AsahiKASEI
MICRODEVICES

AK9791W
Mid-IR photodiode

1. General Description

The AK9791W is a mid-infrared quantum photo diode. It can work at room temperature. AK9791W can be used for multipurpose applications such as human presence detection or non-contact body surface thermometer.
AK9791W can be used with AK9757W.

2. Features

- ☐ Mid-infrared (Mid-IR) photodiode
- ☐ Fast response
- ☐ Wafer supply
- ☐ Small chip size: 0.462mm x 0.290mm
- ☐ Application
  - Human presence detection
  - Non-contact body surface thermometer

3. Table of Contents

4. Block Diagram and Functions

4.1. Block Diagram

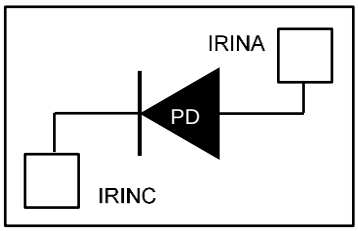


Figure.4.1 Block diagram

4.2. Functions

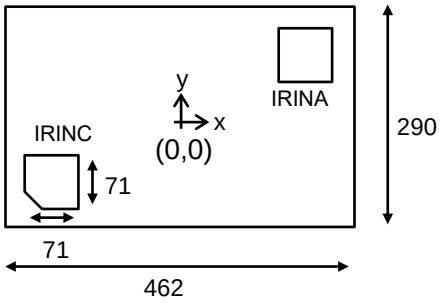
Table.4.1 Block functions

Block	Function
PD	Mid-infrared photodiode

5. Dimensions and Functions

5.1. PAD configurations, Chip dimensions & Cordination

Unit: μm



Top View
Figure 5.1 Image of dimension & direction

Table 5.1 PAD coordination (center of chip (0, 0))

PAD No.	PAD Name	Size(x,y) [μm]	Location(x,y)[μm]
1	IRINC	71, 71	-165.3, -79.5
2	IRINA	71, 71	165.3, 79.5

- Chip size includes 50μm of scribe width.
- Chip thickness is 233μm.
- Bottom side is coated by anti-reflection film

5.2. Functions

Table.5.2 PAD functions

PAD No.	PAD Name	Function
1	IRINC	Cathode PAD
2	IRINA	Anode PAD

6. Absolute Maximum Ratings

Table 6.1 Absolute maximum ratings

Parameter	Symbol	min	max	Units
Storage temperature	Tst	-40	85	°C

WARNING:
Operation at or beyond these limits may result in permanent damage to the device.
Normal operation is not guaranteed at these extremes.
Do not apply voltage between IRINA and IRINC, intentionally.

7. Recommended Operating Conditions

Table 7.1 Recommended operation conditions

Parameter	Symbol	min	Typ	max	Units
Operating temperature	Ta	-30	-	85	°C
IRINA-IRINC Bias Voltage (*1)	Vbias	-	0	-	V

Note:
*1: Do not apply voltage between IRINA and IRINC, intentionally.

8. Electrical Characteristics

Table 8.1 Electrical characteristics
(Unless otherwise specified, operation under the room temperature; Ta= 25ºC)

Parameter	Symbol	min	Typ	max	Unit
Internal resistance (*2)	R0	10.5	-	50.9	kΩ
Output current (*3,*4)	Ip	-	1.8	-	nA

Note:

*2: Measurement conditions:

- Average value of resistance at ±0.01V.

$$R0 = \frac{R(+0.01V) + R(-0.01V)}{2}$$

*3: Measurement conditions:

The test is done by the equivalent light source as below.

- Light source: Flat Blackbody
  Flat Blackbody furnace covers entire FOV(115deg)
- Surface temperature: 45°C
  Light is irradiated from the back side.

*4: Reference data only, not tested in production.

9. Optical Characteristics (reference)

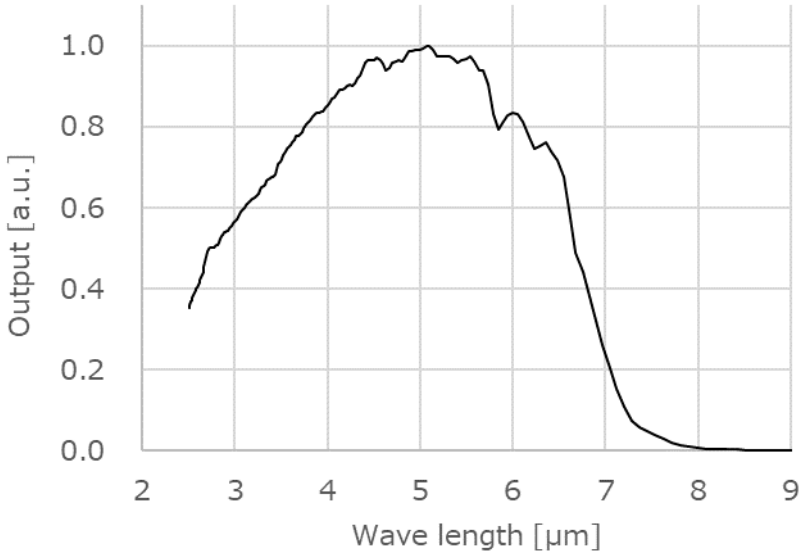


Figure 9.1 Optical sensitivity spectrum

10. Precautions

<Electrostatic Discharge (ESD)>

This product is sensitive to Electrostatic Discharge (ESD). When handling the product, please be careful about the following matters.

- When you handle the product, please work in the environment to protect against static electricity (ex. more than 40%RH).
- Always use an ESD wrist strap and wear antistatic clothes.
- Please take electrostatic measures of the container etc. where the product touches directly.

<Storage Environment>

Please avoid exposed to direct sunlight. Please keep it as much as possible at room temperature and normal humidity. The desirable condition is 5 - 35 ºC and 40 - 85%RH. In addition, please keep the product away from the chlorine gas and the causticity gas. When this product is kept in inappropriate environment, it may influence product properties.

<Other Precautions>

As Gallium Arsenide (GaAs) and Indium Antimonide (InSb) are used for this product, please be careful about the following matters.

1) Please do not take this product to burning and melting and destroys, chemical processing etc..
2) When you discard this product, please handle it according to related laws and your regulations on waste disposal.

Please be careful not to damage and pollute the sensor surface because the sensor properties may change.

11. Ordering Guide

AK9791W -30 to 85ºC wafer thickness:233µm(Typ)

12. Revision History

Date (Y/M/D)	Revision	Reason	Page	Contents
2023/02	00	First edition	-	-
2023/05/19	01	Correction	7	Corrected a typo in chapter title.

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