

I-V Photo IC for CD Player

Description

The CXA1753M is a photo IC developed as a photodetector for the optical pickup of CD players.

It has a built-in I-V amplifier, and features low output impedance for stable output.

- Focus servo : astigmatic method
- Tracking servo : three-spot method

Features

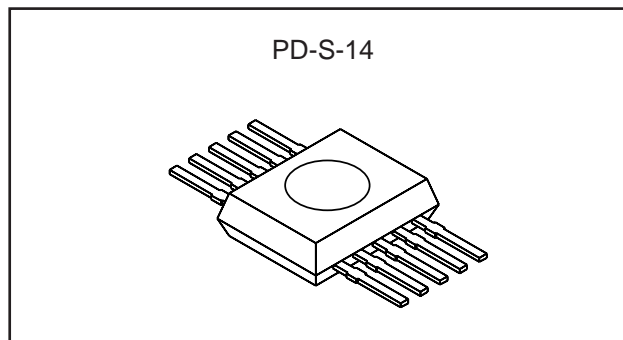
- I-V amplifier (current-voltage conversion circuit)
- Compact transparent molded package (SOP)
Identical to the shape of conventional photodiodes

Applications

Optical pickup of CD players

Structure

Bipolar silicon monolithic IC

**Absolute Maximum Ratings** (Ta=25 °C)

• Supply voltage	V _{CC}	12	V
• Operating temperature	T _{opr}	-20 to +75	°C
• Storage temperature	T _{stg}	-40 to +85	°C
• Allowable power dissipation	P _D	200	mW

Operating Conditions

Supply voltage	V _{CC}	2.8 to 11.0	V
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Electrical and Optical Characteristics I

(V_{CC}=3.0 V, V_C=1.5 V, T_a=25 °C)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current consumption	I _{CC}	In the dark	—	2.0	2.8	mA
Output offset voltage (A-F)	V _{off}	In the dark	-15	0	15	mV
Output offset voltage difference	ΔV _{off}	(A+B) – (C+D) In the dark	-15	0	15	mV
		(A+D) – (B+C) In the dark	-15	0	15	mV
		(A+C) – (B+D) In the dark	-15	0	15	mV
		E–F In the dark	-10	0	10	mV
Output voltage (A-D)	V _O	P _O =10 μW, λ=780 nm	290	370	450	mV
Output voltage (E, F)	V _O	P _O =10 μW, λ=780 nm	610	770	930	mV
Maximum output voltage (A-D)	V _{Omax}	P _O =100 μW, λ=780 nm	2.0	2.2	—	V
Maximum output voltage (E, F)	V _{Omax}	P _O =100 μW, λ=780 nm	2.5	2.9	—	V
Frequency response (A-D)	f _c	100 kHz reference, -3 dB	2.0	3.0	—	MHz
Frequency response (E, F)	f _c	10 kHz reference, -3 dB	100	400	—	kHz

Electrical and Optical Characteristics II

(V_{CC}=5.0 V, V_C=2.5 V, T_a=25 °C)

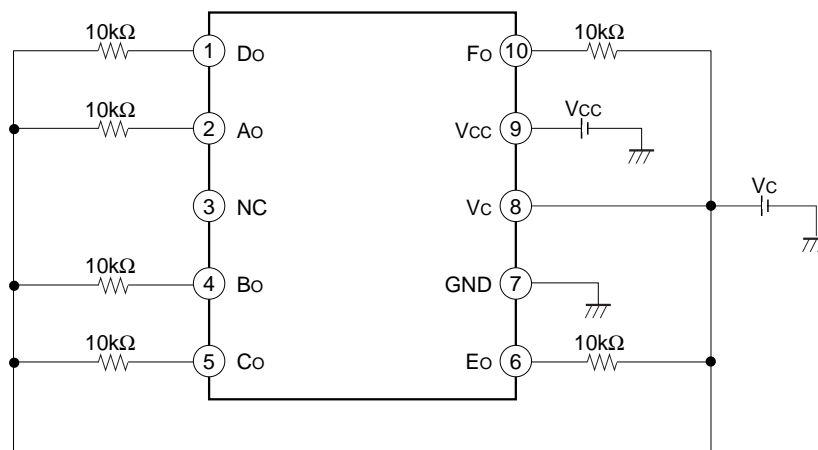
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current consumption	I _{CC}	In the dark	—	3.5	4.5	mA
Output offset voltage (A-F)	V _{off}	In the dark	-15	0	15	mV
Output offset voltage difference	ΔV _{off}	(A+B) – (C+D) In the dark	-15	0	15	mV
		(A+D) – (B+C) In the dark	-15	0	15	mV
		(A+C) – (B+D) In the dark	-15	0	15	mV
		E–F In the dark	-10	0	10	mV
Output voltage (A-D)	V _O	P _O =10 μW, λ=780 nm	290	370	450	mV
Output voltage (E, F)	V _O	P _O =10 μW, λ=780 nm	610	770	930	mV
Maximum output voltage (A-D)	V _{Omax}	P _O =100 μW, λ=780 nm	4.0	4.2	—	V
Maximum output voltage (E, F)	V _{Omax}	P _O =100 μW, λ=780 nm	4.5	4.9	—	V
Frequency response (A-D)	f _c	100 kHz reference, -3 dB	2.0	2.5	—	MHz
Frequency response (E, F)	f _c	10 kHz reference, -3 dB	100	400	—	kHz

Note 1 : V_C is reference for output voltage and output offset voltage.

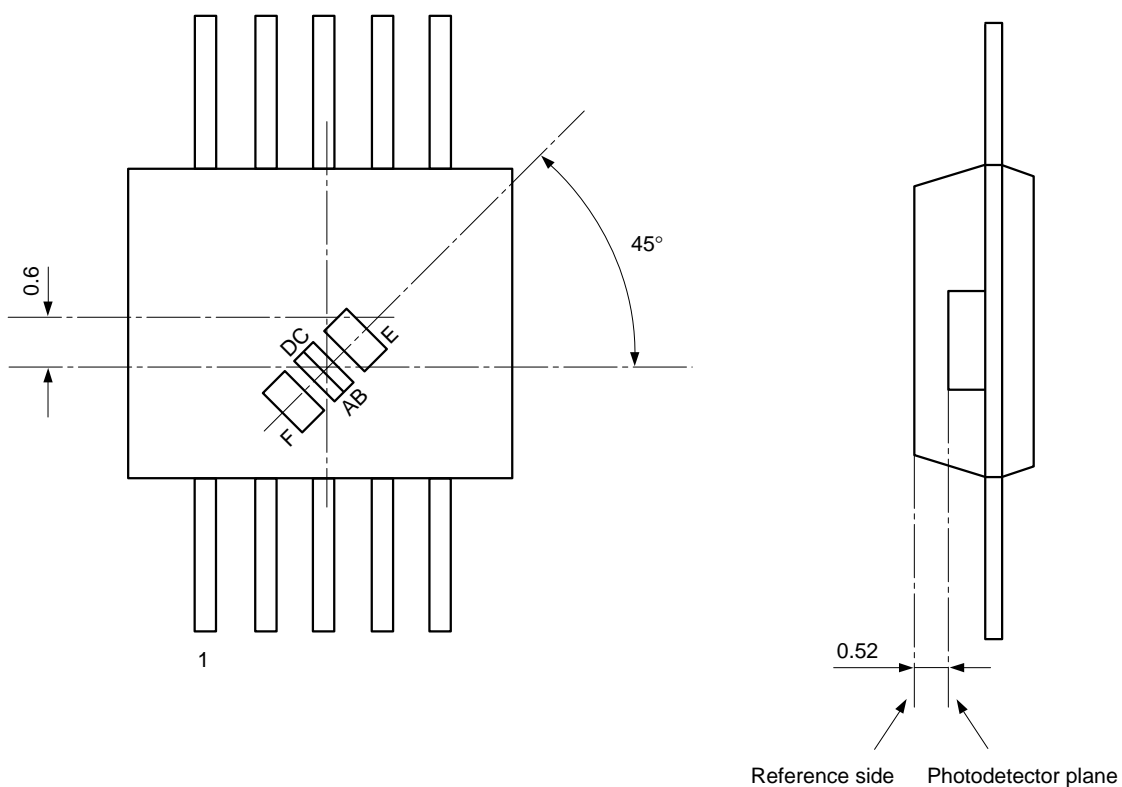
Note 2 : GND is reference for maximum output voltage.

Note 3 : Output voltage and frequency response are subject to confirmation of design.

Measurement Circuit



Photodetector position

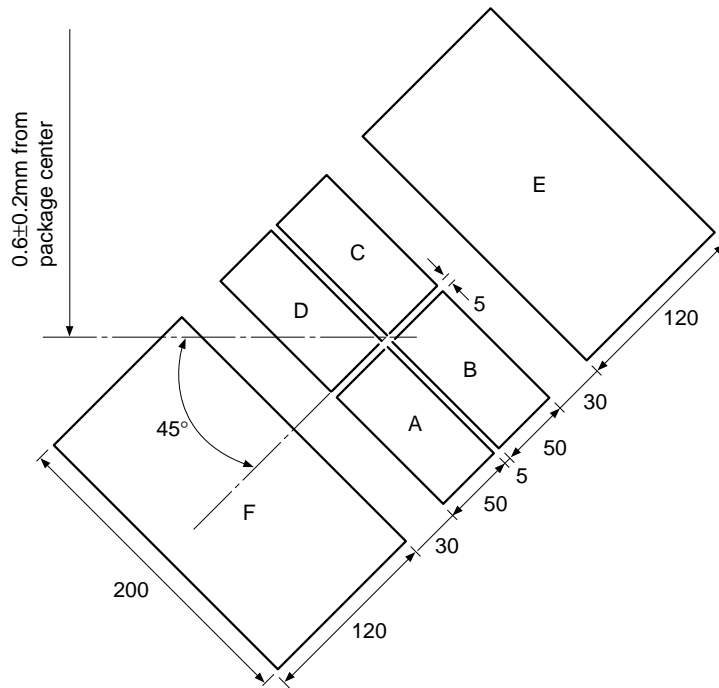


Tolerance in position of photodetector center

- X, Y : ± 0.2
- Z : ± 0.2
- θ : $\pm 2^\circ$

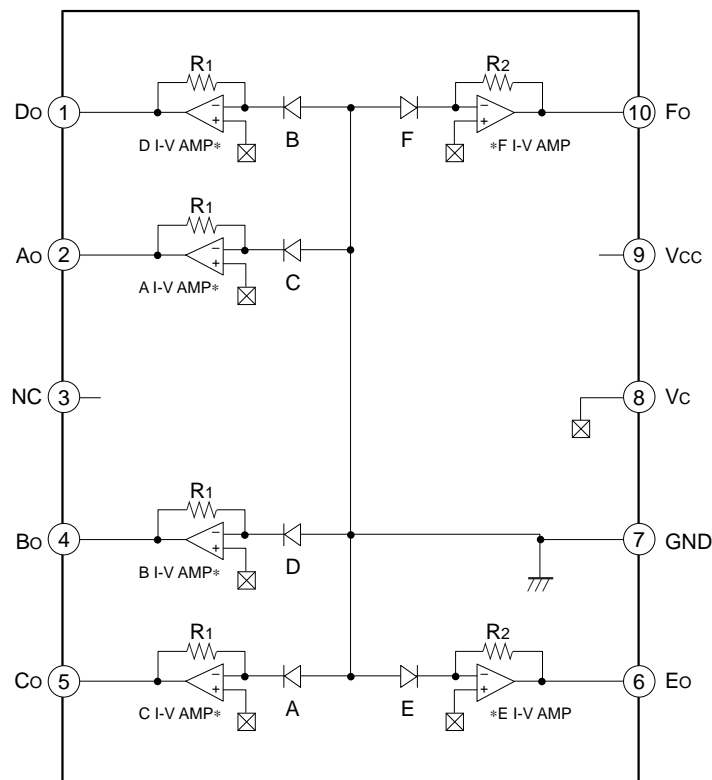
(Unit : mm)

Photodetector Pattern Dimensions



(Unit : μm)

Circuit Block Diagram



R1=166kΩ, R2=334kΩ
A, B, C, D, E and F are photodiodes

Pin Description

Pin No.	Symbol	I/O	Equivalent circuit	Description
1 2 4 5	Do Ao Bo Co	O		Output of voltage signals converted from optical signals.
3	NC			Common with GND for the package construction.
6 10	Eo Fo	O		Output of voltage signals converted from optical signals.
7	GND	I		For a dual power supply : negative power supply For a single power supply : GND
8	Vc	I		For a dual power supply : GND For a single power supply : center voltage input
9	Vcc	I		Positive power supply

Notes on Operation

1. Connection to RF amplifiers

The CXA1753M features the voltage-output type and the voltage-input type such as the CXA1610M should be used as RF amplifiers. The noise tolerance will be greatly improved over that of conventional photodiodes used with current-input RF amplifiers.

2. Power supply

The CXA1753M can be used either with a dual power supply or with a single power supply.

However, this IC is not provided with a center voltage generating circuit, and so when used with a single power supply the center voltage must be supplied by an RF amplifier or some other device. For instance when the CXA1610M is used as an RF amplifier, the V_c input pin of the CXA1753M should be connected to the VR output pin of the CXA1610M.

In addition, note that Pin 3 is internally connected to Pin 7 (GND).

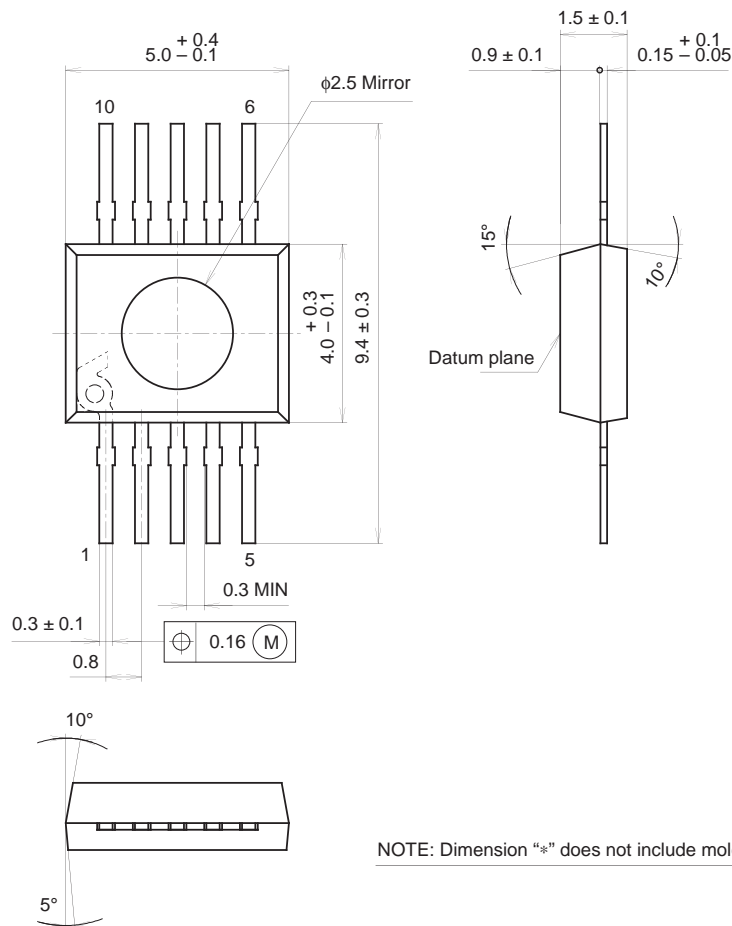
Power supply connections for each case are as follows.

	(9) V _{CC}	(7) GND	(8) V _c	(3) NC
Dual power supply	Positive power supply	Negative power supply	GND	Negative power supply or open
Single power supply	Positive power supply	GND	Center voltage	GND or open

For both a dual power supply and a single power supply, the voltage difference between the V_{CC} and GND pins should be within the range of 2.8 V and 11.0 V.

Package Outline Unit : mm

PD-S-14



NOTE: Dimension "*" does not include mold protrusion.

SONY CODE	PD-S-14
EIAJ CODE	_____
JEDEC CODE	_____

PACKAGE WEIGHT	0.06g
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