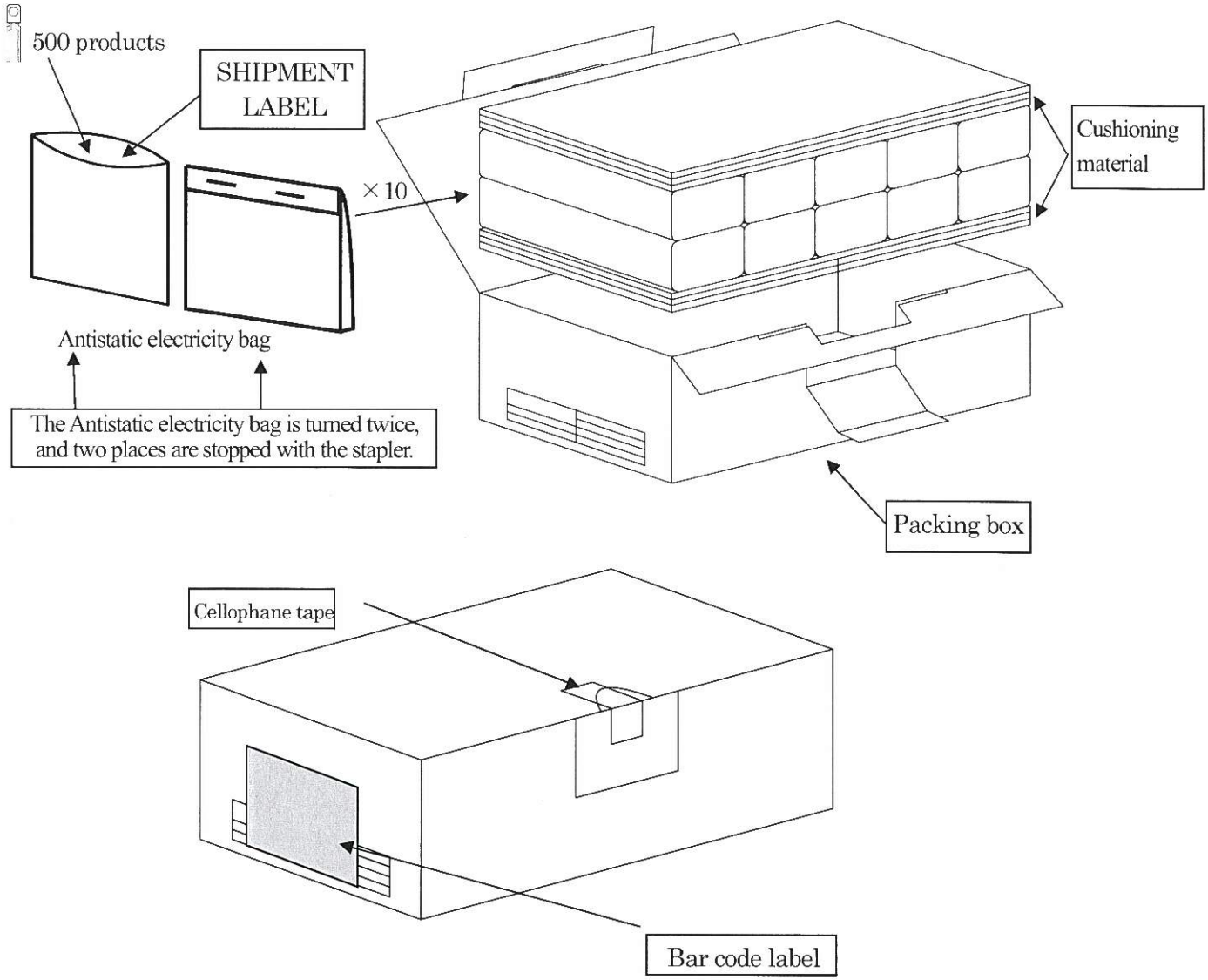
(6-2) Packaging



①Inner packing material : Antistatic electricity bag (Polyethylene)

②Outer material : Packing box (Corrugated cardboard) , Cushioning material (Urethane), Cellophane tape

③Quantity : 5000pcs. /box

④Indication phase items :

The contents of the carton indication conforms to EIAJ C-3 and the following items are indicated.

Model No. , Internal production control name, Quantity , Packing date , Corporate name , Country of origin

⑤Regular packaged mass : Approximately 730g

⑥Storage condition : Packaged products shall be stored at the temperature 5 to 30℃ and the humidity 70%RH or less away From direct sunlight.