



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

# LA0151CS

Monolithic Linear IC  
For Ultra-small illumination Sensor  
Photo IC

## Overview

The LA0151CS is a photo IC for ultra-small illumination 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.

## Functions

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

## Specifications

**Absolute Maximum Ratings** at  $T_a = 25^\circ\text{C}$

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	$^\circ\text{C}$

**Recommended operating conditions and operating voltage range** at  $T_a = 25^\circ\text{C}$

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

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**SANYO Semiconductor Co., Ltd.**

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# LA0151CS

**Electrical and optical characteristics** at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 3.3\text{V}$

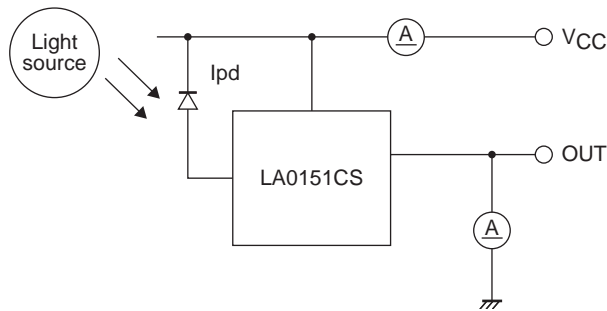
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current dissipation (1) *1, *3	$I_{CC}$	$E_v = 1000 \text{ lx}$ , $R_L = 5\text{k}\Omega$ , N mode	90	150	210	$\mu\text{A}$
Current dissipation (2) *1, *3	$I_{CC}$	$E_v = 1000 \text{ lx}$ , $R_L = 5\text{k}\Omega$ , L mode	42	70	98	$\mu\text{A}$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

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

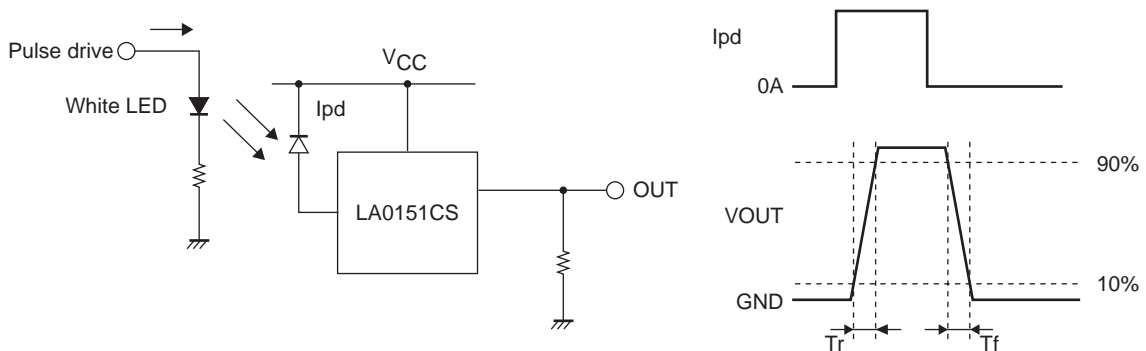
\*1. Measured with the standard light source A. White LED is used instead in the mass production line.

\*2. Design guaranteed item

\*3. Test circuit for measuring current dissipation and output current



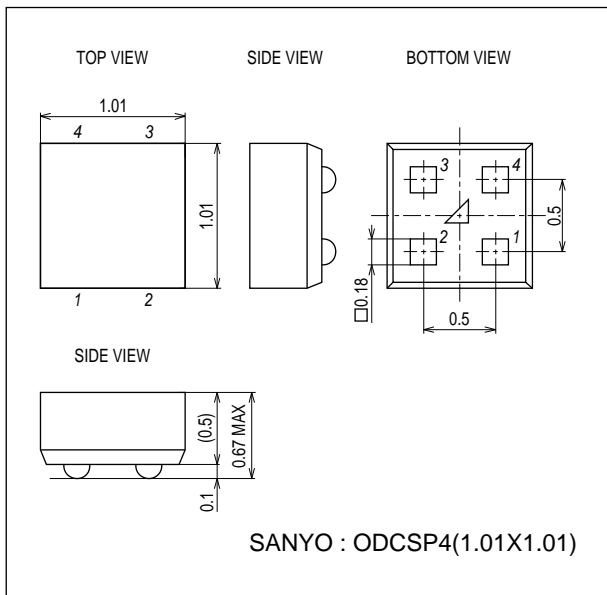
\*4. Measuring method of rise time ( $T_r$ ) and fall time ( $T_f$ )



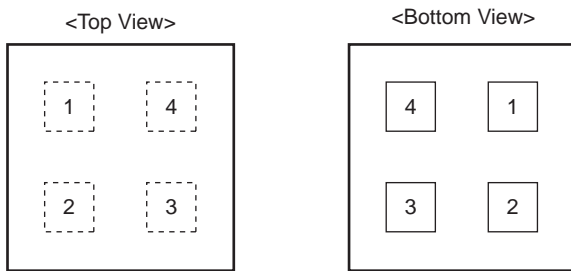
\*5. Reference value : min = 2.6V and typ = 2.8V when  $V_{CC} = 2.9\text{V}$

**Package Dimensions**

unit : mm (typ)  
3350A



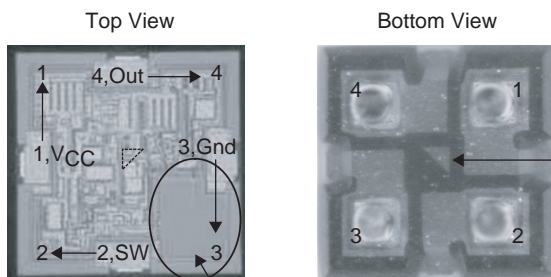
**Pad layout**



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<sup>□</sup>

**Pad layout (Photos)**



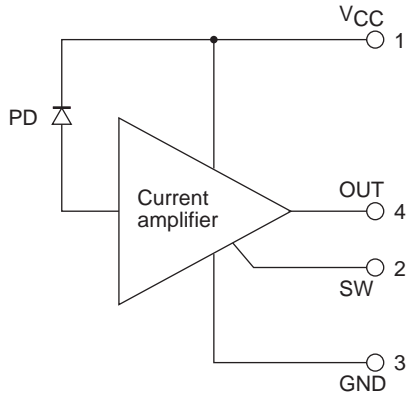
Pin 1 mark  
It is located at the center of the bottom of the package.

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

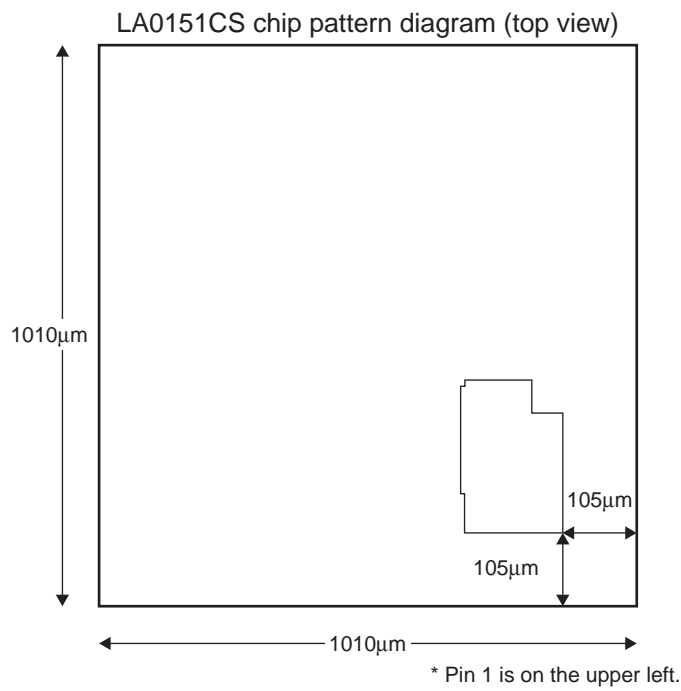
\* The photo diode is located in pin 3. Be careful not to mistake the pin 1 mark for the photo diode.

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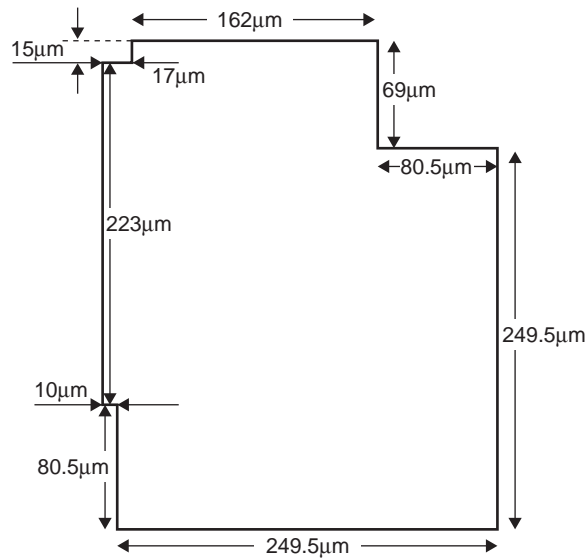
## Internal block diagram



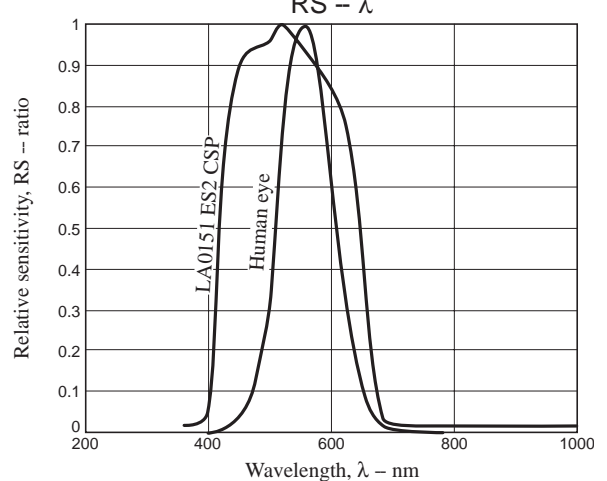
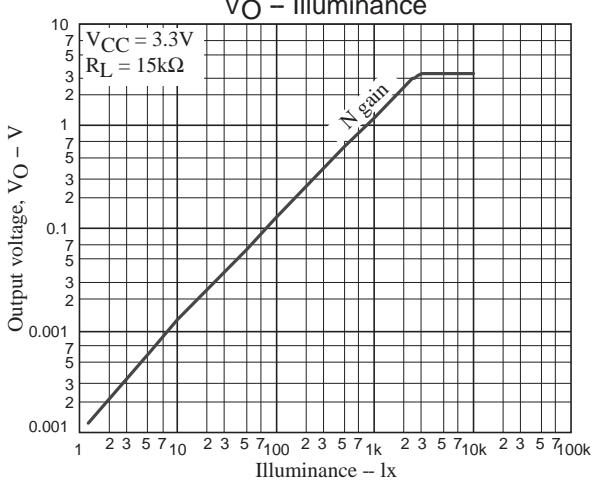
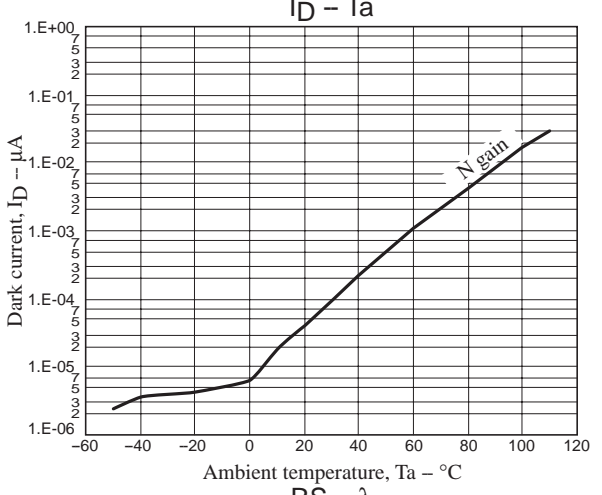
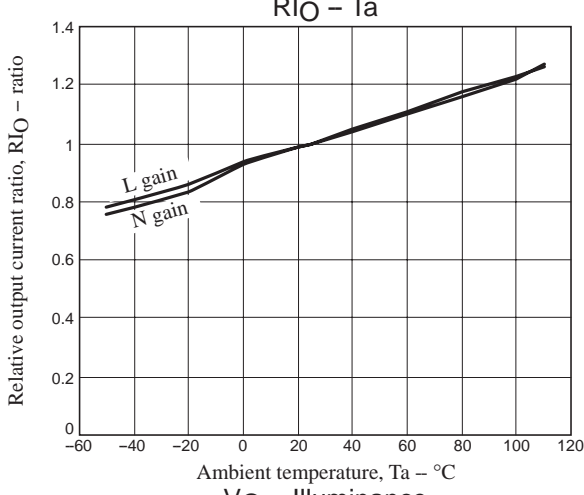
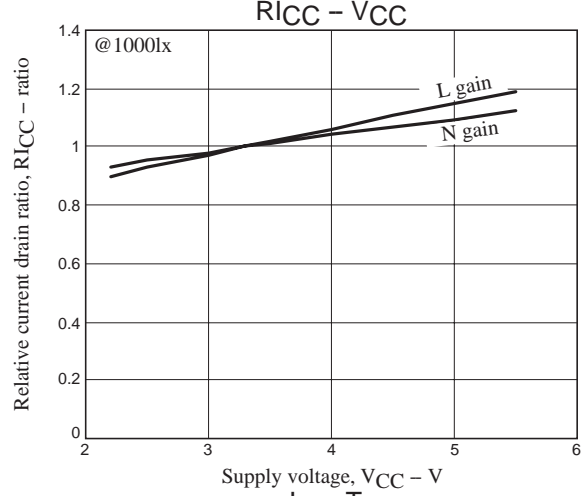
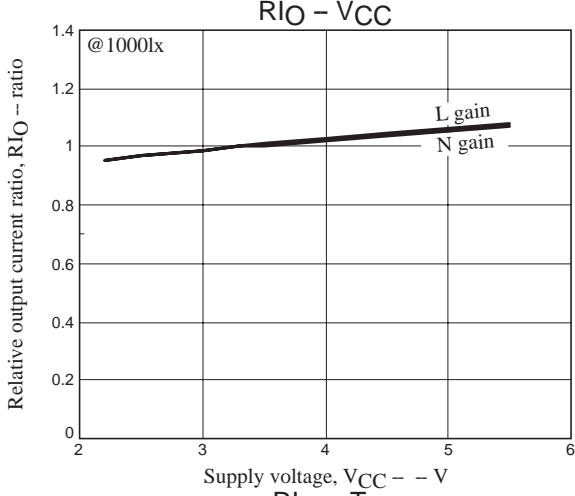
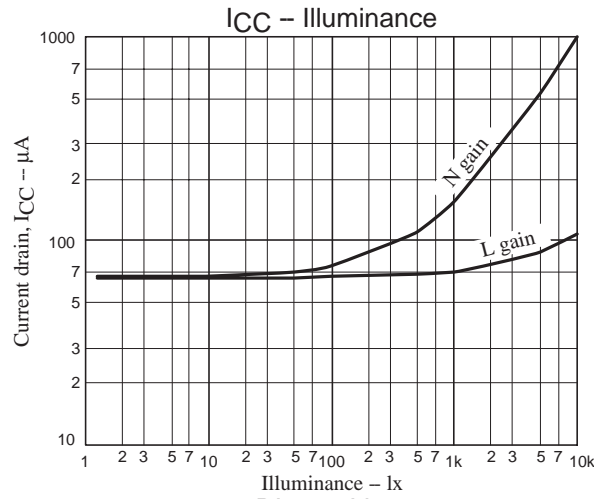
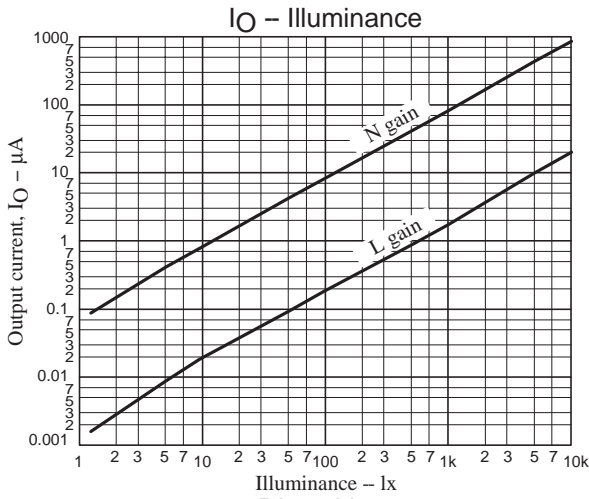
## Chip pattern and photo-receiving pattern diagrams

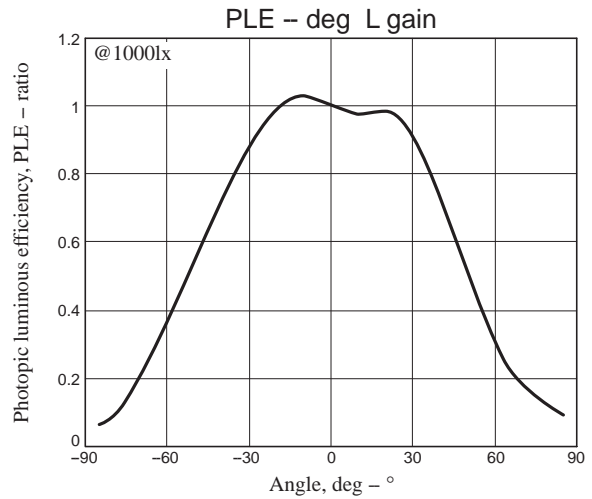
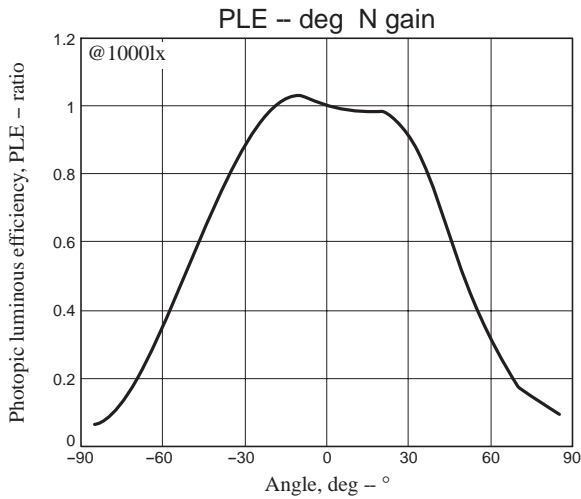


## LA0151CS photo-receiving pattern enlarged diagram (effective area)



# LA0151CS





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