Four Quadrant Photodiode PR5401

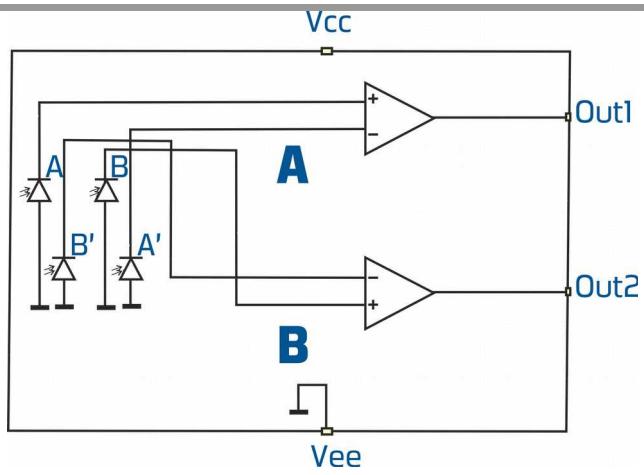
Two differential pairs of photodiodes with amplifiers

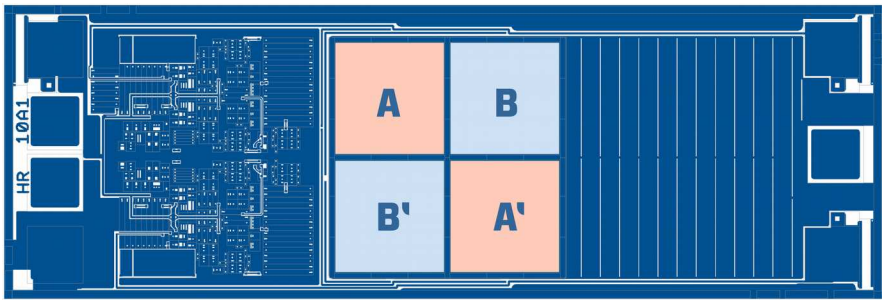
PR5401 consists of two pairs of photodiodes placed in opposite quadrants with diffferential amplifiers. If illuminated uniformly, the output is Vcc/2, but depends on the balance of illumination on each pair.

APPLICATIONS

- Light beam alignment
- 2D optical tracking
- tilt sensor

BLOCK DIAGRAM





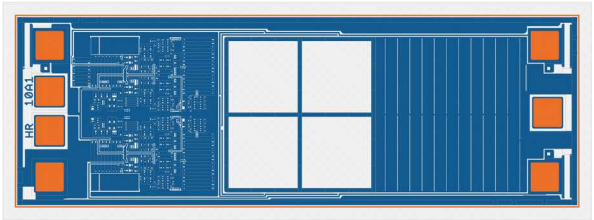
Light orange: A photodiodes; light blue: B photodiodes

PACKAGES

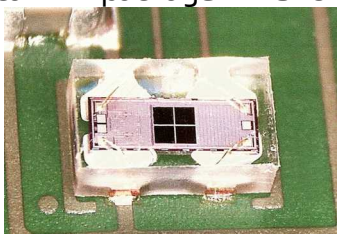
The PR5401 is offered as bare die or in a tiny optical DFN package.

Die size: 2,500 µm x 900 µm

a) IC as bare die – PR5401-**BD**



b) In optical DFN package - PR5401-**TM**



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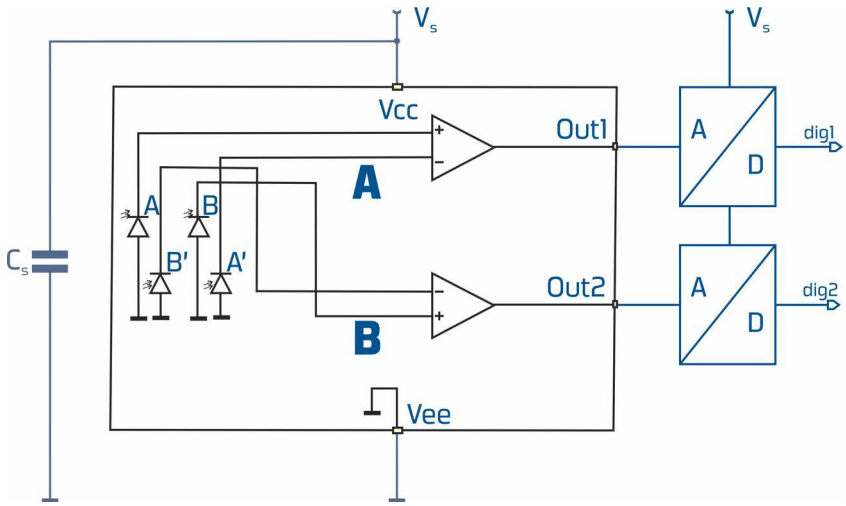
ODFN-4L 1.8mm x 2.9mm package.

Application Circuit



The output is usually connected to a power amplifier or an analog-digital converter.

Electrical Characteristics

ABSOLUTE MAXIMUM RATINGS

Parameter		Min	Typ	Max	Units
V_{CC} (supply voltage)		-0.3		8	V
V_{PIN} (voltage @ other pins)		-0.3		V_{CC}+0.3	V
Operating Temperature	PR5401-BD PR5401-TM	-40 -40		85 85	°C °C
Storage Temperature Range	PR5401-BD PR5401-TM	-55 -40		125 100	°C °C
T_J (Junction Temperature)	PR5401-BD PR5401-TM	-40 -40		85 85	°C °C
Electrostatic Discharge (ESD) Protection @ all pins	HBM	4			kV

OPERATING CHARACTERISTICS

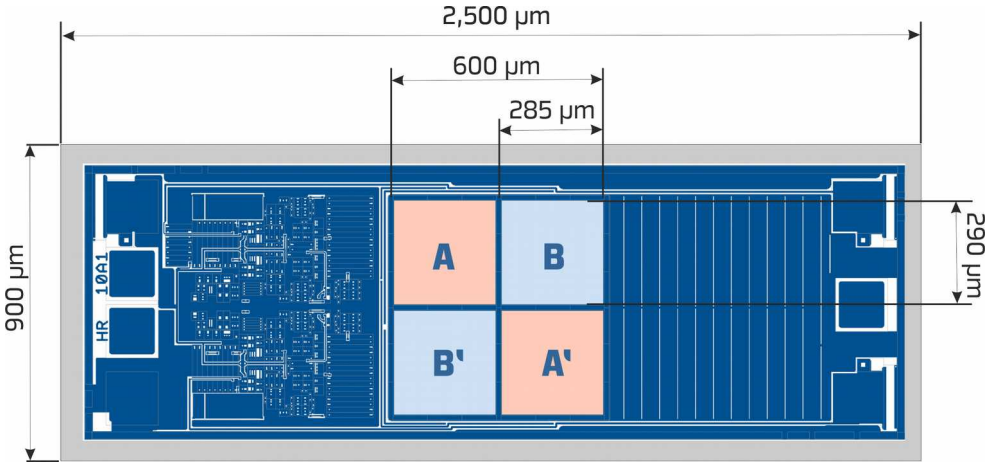
V_{CC} = 5.0 V, T_J = -40...85°C (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{cc}	Supply voltage		2.5	3.3	8	V
I_{CC}	Supply current (no load)		0.23		1.0	mA
Output characteristics						
I_{Load}(Lo)	Out current (Out vs. GND)				0.1	mA
Photosensors						
λ_{ar}	Spectral application range	Se(λar)=0.25*λ_{peak}	500		950	nm
λ_{peak}	Peak sensitivity			800		nm

Test pins are used for chip test only. Their use is not further described in this document.

Four Quadrant Photodiode PR5401

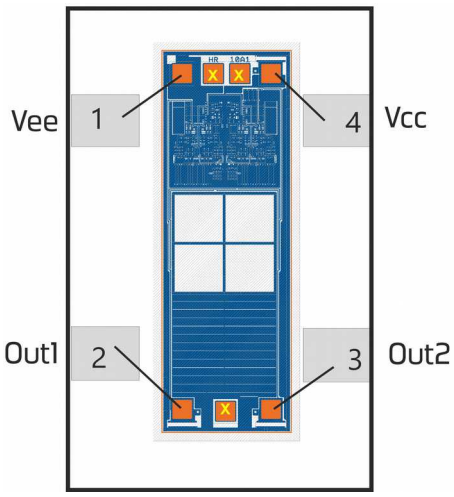
Photodiodes – Dimensions



General dimensions:

- Die size: 2,500 µm x 900 µm (measured between centres of scribe lane)
- Photodiodes active area: approx. 285 µm x 290 µm x 4
- Pad window: 120 µm x 120 µm
- For ODFN-4L package: Chip centre may be offset by up to 200 µm from package centre in any direction.

PIN DESCRIPTION



Pin No	Pin Name	Pin Function Description
1	Vee	negative supply voltage
2	Out1	A channel amplifier output
3	Out2	B channel amplifier output
4	Vcc	positive supply voltage

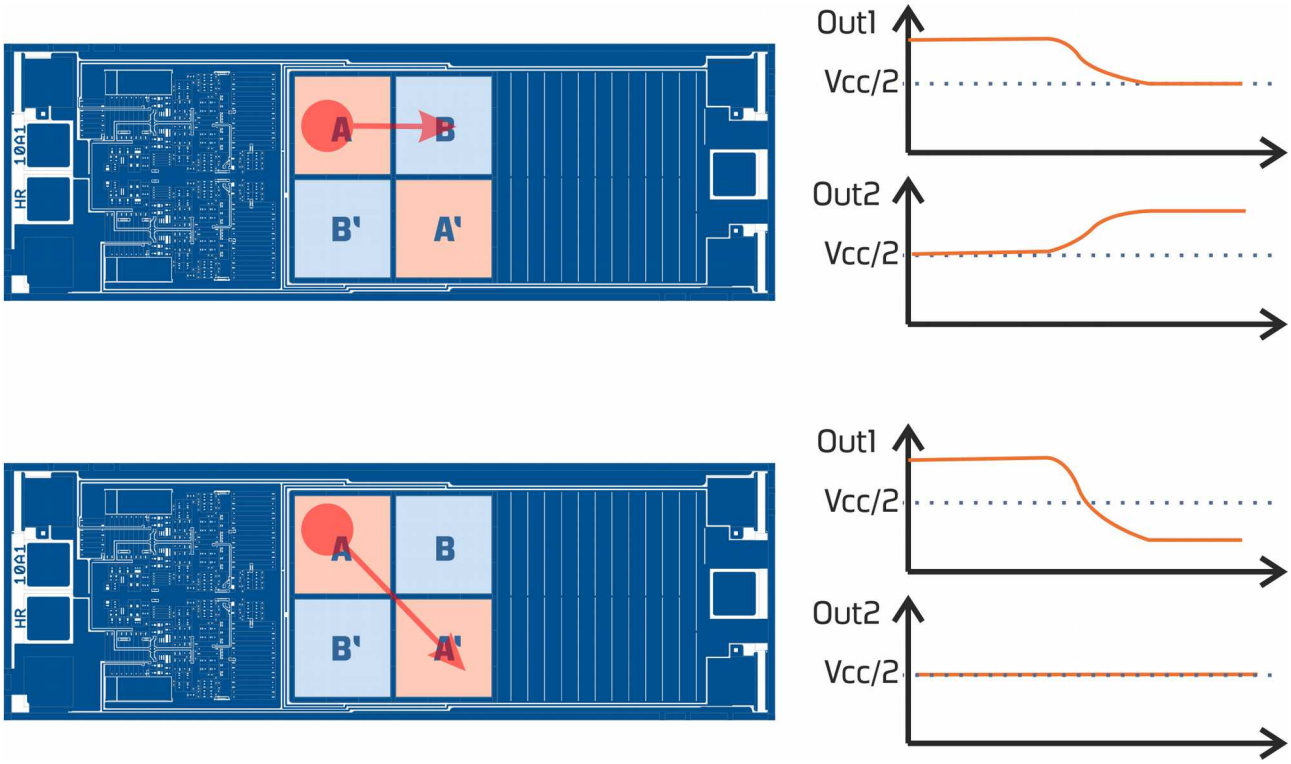
Test pins are for chip test only and not described in this document.

Four Quadrant Photodiode PR5401

Application Examples

The following applications examples are meant as suggestions. PREMA does not guarantee usability and cannot give application support for the use in specific devices.

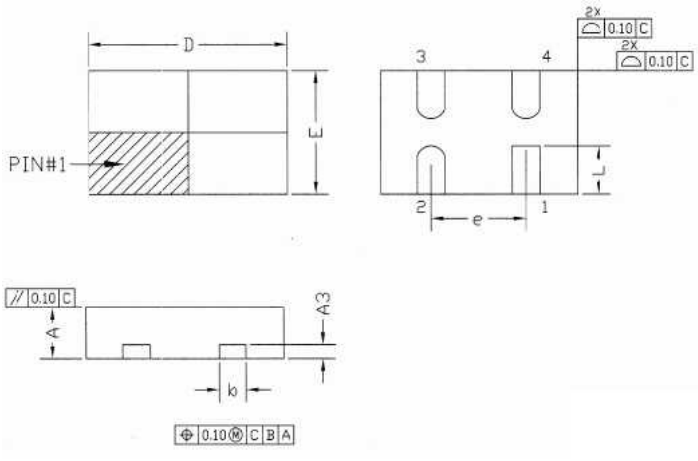
OPTICAL BEAM CENTERING OR MOTION DETECTION



Four Quadrant Photodiode
PR5401

PR5401-TM - Package Dimensions

ODFN-4L-1.8x2.9 PACKAGE



SYM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	0.90	0.95	0.033	0.035	0.037
A3		0.20 REF.			0.008 REF.	
b	0.35	0.40	0.45	0.014	0.016	0.018
D	2.80	2.90	3.00	0.110	0.114	0.118
E	1.70	1.80	1.90	0.066	0.070	0.074
e		1.40 BSC			0.055 BSC	
L	0.60	0.70	0.80	0.023	0.027	0.031

NOTES:
1. CONTROLLING DIMENSION IN MM.
2. PACKAGE DIMENSION DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS, BURRS OR METAL SMEARING.
3. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE EXPOSED TERMINALS. MAXIMUM COPLANARITY SHALL BE 0.003 [0.08].
4. WARPAGE SHALL NOT EXCEED 0.004 [0.10].

A lead-free solder profile with a peak temperature of 260°C or less, according to J-STD-020 should be followed.
Samples shipped without moisture barrier bag must be dry-baked according to JEDEC guidelines before soldering. Manual soldering may not be possible or must be done with utmost care.
Direct infrared heating should be avoided; pure convection heating is recommended. There is no experience with gas phase soldering.

PRELIMINARY DATASHEET - DATA MAY CHANGE WITHOUT NOTICE

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