

LA0151CS

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



ON Semiconductor®
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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 $T_a = 25^\circ\text{C}$ (Note 1)

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC}		6	V
Operating temperature	T_{opr}		-30 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +100	$^\circ\text{C}$

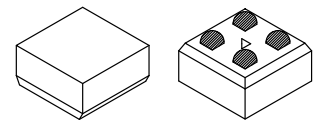
1. Stresses exceeding those listed in the Absolute Maximum Rating table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

RECOMMENDED OPERATING CONDITIONS AND

OPERATING VOLTAGE RANGE at $T_a = 25^\circ\text{C}$ (Note 2)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Recommended supply voltage	V_{CC}		2.2	3.3	5.5	V
SW pin low voltage	V_L	Normal gain mode	0		0.4	V
SW pin high voltage	V_H	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

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	μA
Current dissipation (2) (Note 5, 7)	I_{CC}	$E_v = 1000\text{ lx}$, $R_L = 5\text{ k}\Omega$, L mode	42	70	98	μA
Output current (1) (Note 5, 7)	I_{O1}	$E_v = 100\text{ lx}$, N mode	6	8	10	μA
Output current (2) (Note 5, 7)	I_{O2}	$E_v = 1000\text{ lx}$, N mode	60	80	100	μA
Output current (3) (Note 5, 7)	I_{O3}	$E_v = 100\text{ lx}$, L mode	0.12	0.16	0.2	μA
Output current (4) (Note 5, 7)	I_{O4}	$E_v = 1000\text{ lx}$, L mode	1.2	1.6	2.0	μA
Dark current	I_{leak}	$E_v = 0\text{ lx}$, N mode, L mode			0.1	μA
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	μs
Rise time (2) (Note 8)	T_{r2}	$E_v = 1000\text{ lx}$, $R_L = 500\text{ k}\Omega$, L mode		20	50	μs
Fall time (1) (Note 8)	T_{f1}	$E_v = 1000\text{ lx}$, $R_L = 5\text{ k}\Omega$, N mode		150	500	μs
Fall time (2) (Note 8)	T_{f2}	$E_v = 1000\text{ lx}$, $R_L = 500\text{ k}\Omega$, L mode		150	500	μs
Peak sensitivity wave length (Note 6)	λ_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

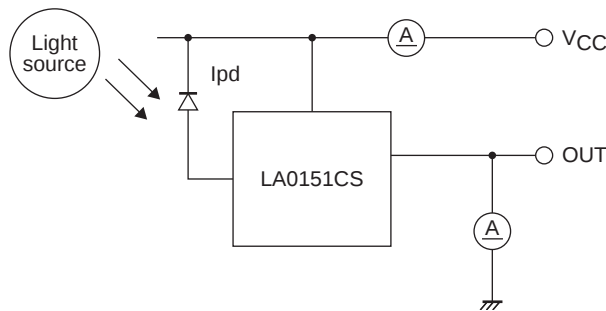
3. Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

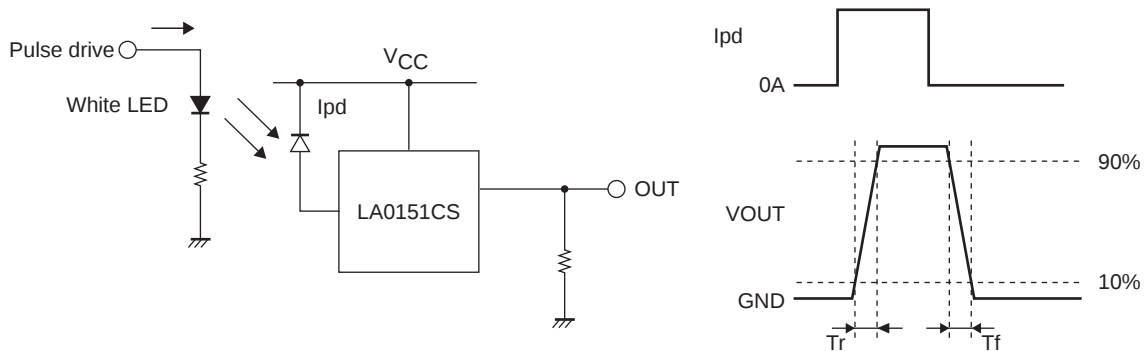
5. Measured with the standard light source A. White LED is used instead in the mass production line.

6. Design guaranteed item

7. Test circuit for measuring current dissipation and output current



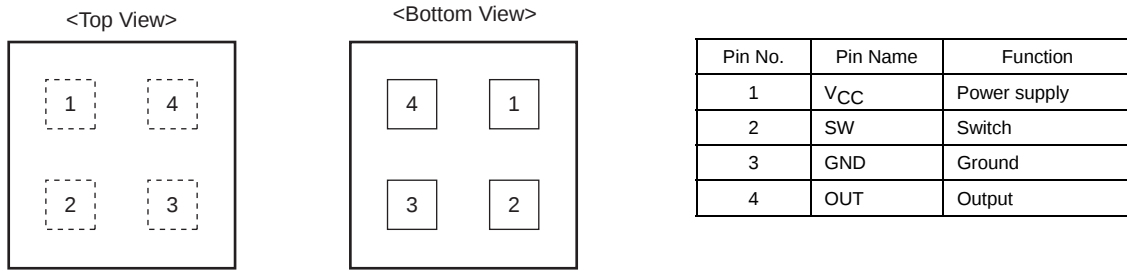
8. Measuring method of rise time (T_r) and fall time (T_f)



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

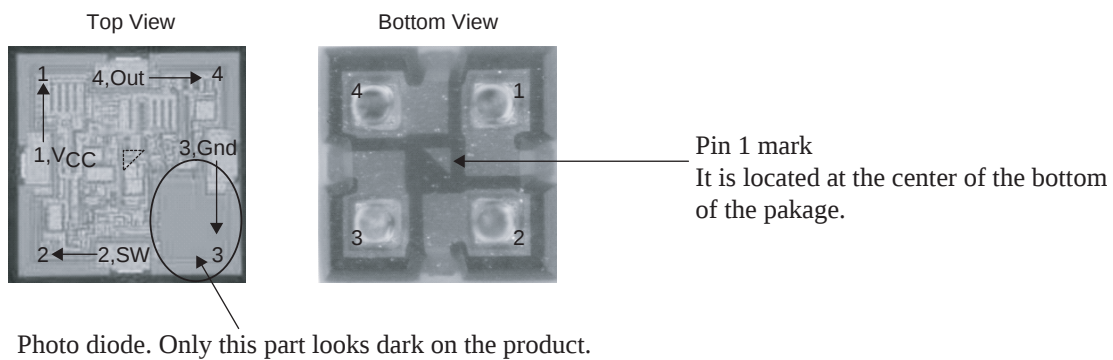
LA0151CS

PAD LAYOUT



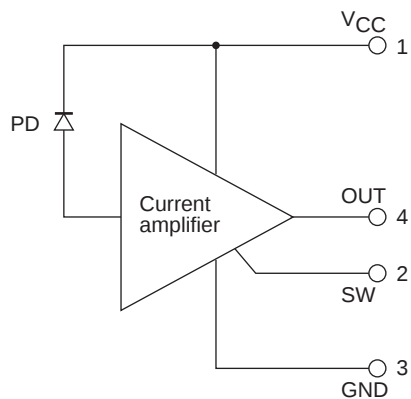
Ball pitch : 0.5mm, Ball size : 0.18mm □

PAD LAYOUT (Photos)



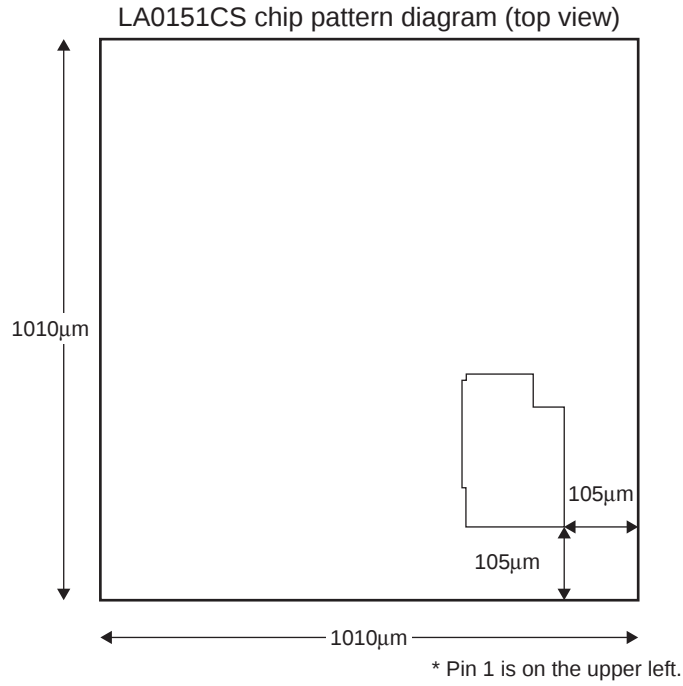
* The photo diode is located in pin 3. Be careful not to mistake the pin 1 mark for the photo diode.

INTRNAL BLOCK DIAGRAM

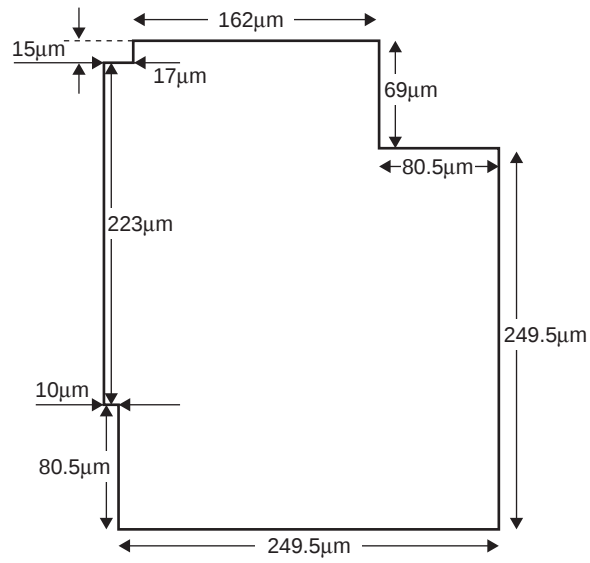


LA0151CS

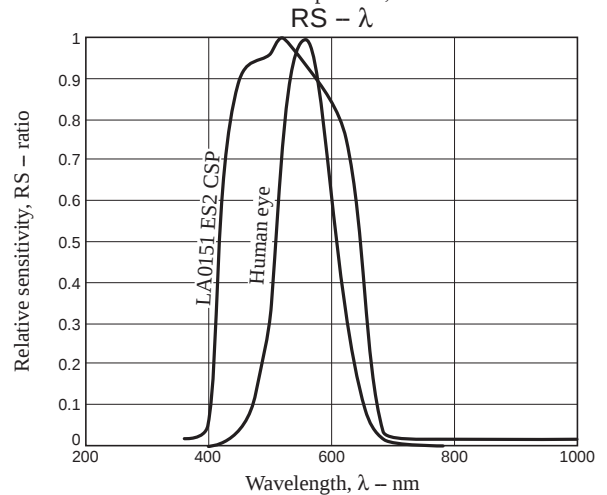
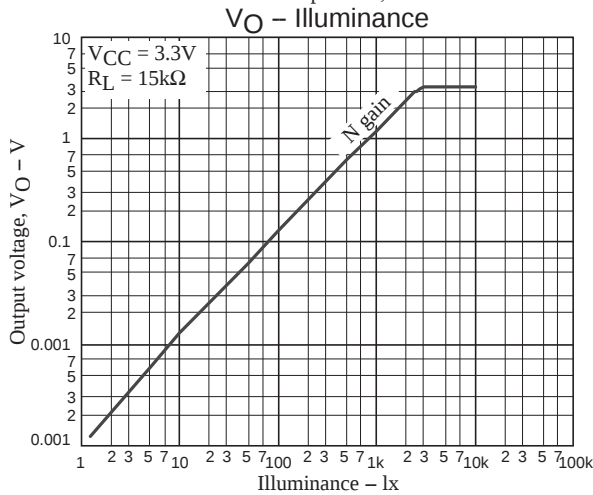
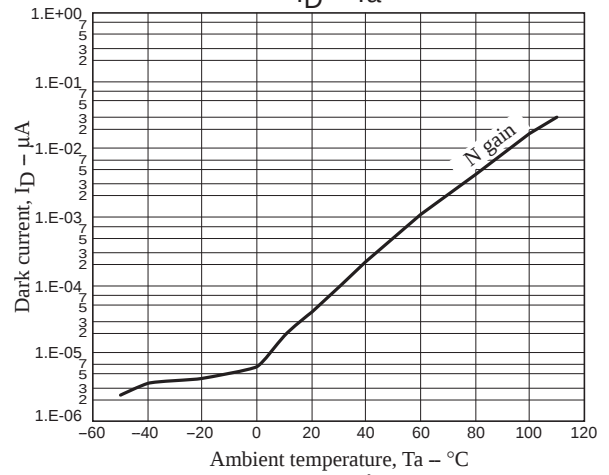
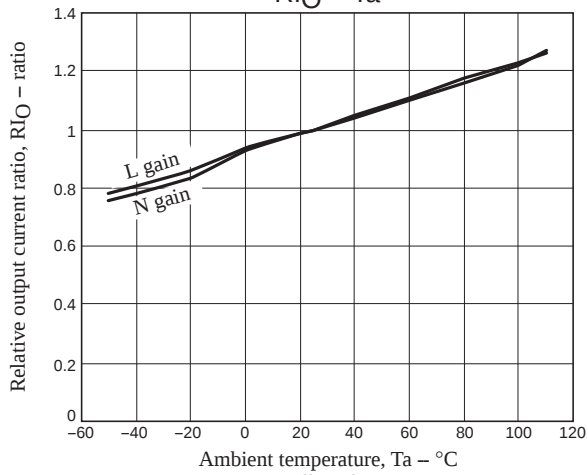
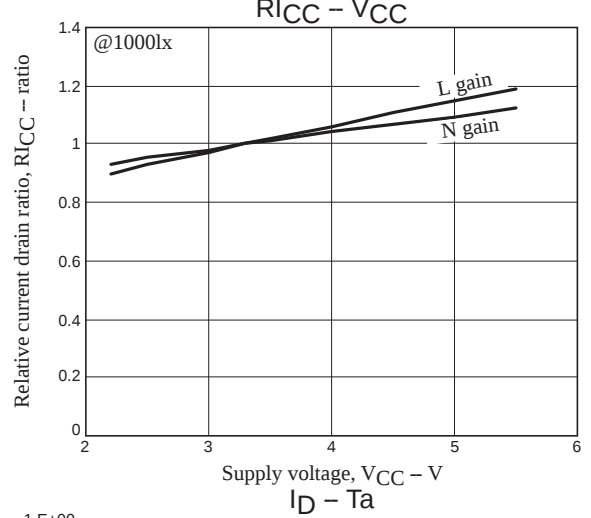
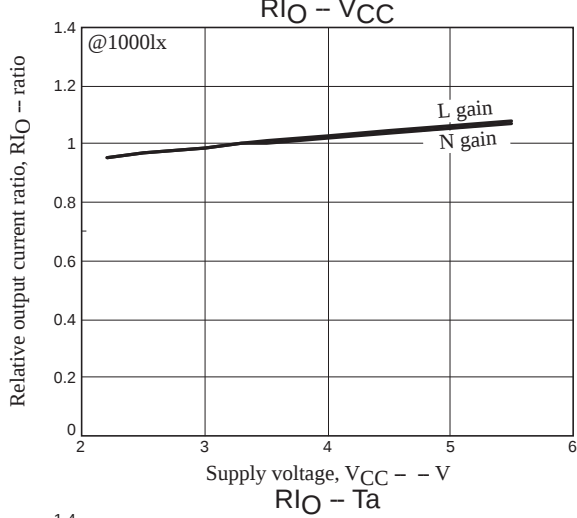
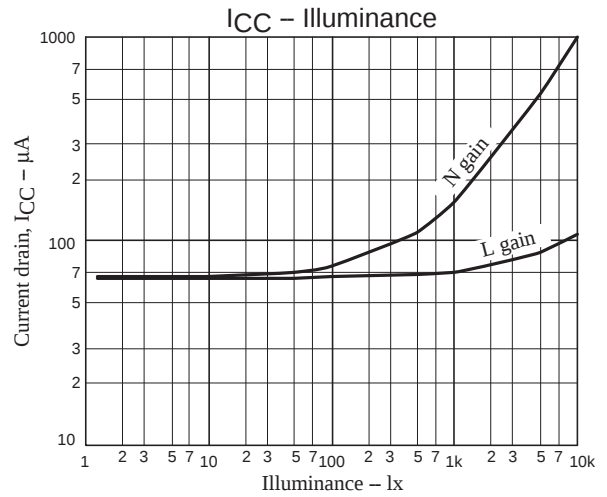
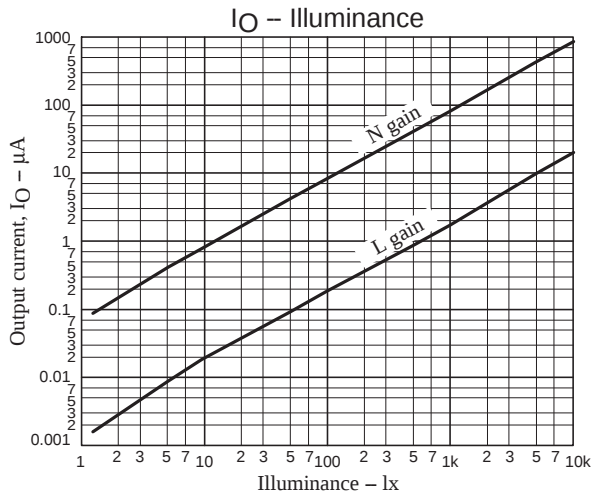
CHIP PATTERN AND PHOTO-RECEIVING PATTERN DIAGRAMS



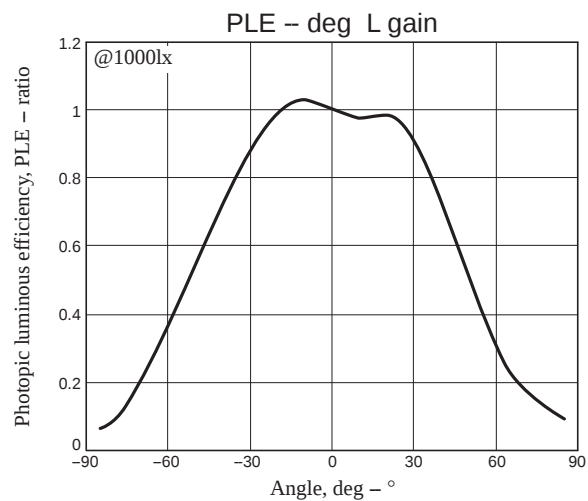
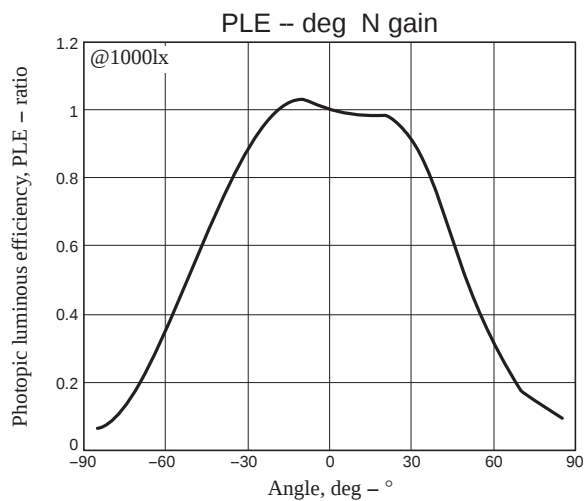
LA0151CS photo-receiving pattern enlarged diagram (effective area)



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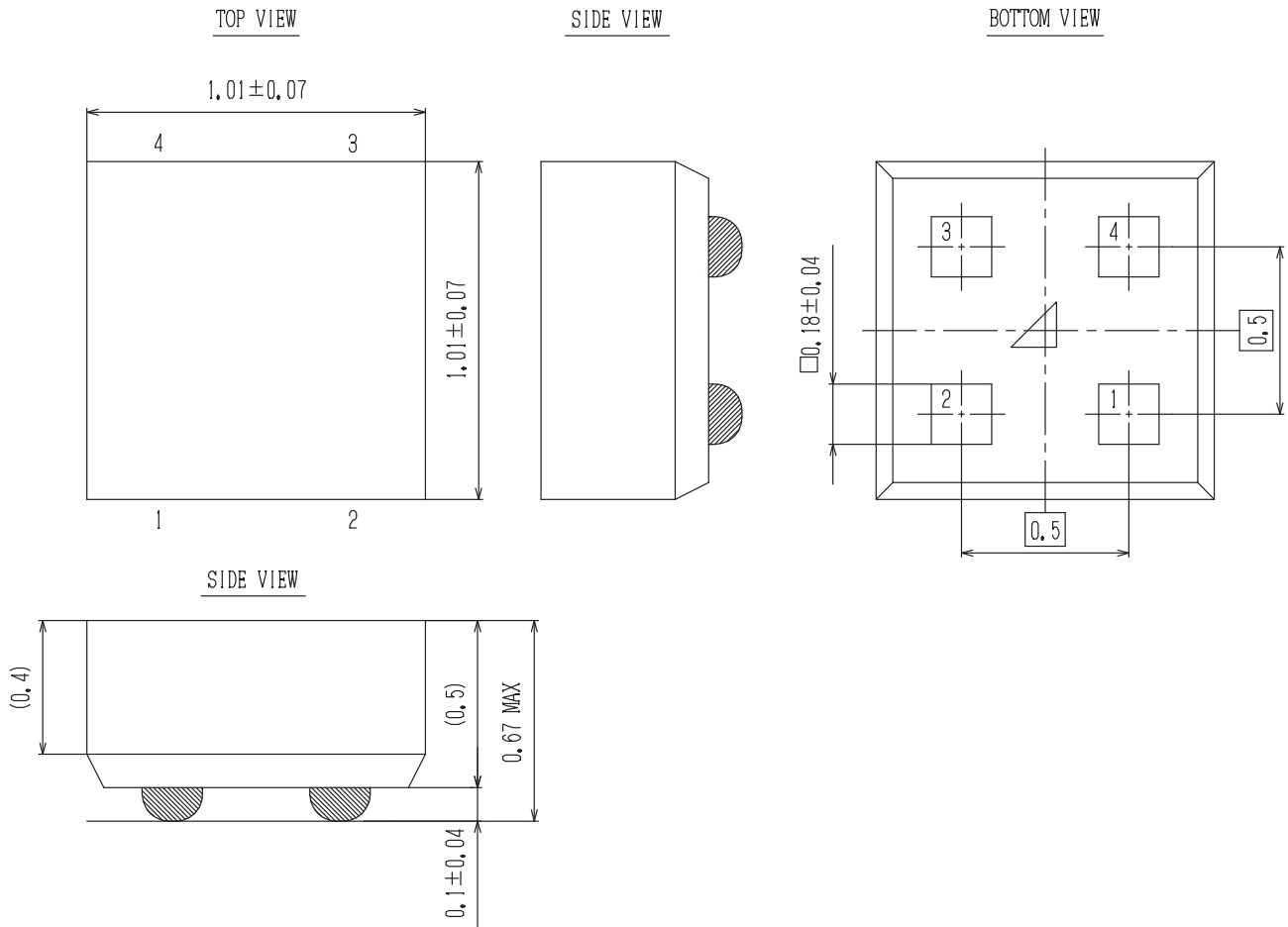
PACKAGE DIMENSIONS

unit : mm

ODCSP4 1.01x1.01

CASE 570AC

ISSUE O



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