LA0151CS

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

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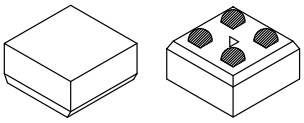

ODCSP4 1.01 mm x 1.01 mm

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

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

SPECIFICATION

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC}		6	V
Operating temperature	Topr		−30 to +85	°C
Storage temperature	Tstg		−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.

RECOMMENED OPERATING CONDITIONS AND OPERATING VOLTAGE RANGE at Ta = 25°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	Vl	Normal gain mode	0		0.4	V
SW pin high voltage	Vh	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.

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ELECTRICAL AND OPTICAL CHARACTERISTICS at Ta = 25°C, V_{CC} = 3.3V (Note 3)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current dissipation (1) (Note 5, 7)	I_{CC}	Ev = 1000 lx, R_L = 5kΩ, N mode	90	150	210	μA
Current dissipation (2) (Note 5, 7)	I_{CC}	Ev = 1000 lx, R_L = 5kΩ, L mode	42	70	98	μA
Output current (1) (Note 5, 7)	I_O1	Ev = 100 lx, N mode	6	8	10	μA
Output current (2) (Note 5, 7)	I_O2	Ev = 1000 lx, N mode	60	80	100	μA
Output current (3) (Note 5, 7)	I_O3	Ev = 100 lx, L mode	0.12	0.16	0.2	μA
Output current (4) (Note 5, 7)	I_O4	Ev = 1000 lx, L mode	1.2	1.6	2.0	μA
Dark current	Ileak	Ev = 0 lx, N mode, L mode			0.1	μA
Temperature coefficient (Note 6)	Itc	Ev = 100 lx, N mode, L mode, Ta = -20 to 60°C		0.34		%/°C
Rise time (1) (Note 8)	Tr1	Ev = 1000 lx, R_L = 5kΩ, N mode		15	40	μs
Rise time (2) (Note 8)	Tr2	Ev = 1000 lx, R_L = 500kΩ, L mode		20	50	μs
Fall time (1) (Note 8)	Tf1	Ev = 1000 lx, R_L = 5kΩ, N mode		150	500	μs
Fall time (2) (Note 8)	Tf2	Ev = 1000 lx, R_L = 500kΩ, L mode		150	500	μs
Peak sensitivity wave length (Note 6)	λp			550		nm
Saturation output voltage (Note 9)	V_O	Ev = 1000 lx, R_L = 150kΩ, N mode	3.0	3.2		V

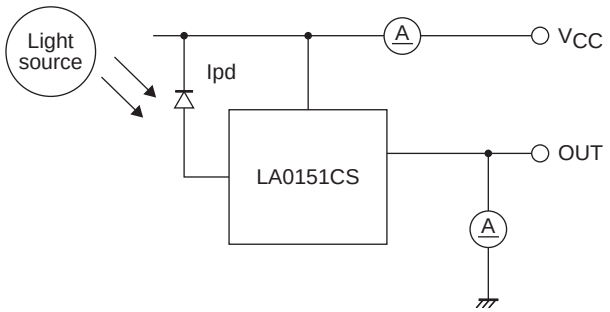
3. Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

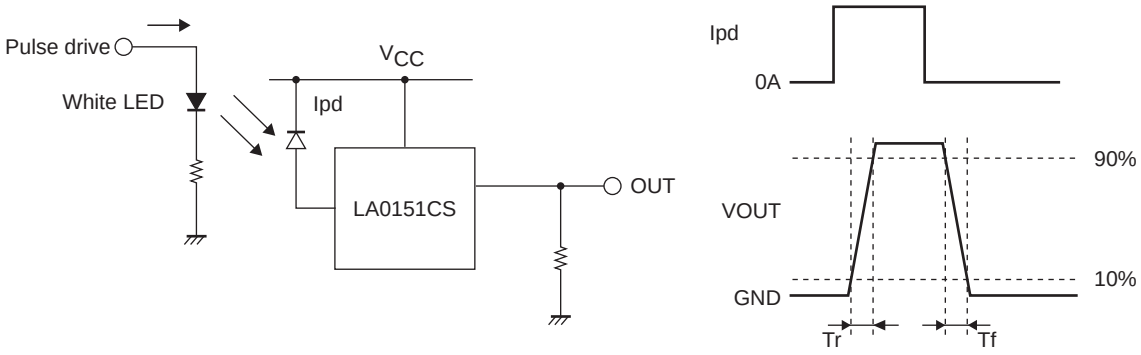
5. Measured with the standard light source A. White LED is used instead in the mass production line.

6. Design guaranteed item

7. Test circuit for measuring current dissipation and output current

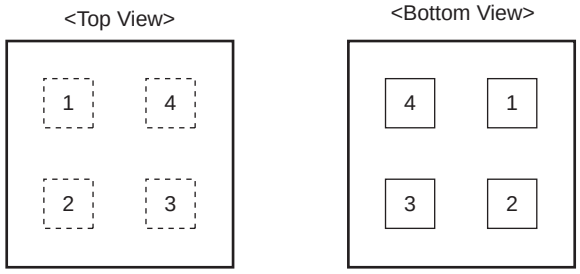


8. Measuring method of rise time (Tr) and fall time (Tf)



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

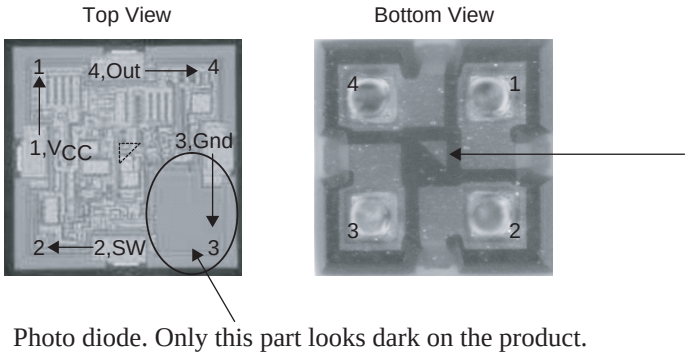
PAD LAYOUT



Pin No.	Pin Name	Function
1	V_{CC}	Power supply
2	SW	Switch
3	GND	Ground
4	OUT	Output

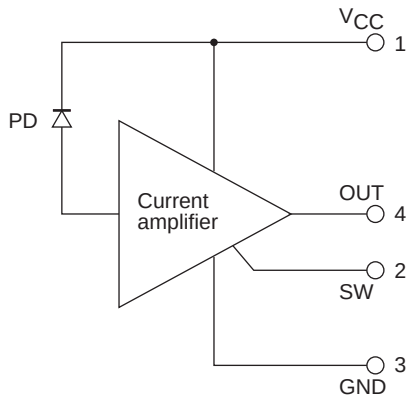
Ball pitch : 0.5mm, Ball size : 0.18mm □

PAD LAYOUT (Photos)



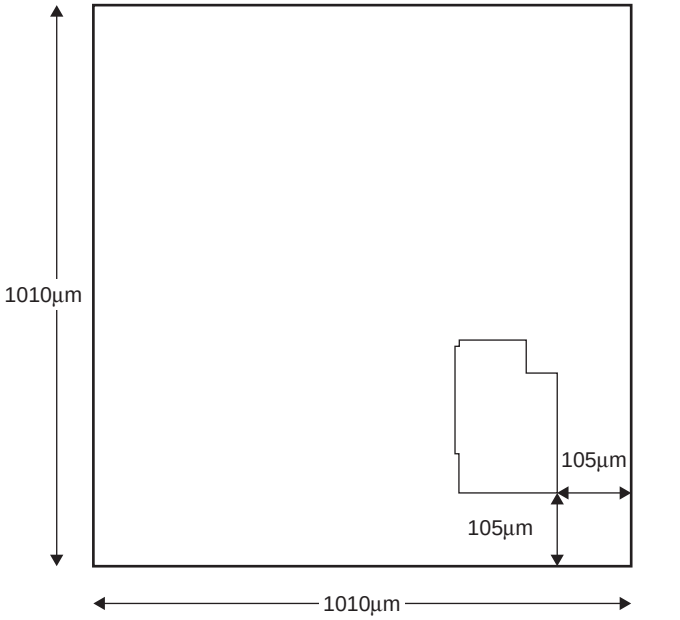
* The photo diode is located in pin 3. Be careful not to mistake the pin 1 mark for the photo diode.

INTRNAL BLOCK DIAGRAM



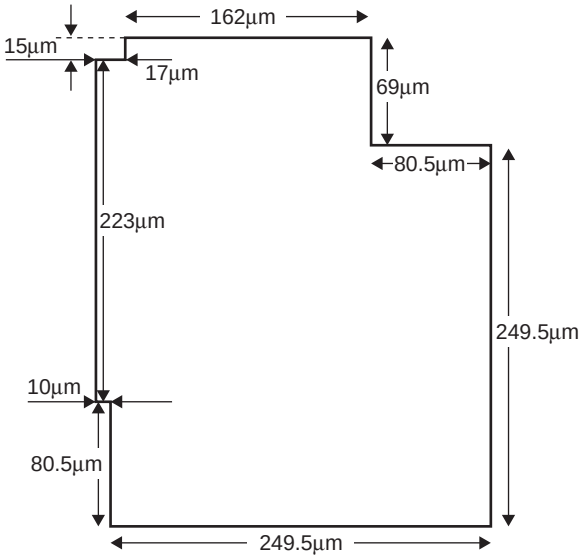
CHIP PATTERN AND PHOTO-RECEIVING PATTERN DIAGRAMS

LA0151CS chip pattern diagram (top view)

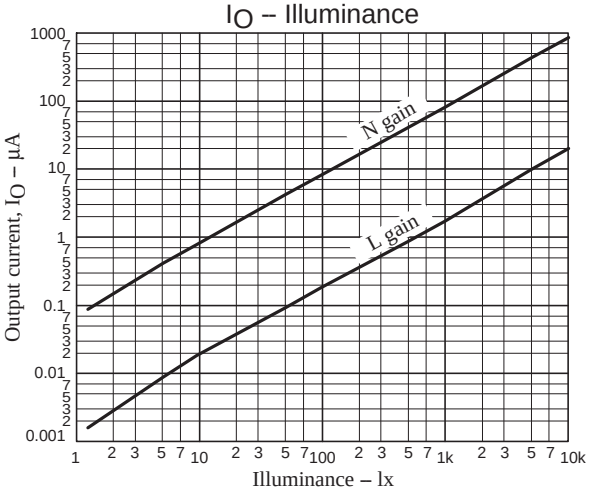


* Pin 1 is on the upper left.

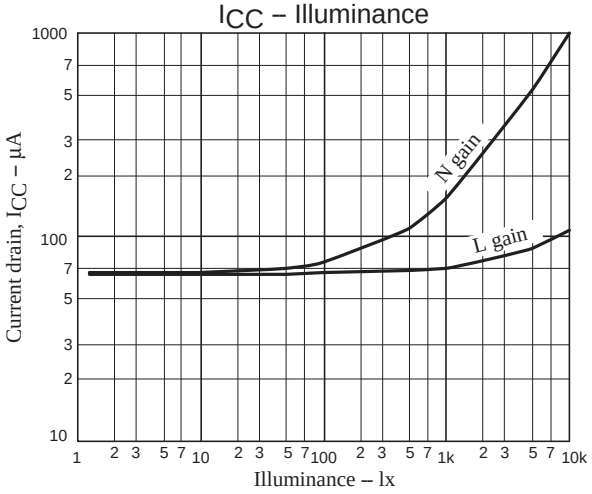
LA0151CS photo-receiving pattern enlarged diagram (effective area)



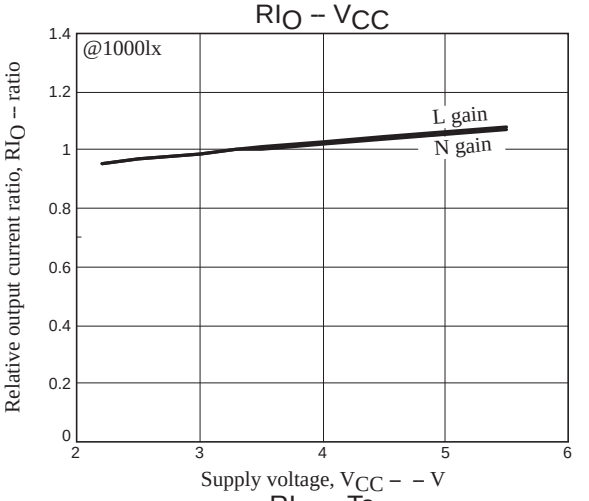
I_O – Illuminance



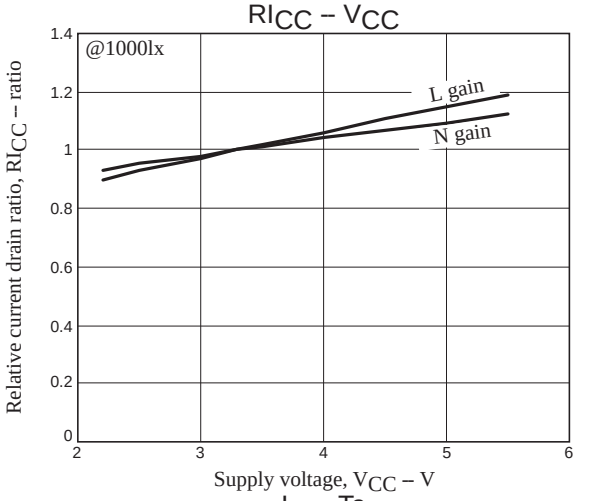
I_{CC} – Illuminance



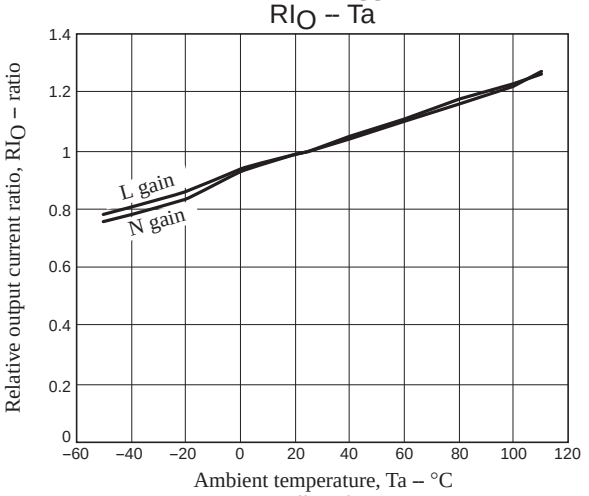
RI_O – V_{CC}



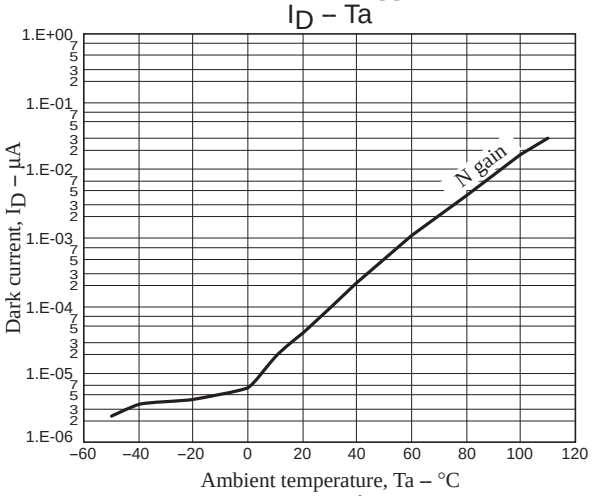
RI_{CC} – V_{CC}



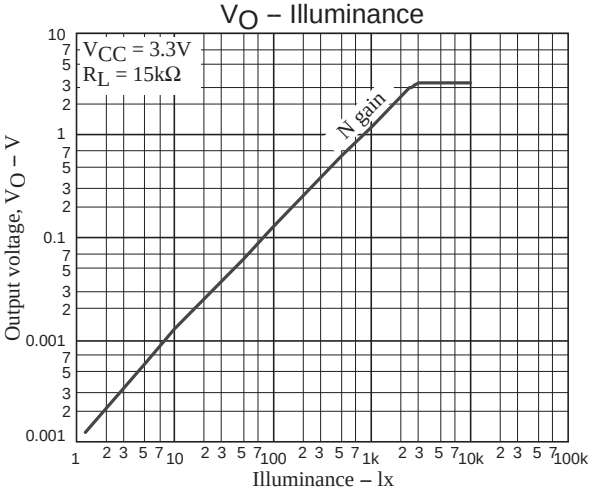
RI_O – Ta



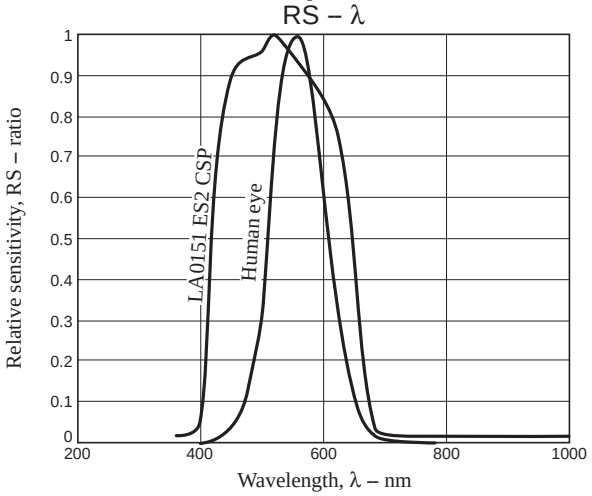
I_D – Ta

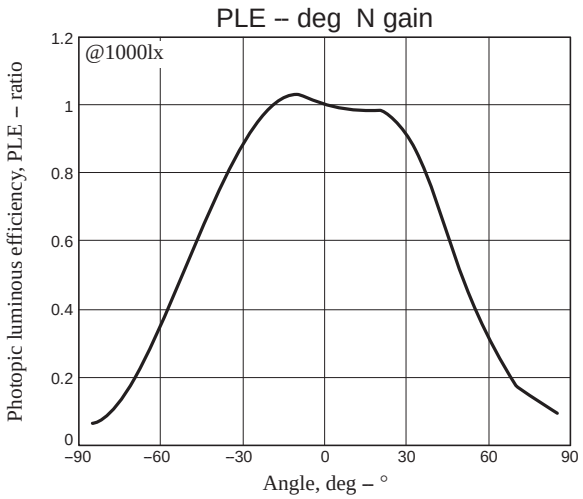


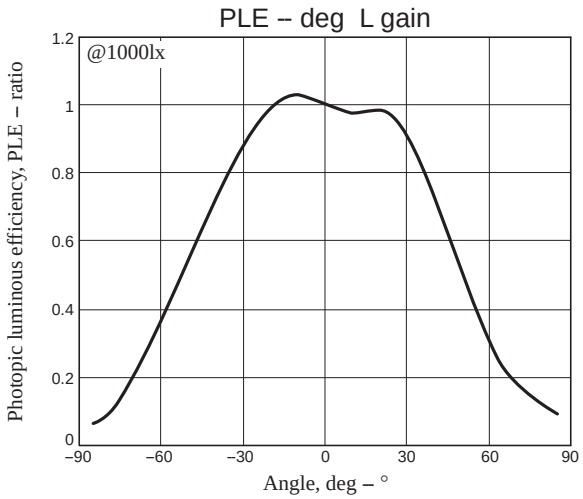
V_O – Illuminance



RS – λ




PLE – deg N gain
@1000lx
Photopic luminous efficiency, PLE – ratio
1.2
1
0.8
0.6
0.4
0.2
0
–90
–60
–30
0
30
60
90
Angle, deg – °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1.2
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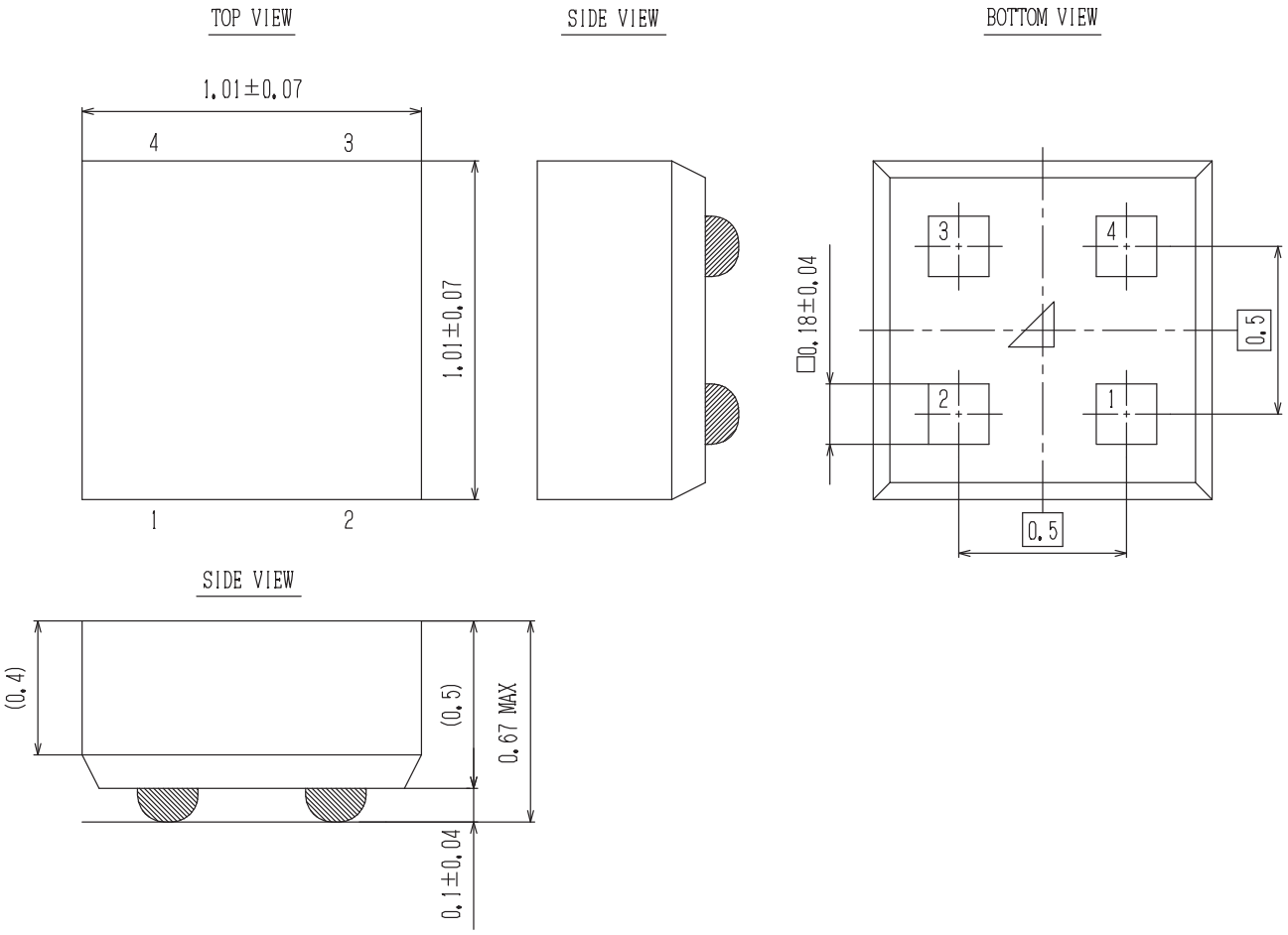
0
–90
–60
–30
0
30
60
90
Angle, deg – °

PACKAGE DIMENSIONS

unit : mm

ODCSP4 1.01x1.01
CASE 570AC
ISSUE O



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