

LV0229XA

Front Monitor OE-IC, for Optical Pickups

Overview

The LV0229XA is a front monitor optoelectronic IC for optical pickups that has a built-in photo diode compatible with three waveforms. LV0229XA is small size and type CSP packages.

Function

- Pin photodiode compatible with three wavelengths incorporated.
- Gain adjustment (-5dB to +5dB in 256 steps) through serial communication.
- Amplifier to amplify differential output.
- Photodiode compatible with three wavelengths incorporated, high-speed process employed.
- Compact, thin CSP package employed.
- Use AR coated glass for three-wavelength (One side).

Typical Applications

- Blu-ray Disk Drive for PC
- Blu-ray recorder
- Blu-ray player

Specifications

Absolute Maximum Ratings at Ta = 25°C (Note1)

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC}		6	V
Allowable power dissipation	P _d	substrate (Note2), Ta = 75°C	105	mW
Operating temperature	T _{opr}		-20 to +75	°C
Storage temperature	T _{stg}		-40 to +100	°C

1. Stresses exceeding those listed in the 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.
2. Glass epoxy both-side substrate 55mm × 45mm × 1mm, Copper foil area (head: about 85% tail: about 70%).

Recommended Operating Conditions at Ta = 25°C (Note3)

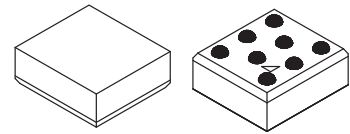
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Operating supply voltage	V _{CC}		4.5	5	5.5	V
Output load capacitance	Co		12	20	33	pF
Output load resistance	Zo		3			kΩ

3. 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.



ON Semiconductor®

www.onsemi.com



ODCSP8 (1.35 x 1.23)

ORDERING INFORMATION

Ordering Code:
LV0229XA-NH

Package
ODCSP8
(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

LV0229XA

Electrical and Optical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$, $R_L = 6\text{k}\Omega$, $C_L = 20\text{pF}$ (Note4)

Parameter	Symbol	Conditions	IV Gain	Ratings			Unit
				min	typ	max	
Current dissipation	I_{CC}			9	14	19	mA
Sleep current	I_{slp}				0.2	0.5	mA
Output voltage when shielded	V_c	At shielding		1.85	2	2.15	V
Output offset voltage	V_{ofs}	At shielding, voltage between VOP-VON		-30	0	30	mV
Temperature dependence of offset voltage (Note5)	V_{ofs}	$T_a = -10$ to $+75^\circ\text{C}$		-60	0	60	$\mu\text{V}/^\circ\text{C}$
Optical output voltage (Note5) Voltage between VOP-VON	VLC	$\lambda = 780\text{nm}$, $G = 0\text{dB}$	Low	1.93	2.41	2.90	mV/ μW
	VH1C		Middle	4.58	5.73	6.87	
	VH2C		High	10.86	13.58	16.29	
	VLD	$\lambda = 650\text{nm}$, $G = 0\text{dB}$	Low	2.03	2.54	3.05	
	VH1D		Middle	4.82	6.02	7.23	
	VH2D		High	11.42	14.28	17.13	
	VLB	$\lambda = 405\text{nm}$, $G = 0\text{dB}$	Low	1.27	1.59	1.90	
	VH1B		Middle	3.01	3.76	4.52	
VH2B	High		7.14	8.92	10.71		
Light output voltage adjustment range (Note5)	G	G = 0dB reference, absolute value of adjustment width		4.5	5	5.5	dB
Output saturation voltage (Note5)	V_{oD}	Voltage between VOP-VON		2000			mV
Frequency characteristics (Note5,6)	FcC	-3dB (1MHz reference), $\lambda = 780\text{nm}$ Light input = $40\mu\text{W}$ (DC) + $20\mu\text{W}$ (AC)		40	60		MHz
	FcD1	-3dB (1MHz reference), $\lambda = 650\text{nm}$ Light input = $40\mu\text{W}$ (DC) + $20\mu\text{W}$ (AC)	Low Middle	60	85		
	FcD2	-3dB (1MHz reference), $\lambda = 650\text{nm}$ Light input = $40\mu\text{W}$ (DC) + $20\mu\text{W}$ (AC)	High	50	70		
	FcB1	-3dB (1MHz reference), $\lambda = 405\text{nm}$ Light input = $40\mu\text{W}$ (DC) + $20\mu\text{W}$ (AC)	Low Middle	60	85		
	FcB2	-3dB (1MHz reference), $\lambda = 405\text{nm}$ Light input = $40\mu\text{W}$ (DC) + $20\mu\text{W}$ (AC)	High	50	70		
Settling time (Note5)	T_{set}				10	15	ns
Response time (Note5)	T_r , T_f	$V_o = 0.9\text{Vp-p}$, output level 10 to 90% $f_c = 10\text{MHz}$, duty = 50%			4	10	ns
Linearity (Note5)	Lin	At output voltage 0.5V and 1.0V (Between VOP-VON)		-1	0	1	%
Light-output voltage temperature dependence Voltage between VOP-VON (Note5,7)	TC	$\lambda = 780\text{nm}$, 25°C reference		6	9	12	%
	TD	$\lambda = 650\text{nm}$, 25°C reference		-3	0	3	%
	TB	$\lambda = 405\text{nm}$, 25°C reference		-2	1	4	%

4. 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.

5. The design reference value.

6. The frequency characteristics when VOP and VON are applied individually.
The frequency characteristics are for the output voltage adjustment range is -5 to +5dB.

7. The temperature dependence for the case of High / Middle / Low gain and for the case when the temperature is 25 to 75°C for the output voltage adjustment range of -5 to +5dB.

[Expression of output voltage]

$$V_n = (\text{sensitivity} / 1.78) \times 5221 / (5221 - 14 \times \text{GCAstep}) \times \text{light intensity } (\mu\text{W})$$

LV0229XA

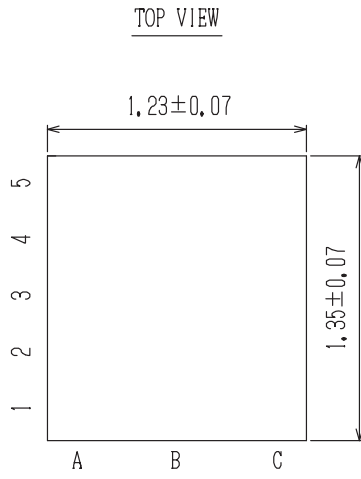
Package Dimensions

unit : mm

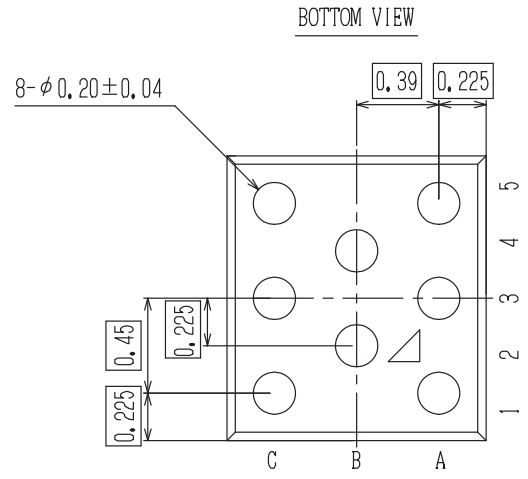
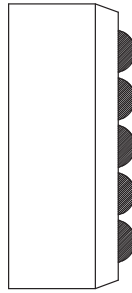
ODCSP8 1.35x1.23

CASE 570AR

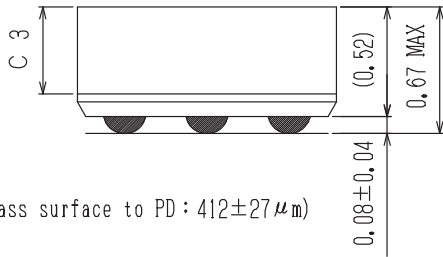
ISSUE O



SIDE VIEW



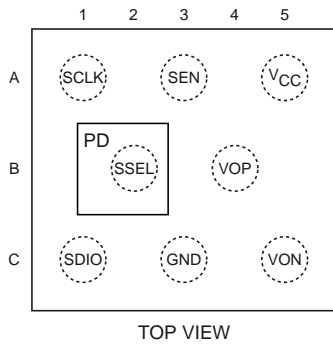
SIDE VIEW



C3 = (Glass surface to PD : $412 \pm 27 \mu\text{m}$)

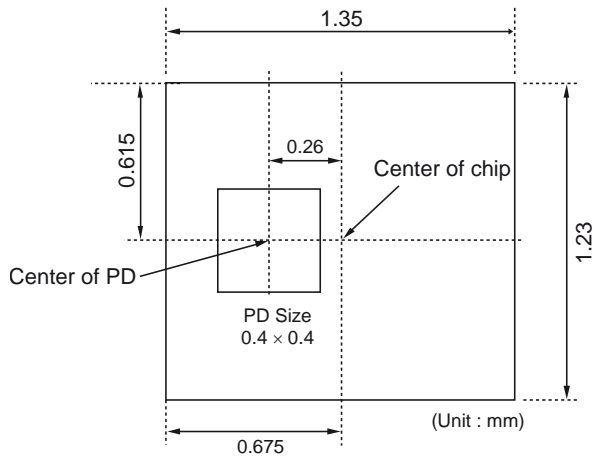
LV0229XA

Pin Assignment



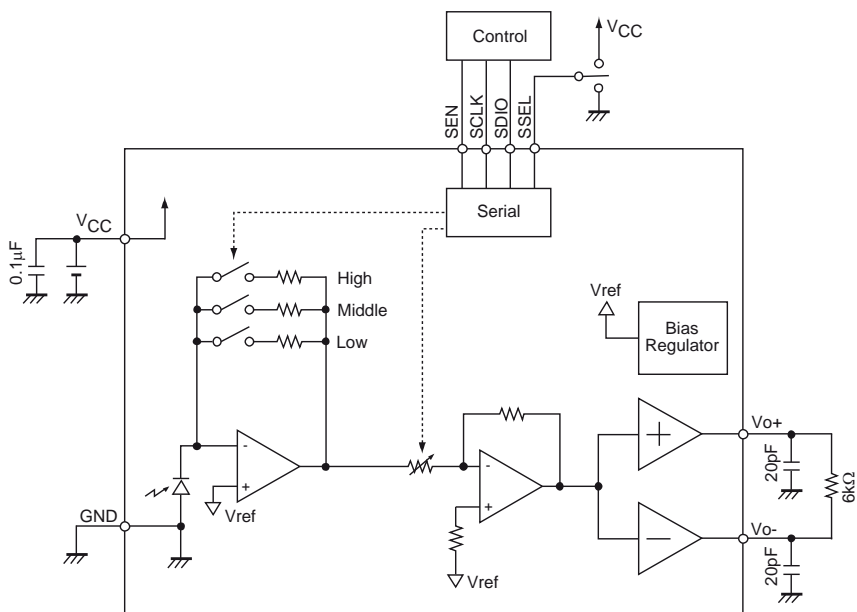
Pin No.	Pin name	Function
A1	SCLK	Serial communication Clock pin
A3	SEN	Serial communication Enable pin
A5	V _{CC}	Power supply voltage pin
B2	SSEL	Register selection pin
		SSEL = Low : Address 00 to 0Fh used
		SSEL = High : Address 10 to 1Fh used
		SSEL = Open : Address 70 to 7Fh used
B4	VOP	Positive side output pin
C1	SDIO	Serial communication Data pin
C3	GND	GND pin
C5	VON	Negative side output pin

PD assignment



*PD size for reference to be used for design

Block diagram and Test circuit diagram



* Please place decoupling capacitors within 3mm from pin

LV0229XA

Resister table

Enable selection of the register group from the SSEL pin.

SSEL = Low

	Address	7	6	5	4	3	2	1	0
Name	00h	POWER		IV GAIN SEL					
Default		00		00		0	0	0	0
Value		11: Power on 00/01/10: Sleep		00/01: High 10: Middle 11: Low					
Name	01h	GAIN							
Default		1	1	1	1	1	1	1	1
Value		00000000 to 11111111							
Name	0Eh	TEST1 (*1)							

SSEL = High

	Address	7	6	5	4	3	2	1	0
Name	10h	POWER		IV GAIN SEL					
Default		00		00		0	0	0	0
Value		11: Power on 00/01/10: Sleep		00/01: High 10: Middle 11: Low					
Name	11h	GAIN							
Default		1	1	1	1	1	1	1	1
Value		00000000 to 11111111							
Name	1Eh	TEST1 (*1)							

SSEL = Open

	Address	7	6	5	4	3	2	1	0
Name	70h	POWER		IV GAIN SEL					
Default		00		00		0	0	0	0
Value		11: Power on 00/01/10: Sleep		00/01: High 10: Middle 11: Low					
Name	71h	GAIN							
Default		1	1	1	1	1	1	1	1
Value		00000000 to 11111111							
Name	7Eh	TEST1 (*1)							

*1 TEST1 are either the time when power is applied or "00000000" is set. Do not attempt to change "00000000" during operation.

"00000000" is returned when reading is made.

*2 No problem in terms of operation occurs even when writing is made to the address 02h to 0Dh & 0Fh, 12h to 1Dh & 1Fh and 72h to 7Dh & 7Fh.

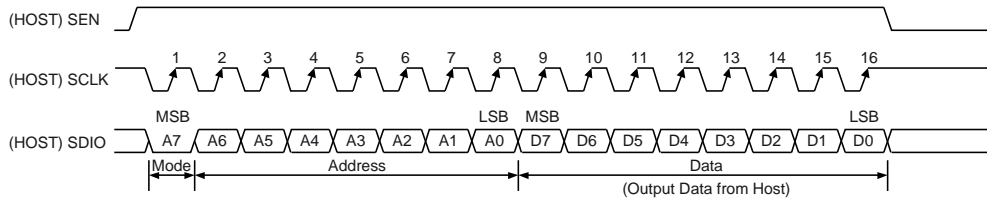
"00000000" is returned when this address is read.

*3 When I performed address reading except the register group set by an SSEL terminal, I keep Hi-Z without paying a value.

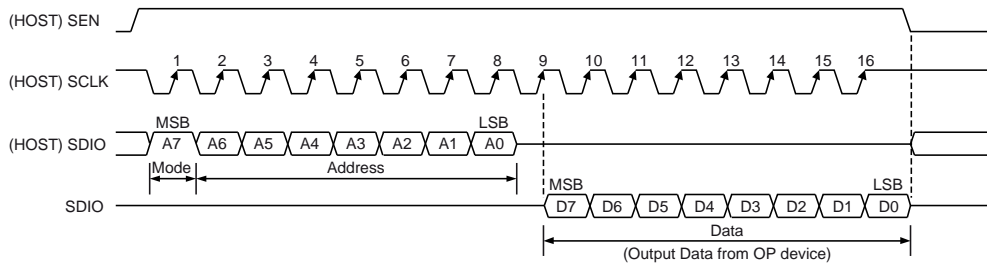
LV0229XA

Serial protocol

WRITE timing chart



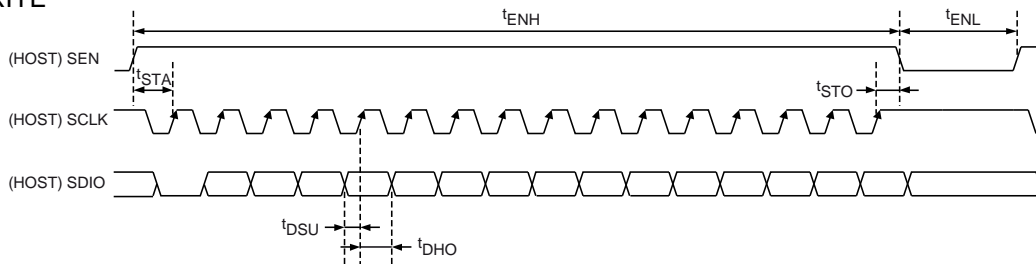
READ timing chart



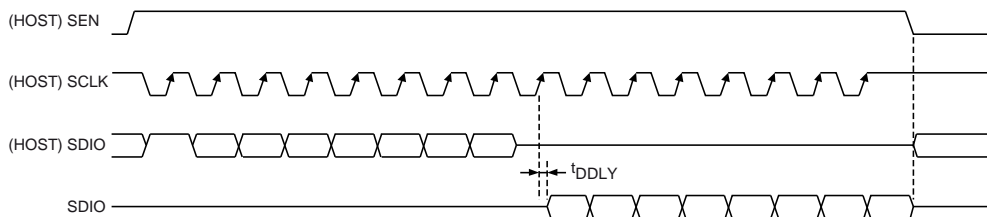
SDIO pin load / $C_L = 20\text{pF}$. The table below shows the design reference value.

Parameter	Symbol	Min.	Typ.	Max.	Unit
SCL clock frequency Write	f_{SCL}	0		10	MHz
SCL clock frequency Read	f_{SCL}	0		4	MHz
SDIO data setup time	t_{DSU}	50			ns
SDIO data hold time	t_{DHO}	50			ns
SDIO output delay	t_{DDL}		10	80	ns
SEN "H" period	t_{ENH}	1.6			μs
SEN "L" period	t_{ENL}	200			ns
SCL rise time after SEN rise	t_{STA}	60			ns
SEN fall time after final SCL rise	t_{STO}	100			ns
Serial input "H" voltage	V_{IH}	2.4		V_{CC}	V
Serial input "L" voltage	V_{IL}			0.6	V
SDIO output "H" voltage	V_{OH}	2.5	2.9	3.3	V
SDIO output "L" voltage	V_{OL}	0	0.3	0.8	V

WRITE



READ

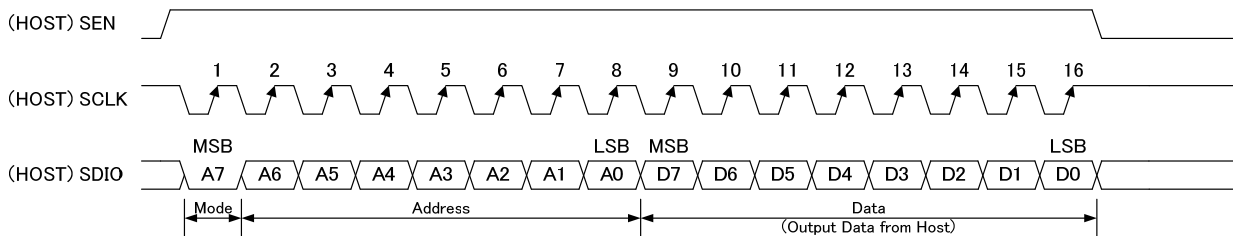


LV0229XA

Pin Description

Pin	Type	Equivalent circuit diagram
SDIO	Input Output	
VOP VON	Output	
SCLK SEN	Input	
SSEL	Input	

Write timing chart



LV0229XA

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.