

**LA0205**

## Optoelectronic IC for CD-R Drive Pickup Applications

### Overview

The LA0205 is a pick-up OE-IC for CD-R drives supporting (CD-ROM 32 × drive and CD-R/RW 8 × drive).

### Features

- High speed photo processing.
- 32 × speed reading.
- Miniature clear package FP-14 (Package size excluding lead section: 3 × 4mm, pin pitch: 0.5mm).

### Functions

- Integrates 8-division PIN photodiode and amplifier circuit. onto a single chip.
- Built-in clipping limiter circuit.
- I/V converter amplifier.

### Specifications

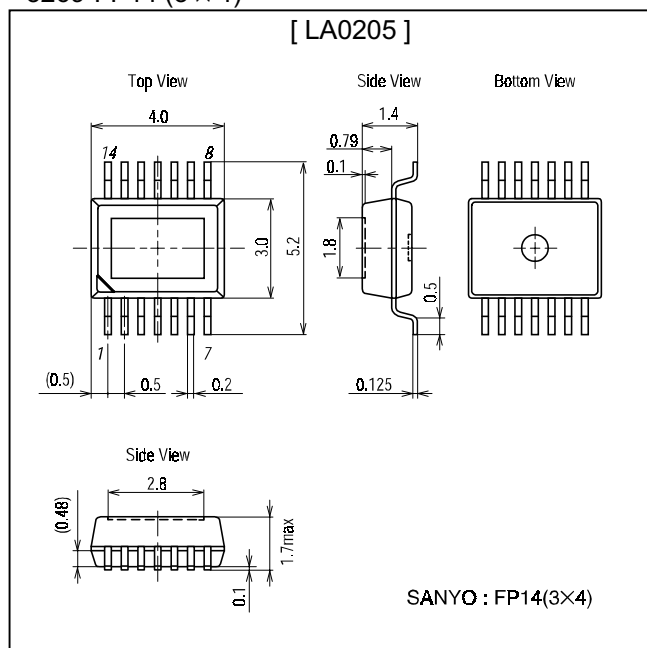
**Absolute Maximum Ratings** at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$		7	V
Allowable power dissipation	$P_d\text{ max}$	$T_a \leq 70^\circ\text{C}$ With a flexible substrate for pick-up Size: $15.4 \times 3.8 \times 1.0\text{ mm}$	125	mW
Operating temperature	$T_{opr}$		-10 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +85	$^\circ\text{C}$

### Package Dimensions

unit: mm

3269-FP14 (3 × 4)



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**Recommended Operating Conditions** at Ta = 25°C

Parameter	Symbol	Ratings	Unit
Recommended supply voltage	V <sub>CC</sub>	5.0	V
Operating supply voltage range	V <sub>CCOPG</sub>	4.5 to 5.5	V
Recommended reference voltage	V <sub>ref</sub>	2.5	V
Reference voltage range	V <sub>REFOPG</sub>	2.0 to 2.8	V

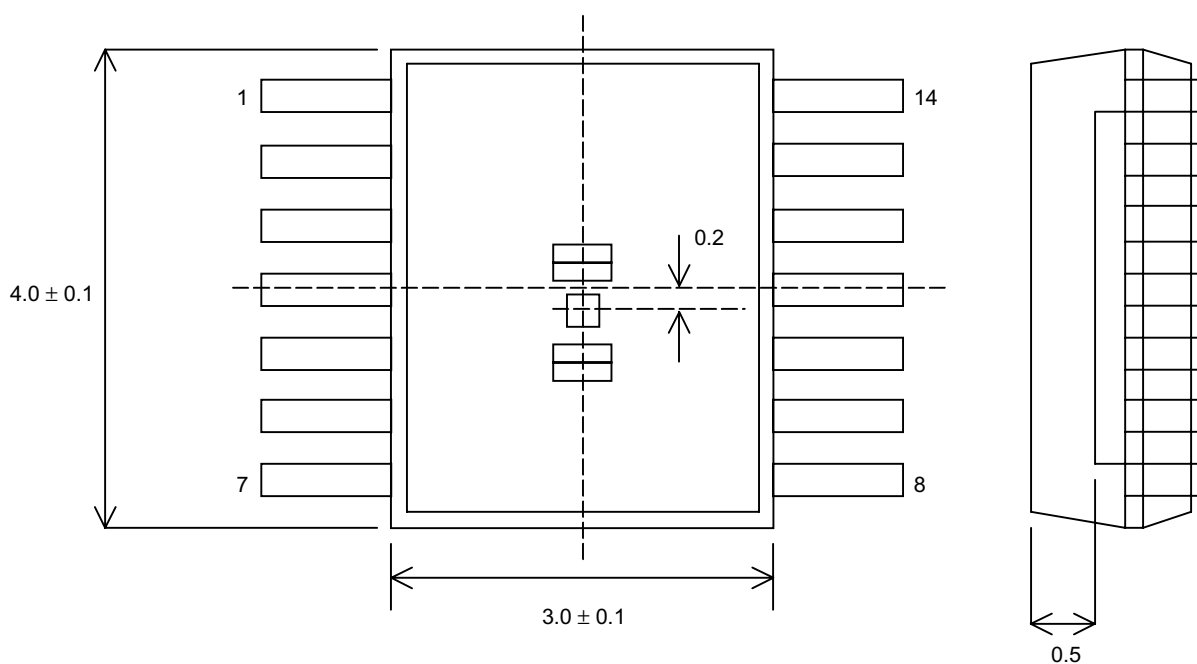
**Optoelectronic Characteristics** at Ta = 25°C, V<sub>CC</sub> = 5 V, V<sub>ref</sub> = 2.5 V, R<sub>L</sub> = 4.7 kΩ, C<sub>L</sub> = 22 pF

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	I <sub>CCO</sub>	With the light shaded	10	14	19	mA
Output voltage	VoAD	Pins A to D: P <sub>I</sub> =10 μW, λ=780 nm	64	80	96	mV
	VoEH	Pins E to H: P <sub>I</sub> =10 μW, λ=780 nm	160	200	240	mV
Output offset voltage	V <sub>ofset</sub>	Pins A to H: with the light shaded	-10	0	10	mV
Difference of offset voltage	ΔV <sub>ofset</sub>	With the light shaded, (A+B)-(C+D)	-15	0	15	mV
		With the light shaded, (A+D)-(B+C)	-15	0	15	mV
		With the light shaded, (A+C)-(B+D)	-15	0	15	mV
		With the light shaded, (E+H)-(F+G)	-15	0	15	mV
Sum of output offset voltage	V <sub>ofsetAD</sub>	Pins A to D: with the light shaded, A+B+C+D	-20	0	20	mV
	V <sub>ofsetEH</sub>	Pins E to H: with the light shaded, E+F+G+H	-22	0	22	mV
Output offset / reference voltage fluctuation	V <sub>ofsAD</sub>	Pins A to D: output offset fluctuation when the voltage is increased by +100 mV to the V <sub>ref</sub> of 2.5 V		-0.3		mV
	V <sub>ofsEH</sub>	Pins E to H: output offset fluctuation when the voltage is increased by +100 mV to the V <sub>ref</sub> of 2.5 V		-0.6		mV
Limiter voltage	V <sub>limit</sub>	Pins A to D: P <sub>I</sub> =300 μW, λ=780 nm	3.8	4.1		V
	V <sub>limit</sub>	Pins E to H: P <sub>I</sub> =100 μW, λ=780 nm	3.8	4.1		V
Frequency characteristics	F <sub>cAD</sub>	Pins A to D: λ=780 nm, -3dB points for 100 KHz	45	65		MHz
	F <sub>cEH</sub>	Pins E to H: λ=780 nm, -3dB points for 100 KHz	15	25		MHz
Group delay deviation	ΔG <sub>d</sub>	Pins A to D: 100 KHz to 23 MHz		1.5	2	ns
Settling time	T <sub>setAD5</sub>	Pins A to D: output 1.8 V to 18 mV			50	ns
	T <sub>setAD8</sub>	Pins A to D: output 1.8 V to 1.8 mV			80	ns
	T <sub>setEH</sub>	Pins R to H: output 1.8 V to 18 mV			50	ns
Output noise level	V <sub>nAD</sub>	Pins A to D: F=23 MHz, RBW=30 KHz		-90	-85	dBm
Output impedance	R <sub>oAD</sub>	Pins A to D		100		Ω
	R <sub>oEH</sub>	Pins E to H		125		Ω

- Note:
1. Output voltage and output offset voltage are referenced to V<sub>ref</sub>.
  2. Limiter voltage is referenced to GND.
  3. Output voltage, frequency characteristics, group delay, settling time, output noise voltage, and output impedance are design confirmation values.

## Photo Diode Layout

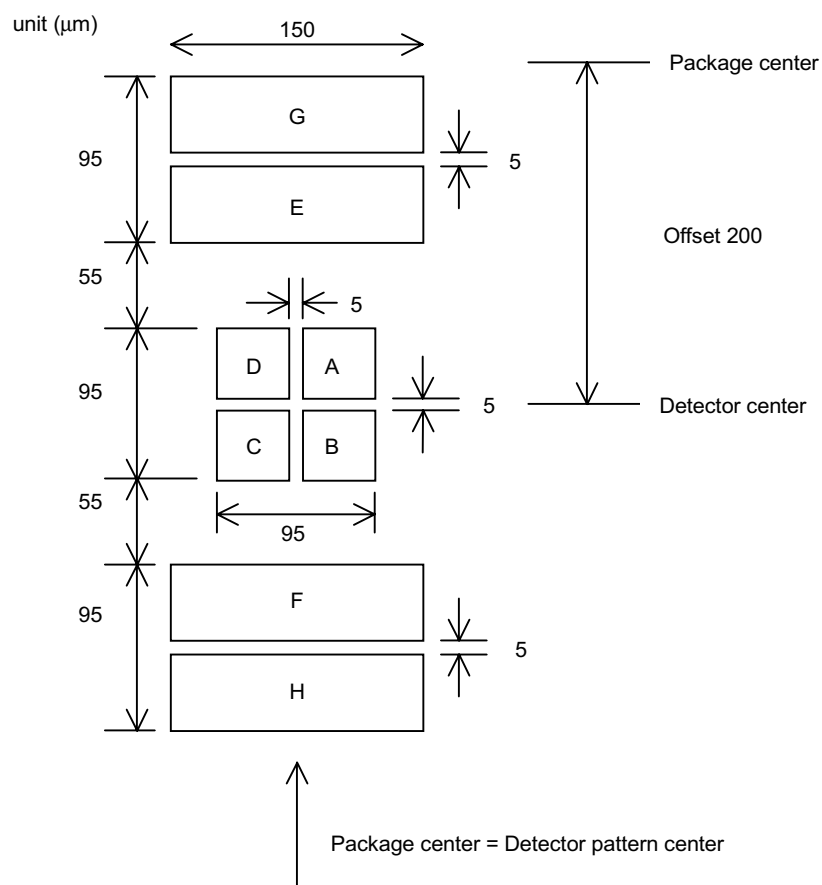
unit (mm)



The tolerance between the package center and the detector pattern center :

X,Y direction  $\pm 0.2$  max  
Z direction  $\pm 0.2$  max

## Detecting Pattern of Photo Diode



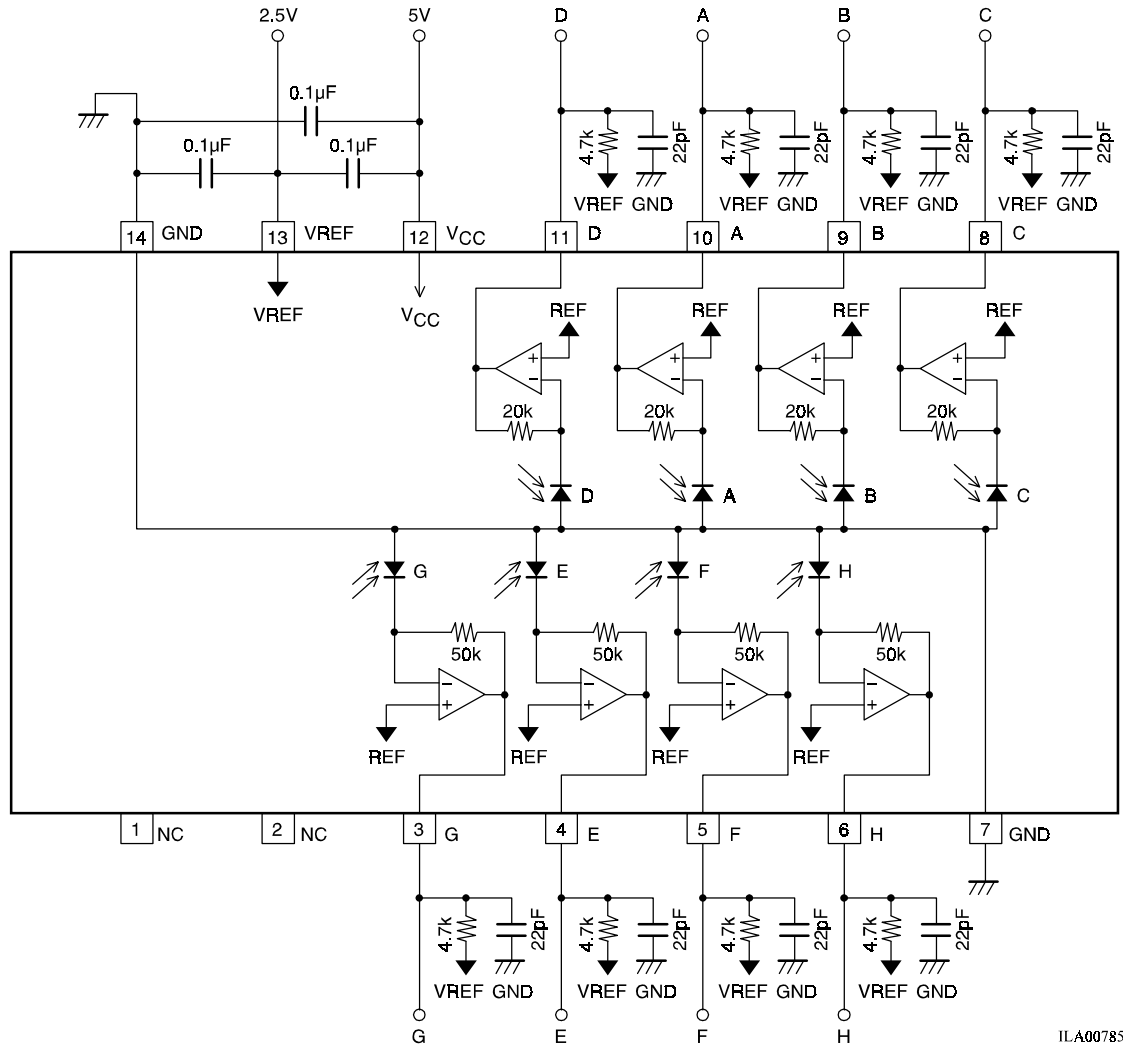
## Pin Description

Pin no.	Pin name	Equivalent circuit	Note
1 2	NC NC		No connection pins
3 4 5 6 8 9 10 11	G E F H C B A D		Output pins for each photo-diode
12	V <sub>CC</sub>		
13	V <sub>ref</sub>		<p>V<sub>ref</sub> pin.</p> <p>This pin has no internal circuit to generate voltage.</p> <p>Therefore, external supply of voltage and about 20 <math>\mu</math>A current (up to 50 <math>\mu</math>A) as a differential amplifier base current is required.</p>
7, 14	GND		

## Package Material Characteristics

Parameter	Reference values
Penetration efficiency	97.0% at 1.0 mmt, 780 nm
Refractive index	1.57 using Abbe technique

## Block Diagram and Test Circuit Diagram



ILA00785

Package: FP-14 (3 × 4)

- Notes:
1. Place the 0.1-  $\mu\text{F}$  capacitors between  $V_{CC}$  pin and GND pin as close as possible to the pins.
  2. The values of 22 pF capacitance and 4.7 k $\Omega$  resistance for output pins are test circuit load conditions.

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