

# LA0151CS

## Ambient Light Sensor, Linear Current Output, with 2-Stage Gain Switching



**ON Semiconductor**<sup>®</sup>  
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### Overview

The LA0151CS is a photo IC for ultra-small package ambient light sensor. It enables to be mounted on a very small limited space such as on the mobile phones which is becoming small and thinner and on other mobile applications.

### Features

- Linear current output
- Low gain mode function [low gain : -35dB]

### Typical Applications

- Mobile phones and tablets
- Digital still cameras
- Security camera

### SPECIFICATION

#### ABSOLUTE MAXIMUM RATINGS at Ta = 25°C (Note 1)

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub>		6	V
Operating temperature	T <sub>opr</sub>		-30 to +85	°C
Storage temperature	T <sub>stg</sub>		-40 to +100	°C

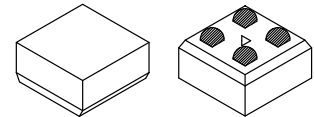
1. Stresses exceeding those listed in the Absolute Maximum Rating table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### RECOMMENDED OPERATING CONDITIONS AND

#### OPERATING VOLTAGE RANGE at Ta = 25°C (Note 2)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Recommended supply voltage	V <sub>CC</sub>		2.2	3.3	5.5	V
SW pin low voltage	V <sub>l</sub>	Normal gain mode	0		0.4	V
SW pin high voltage	V <sub>h</sub>	Low gain mode	2.1			V

2. Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.



ODCSP4 1.01 mm x 1.01 mm

### ORDERING INFORMATION

Ordering Code:  
LA0151CS-TLM-E

Package  
ODCSP4  
(Pb-Free / Halogen Free)

Shipping (Qty / packing)  
5000 / Tape & Reel

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.  
[http://www.onsemi.com/pub\\_link/Collateral/BRD8011-D.PDF](http://www.onsemi.com/pub_link/Collateral/BRD8011-D.PDF)

# LA0151CS

## ELECTRICAL AND OPTICAL CHARACTERISTICS at $T_a = 25^\circ\text{C}$ , $V_{CC} = 3.3\text{V}$ (Note 3)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current dissipation (1) (Note 5, 7)	$I_{CC}$	$E_v = 1000 \text{ lx}$ , $R_L = 5\text{k}\Omega$ , N mode	90	150	210	$\mu\text{A}$
Current dissipation (2) (Note 5, 7)	$I_{CC}$	$E_v = 1000 \text{ lx}$ , $R_L = 5\text{k}\Omega$ , L mode	42	70	98	$\mu\text{A}$
Output current (1) (Note 5, 7)	$I_{O1}$	$E_v = 100 \text{ lx}$ , N mode	6	8	10	$\mu\text{A}$
Output current (2) (Note 5, 7)	$I_{O2}$	$E_v = 1000 \text{ lx}$ , N mode	60	80	100	$\mu\text{A}$
Output current (3) (Note 5, 7)	$I_{O3}$	$E_v = 100 \text{ lx}$ , L mode	0.12	0.16	0.2	$\mu\text{A}$
Output current (4) (Note 5, 7)	$I_{O4}$	$E_v = 1000 \text{ lx}$ , L mode	1.2	1.6	2.0	$\mu\text{A}$
Dark current	$I_{leak}$	$E_v = 0 \text{ lx}$ , N mode, L mode			0.1	$\mu\text{A}$
Temperature coefficient (Note 6)	$I_{tc}$	$E_v = 100 \text{ lx}$ , N mode, L mode, $T_a = -20 \text{ to } 60^\circ\text{C}$		0.34		$\% / ^\circ\text{C}$
Rise time (1) (Note 8)	$T_{r1}$	$E_v = 1000 \text{ lx}$ , $R_L = 5\text{k}\Omega$ , N mode		15	40	$\mu\text{s}$
Rise time (2) (Note 8)	$T_{r2}$	$E_v = 1000 \text{ lx}$ , $R_L = 500\text{k}\Omega$ , L mode		20	50	$\mu\text{s}$
Fall time (1) (Note 8)	$T_{f1}$	$E_v = 1000 \text{ lx}$ , $R_L = 5\text{k}\Omega$ , N mode		150	500	$\mu\text{s}$
Fall time (2) (Note 8)	$T_{f2}$	$E_v = 1000 \text{ lx}$ , $R_L = 500\text{k}\Omega$ , L mode		150	500	$\mu\text{s}$
Peak sensitivity wave length (Note 6)	$\lambda_p$			550		nm
Saturation output voltage (Note 9)	$V_O$	$E_v = 1000 \text{ lx}$ , $R_L = 150\text{k}\Omega$ , N mode	3.0	3.2		V

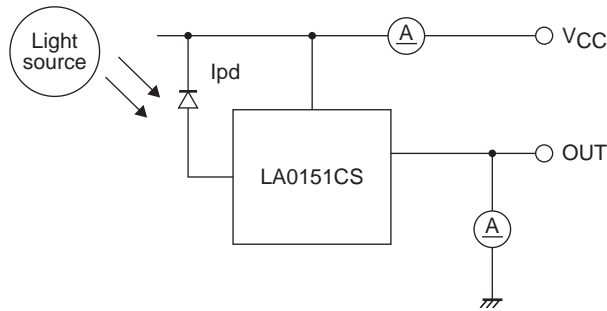
3. Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. N mode and L mode stand for the normal gain mode and the low gain mode, respectively.

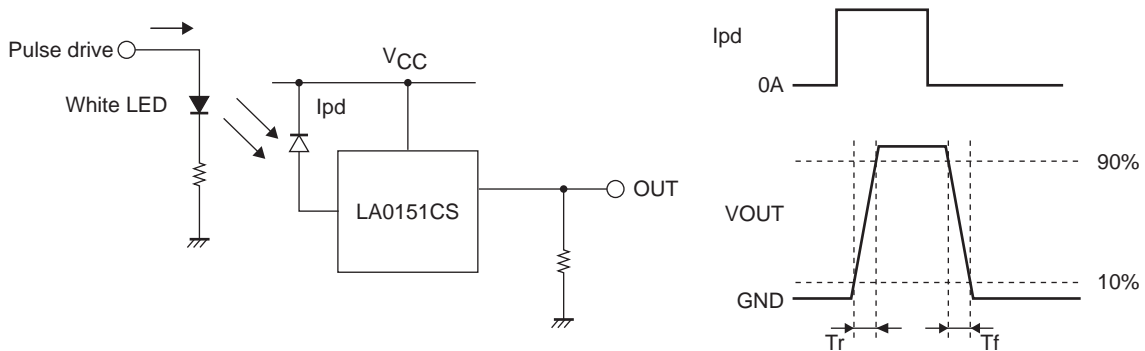
5. Measured with the standard light source A. White LED is used instead in the mass production line.

6. Design guaranteed item

7. Test circuit for measuring current dissipation and output current



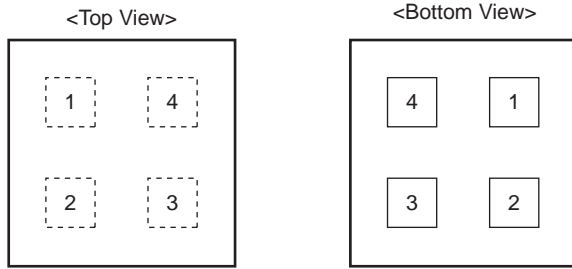
8. Measuring method of rise time ( $T_r$ ) and fall time ( $T_f$ )



9. Reference value : min = 2.6V and typ = 2.8V when  $V_{CC} = 2.9\text{V}$

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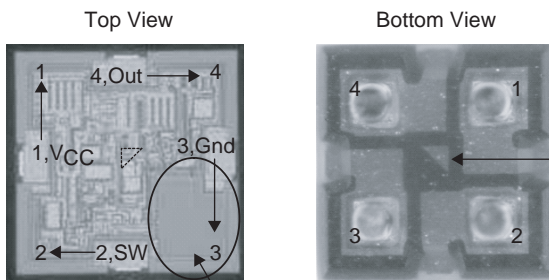
## PAD LAYOUT



Pin No.	Pin Name	Function
1	VCC	Power supply
2	SW	Switch
3	GND	Ground
4	OUT	Output

Ball pitch : 0.5mm, Ball size : 0.18mm □

## PAD LAYOUT (Photos)

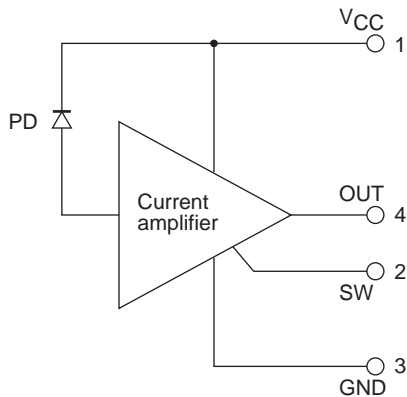


Pin 1 mark  
It is located at the center of the bottom of the package.

Photo diode. Only this part looks dark on the product.

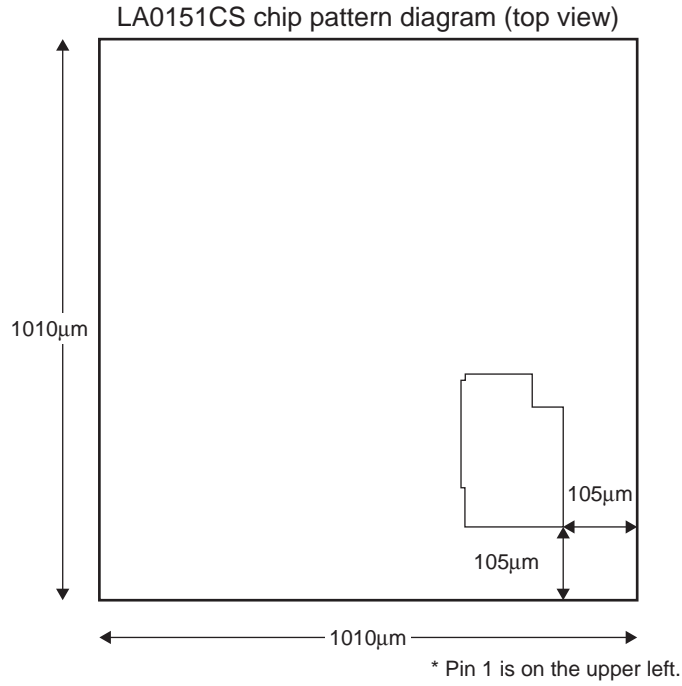
\* The photo diode is located in pin 3. Be careful not to mistake the pin 1 mark for the photo diode.

## INTRNAL BLOCK DIAGRAM

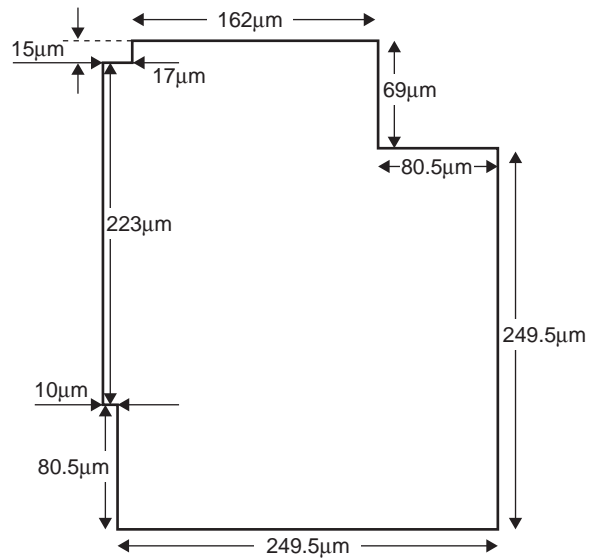


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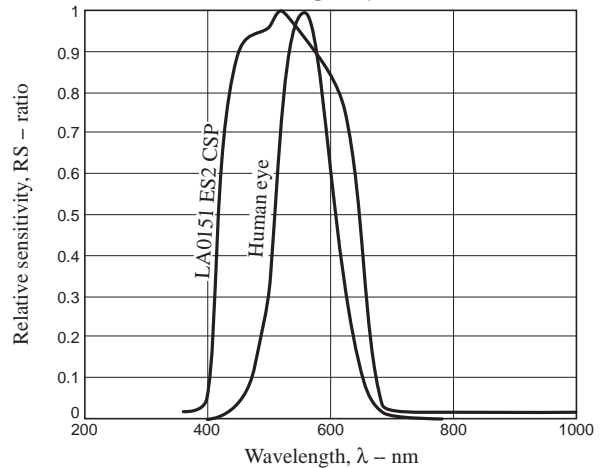
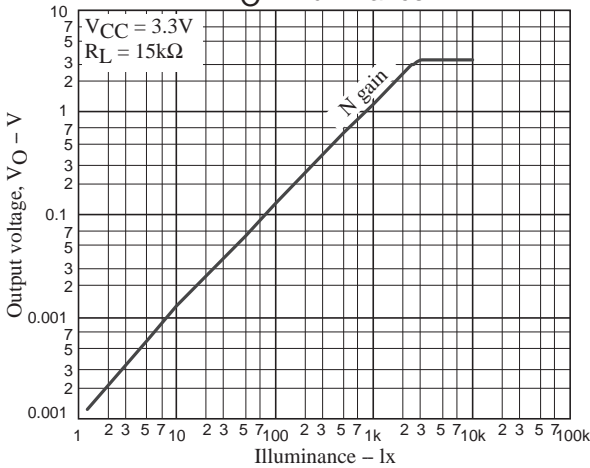
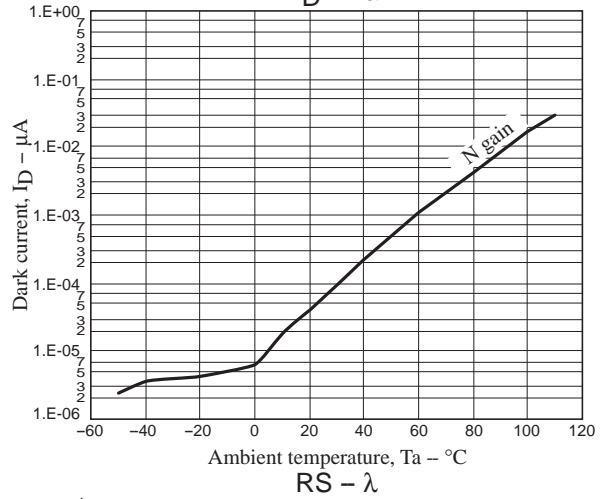
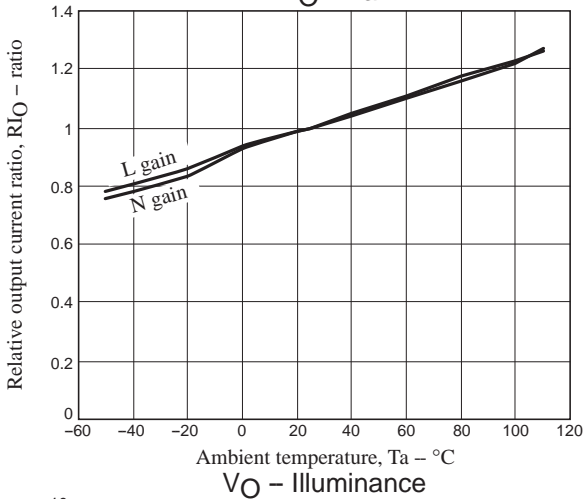
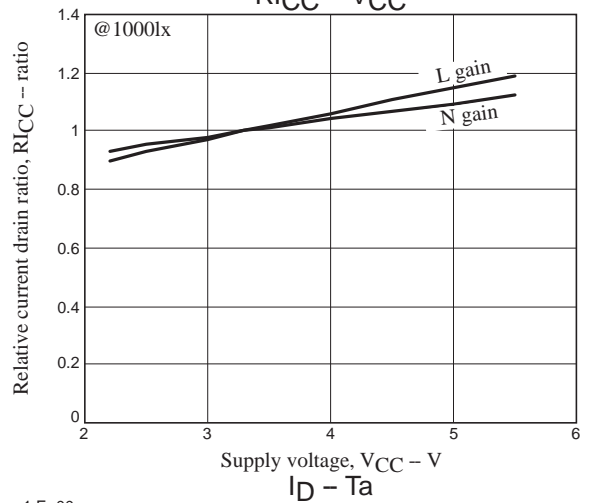
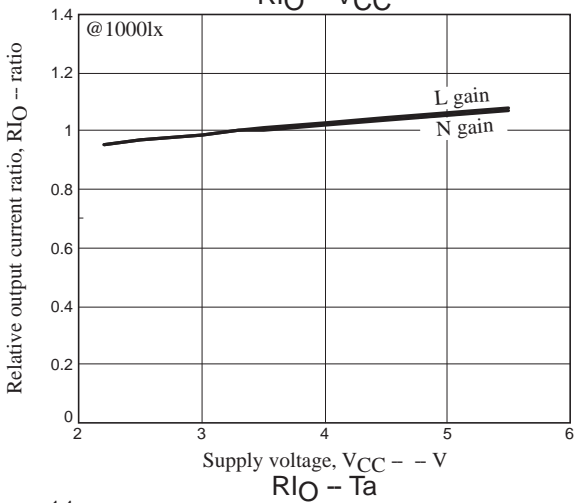
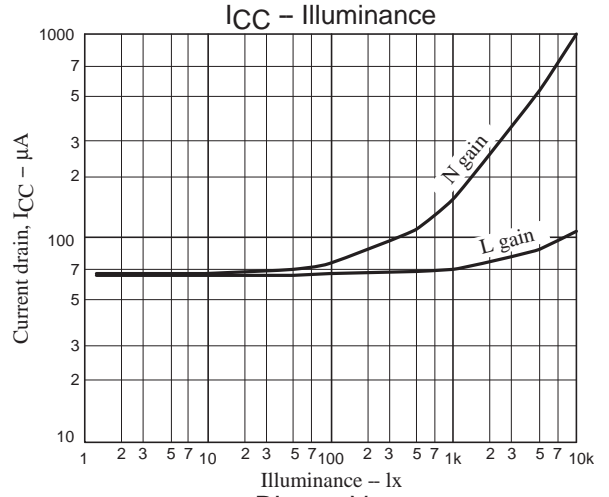
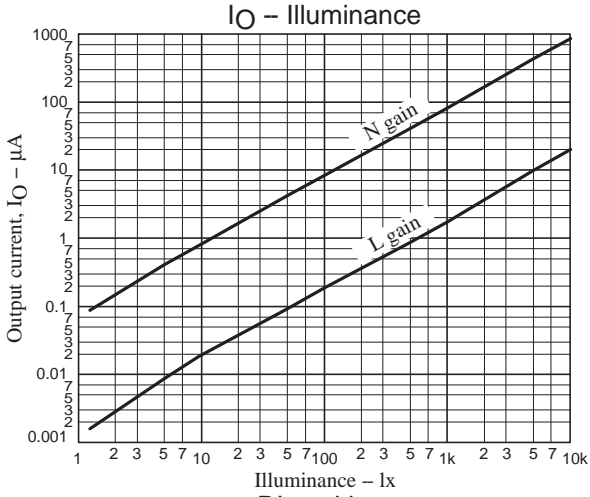
## CHIP PATTERN AND PHOTO-RECEIVING PATTERN DIAGRAMS



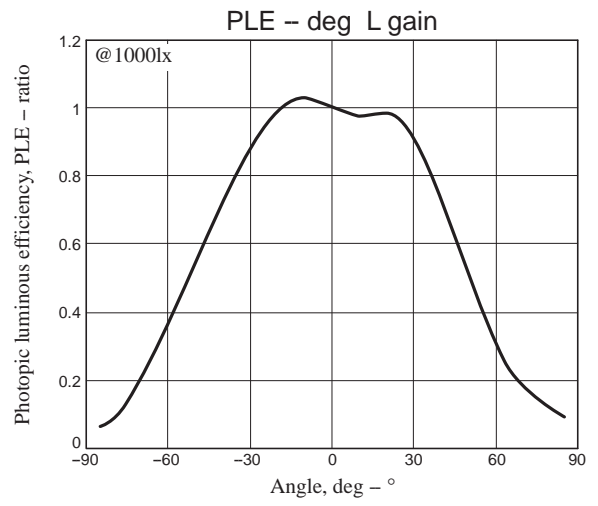
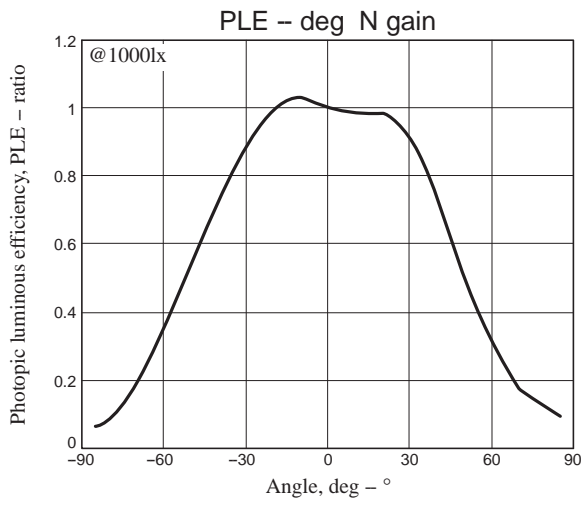
LA0151CS photo-receiving pattern enlarged diagram (effective area)



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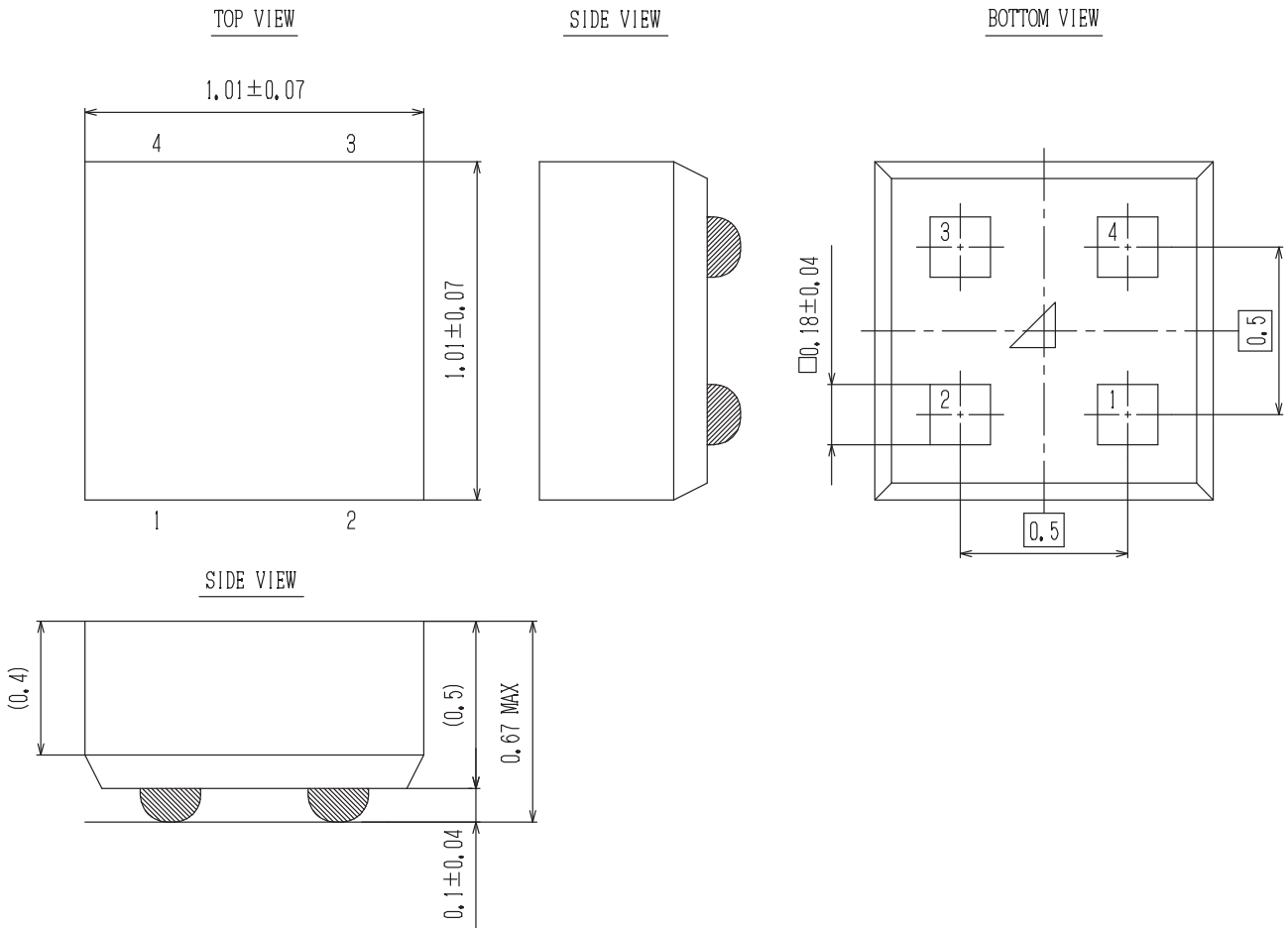
## PACKAGE DIMENSIONS

unit : mm

ODCSP4 1.01x1.01

CASE 570AC

ISSUE O



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