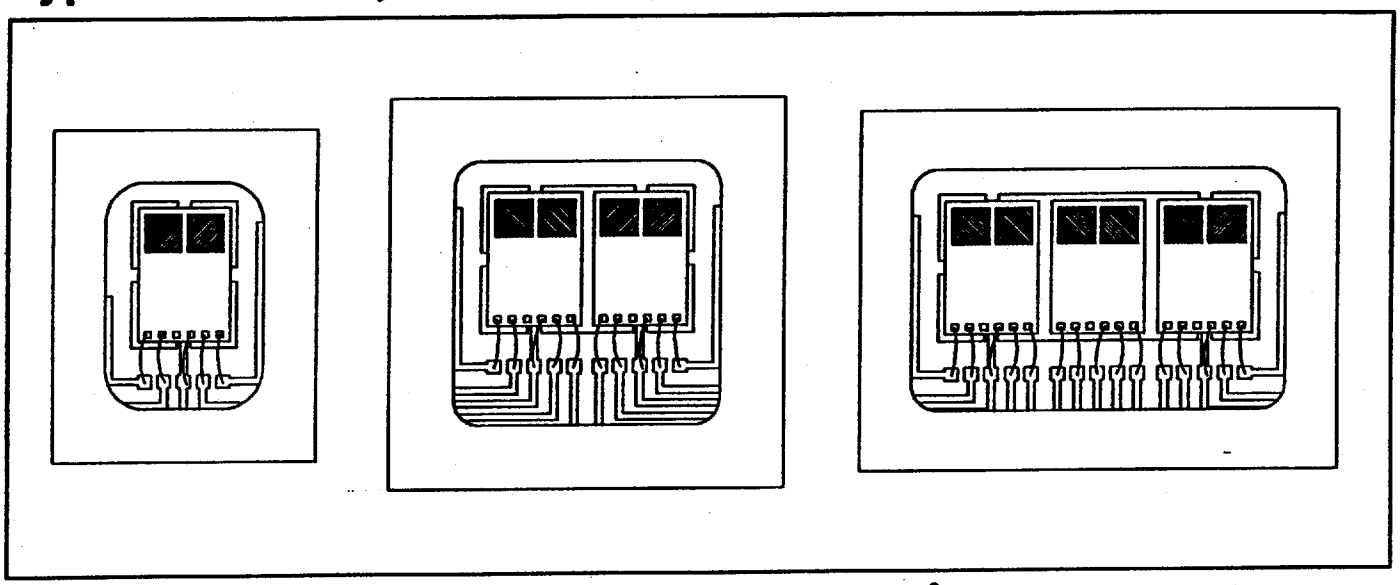
OPTEK

Product Bulletin OPR5001A
July 1991

T-41-51

Optical Comparator Arrays
Type OPR5001A, OPR5002A, OPR5003A



Features

- Surface mountable
- Multiple channels available
- TTL compatible output
- Wide supply voltage range

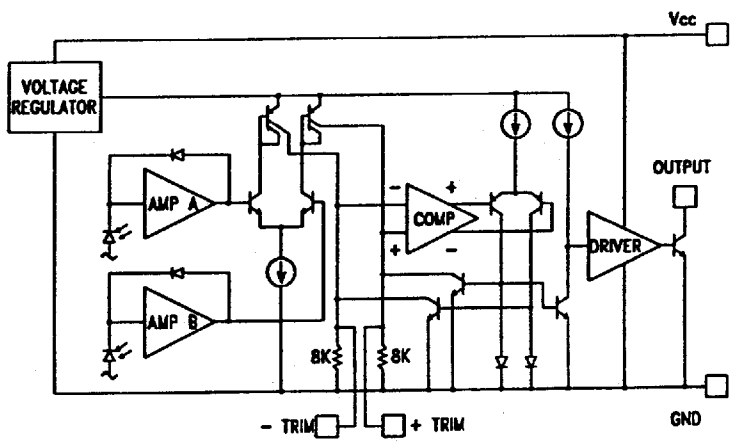
Description

The OPR5001A, OPR5002A and OPR5003A are hybrid sensor arrays consisting of one, two and three channels of the Optek OPC8031 Differential Optical Comparator, "DOC" IC. Specifically designed for encoder applications, the open collector output switches based on the comparison of input photodiode's light current levels. Logarithmic amplification of the input signals makes possible operation over a wide range of light levels.

The packages are surface mountable and made from a custom, opaque Polyimide which shields the active devices from stray light. The high temperature laminate can withstand multiple exposures to the most demanding soldering conditions. Wrap around contacts are gold plated for exceptional storage and wetting characteristics.

Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

Storage Temperature	-55°C to +125°C
Operating temperature	-20°C to +80°C
Supply Voltage	24V
Output Voltage	24V
Output Current	14mA
Power Dissipation	500mW
Soldering Temperature (Vapor Phase Reflow for 30 sec.)	235°C



OPC8031 Block Diagram

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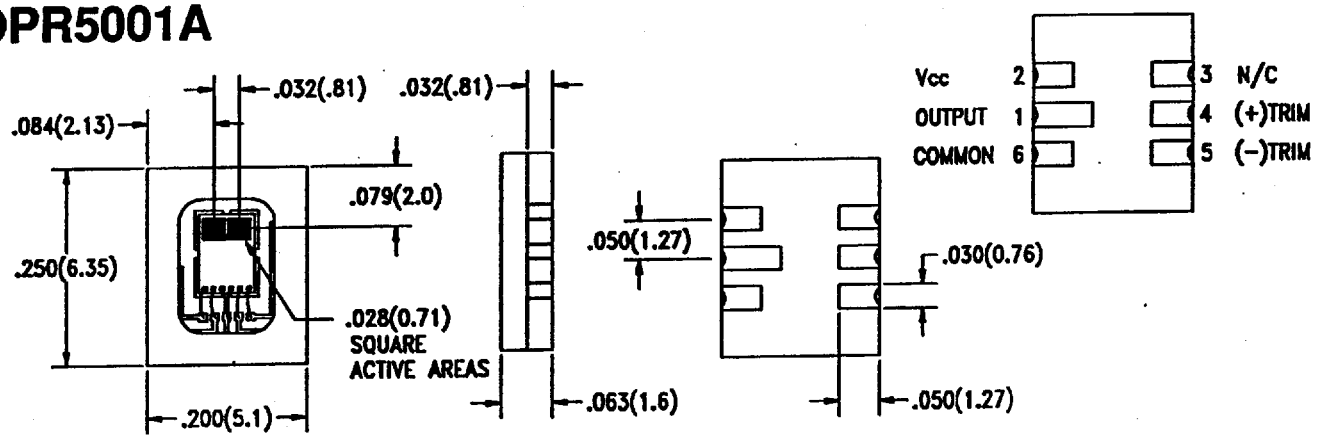
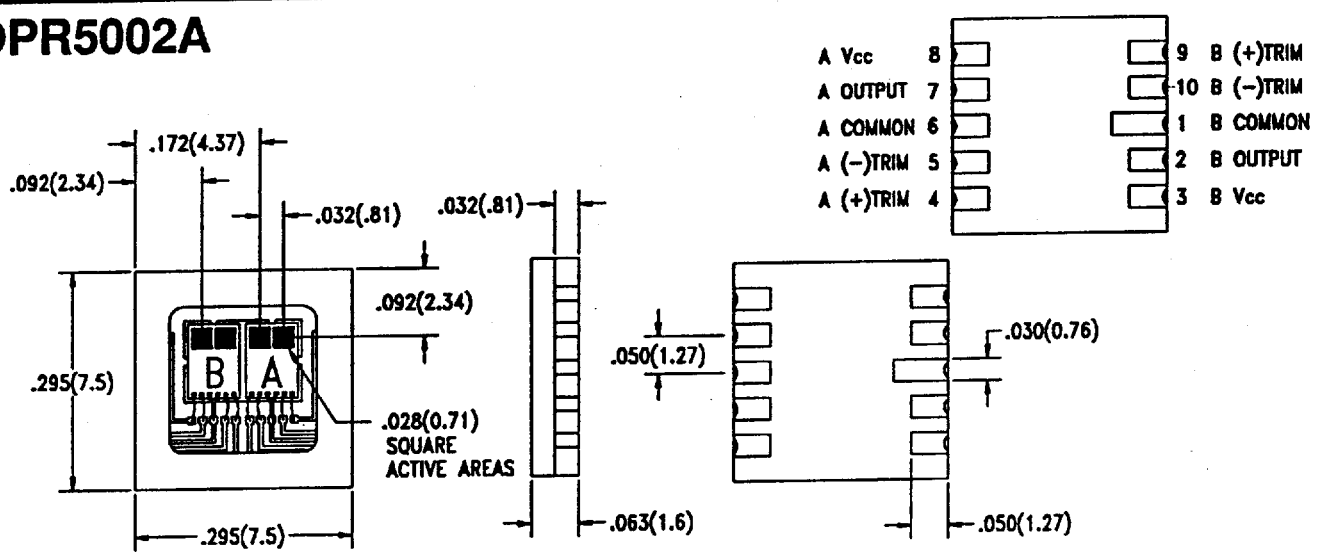
Tolerance = ± .005(± .13) unless otherwise noted.

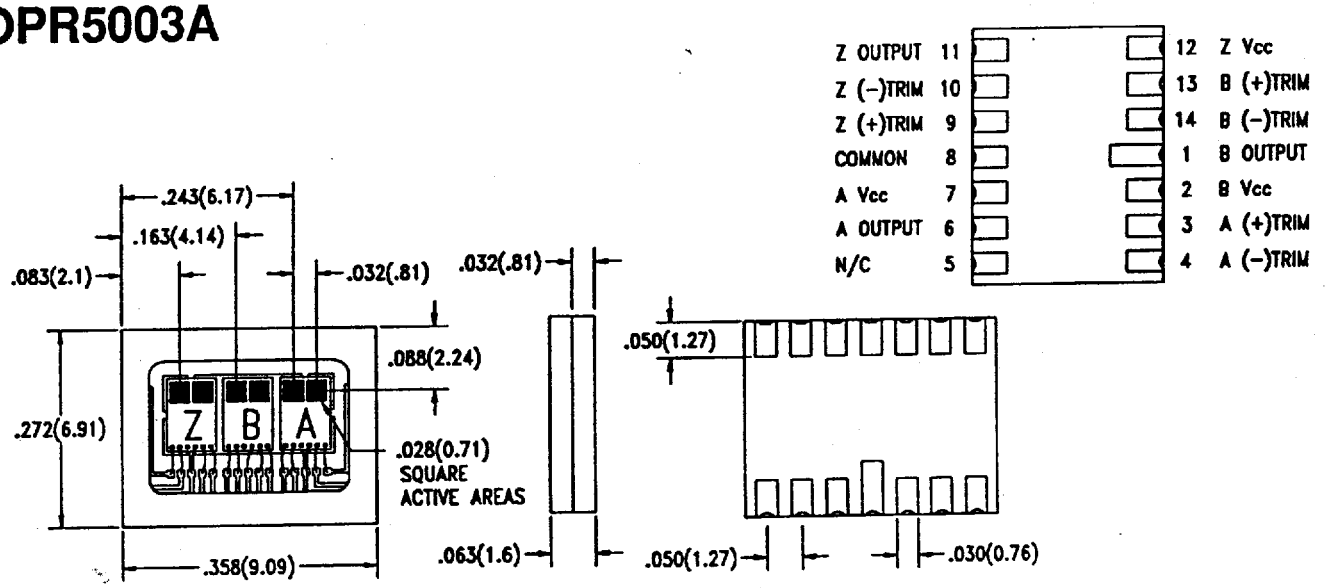
OPR5001A



OPR5002A



OPR5003A



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Electrical Characteristics (T_A = 25°C unless otherwise noted)

SYMBOL	PARAMETER		MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTES
Icc	Supply Current	5001		3	7	mA	Vcc = 24 V	1
		5002		6	14	mA		
		5003		9	20	mA		
Vol	Low Level Output Voltage			0.3	0.4	V	I_{ol} = 14 mA, Vcc = 4.5 V	2
I_{oh}	High Level Output Current			0.1	1.0	µA	Vcc = Vo = 20.0 V	3
OPT-HYS	Optical Hysteresis		2.0	15.0	40	%	Vcc = 5.0 V, I_{ol} = 1.0 mA	4, 7
OPT-OFF	Optical Offset		-40	10	+40	%	Vcc = 5.0 V, I_{ol} = 1.0 mA	4, 7
fmax	Frequency Response			100		kHz	Vcc = 5.0 V, R1 = 100 Ω, C1 = 50 pf	5
tlh	Output Rise Time			2.0		µs		6
thl	Output Fall Time			500		ns		

Notes:

1. Pin (+) = 1.2 µW and Pin (-) = 0.8 µW.
2. Pin (+) = 100.0 nW and Pin (-) = 1.0 µW.
3. Pin (+) = 1.0 µW and Pin (-) 100.0 nW.
4. Pin (-) held at 1.0 µW while Pin (+) is ramped from 0.5 µW to 1.5 µW and back to 0.5 µW.
5. Pin (+) modulated from 1.0 µW to 2.0 µW. Pin (-) modulated from 1.0 µW to 2.0 µW with phase shifted 180° with respect to Pin (+).
6. Measured between 10% and 90% points.
7. Optical Hysteresis and Optical offset are found by placing 1.0 µW of light on the inverting photodiode and ramping the light intensity of the noninverting input from .5 µW up to 1.5 µW and back down. This will produce two trigger points, an upper trigger point and lower trigger point. These points are used to calculate the optical hysteresis and offset.

These are defined as:

$$\% \text{ Optical Hysteresis} = 100 \times \frac{(P_{rise} - P_{fall})}{P_{in(-)}}$$

$$\% \text{ Optical Offset} = 100 \times \frac{(P_{average} - P_{(-)})}{P_{in(-)}}$$

Where:

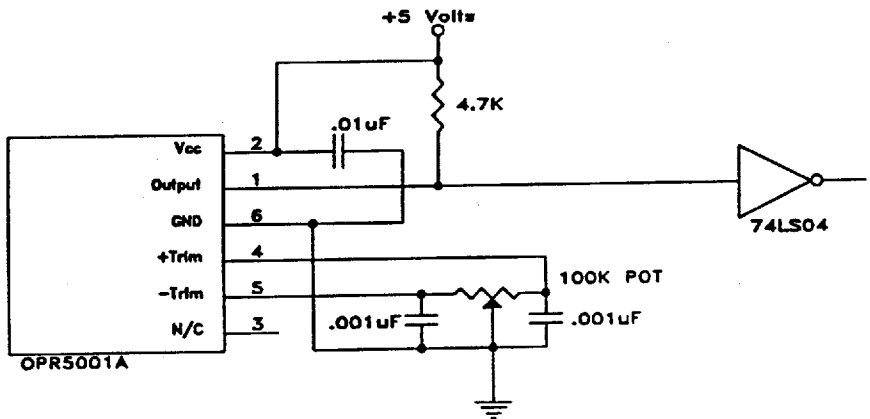
$P_{in(-)}$ = Light level incident upon the "-" photodiode on the I.C. chip (Pin (-) = 1.0 µW).

P_{rise} = Value of light power level incident upon the "+" photodiode that is required to switch the digital output when the light level is an increasing level (rising edge).

P_{fall} = Value of light power level incident upon the "+" photodiode that is required to switch the digital output when the light level is a decreasing level (falling edge).

$$P_{average} = \frac{(P_{rise} + P_{fall})}{2}$$

Application Circuit



Notes:

1. A capacitance of a value between .001 to .01 µF connected as close as possible to the trim terminals is recommended if the device appears to be susceptable to noise transients. It is left to the user to determine the best value for the application.
2. The 74LS04 is recommended as a means of isolating the "DOC" comparitor circuitry from transients induced by inductive and capacitive loads.
3. It is recommeded that a decoupling capacitor be placed as close as possible to the device.

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