



## JAPAN INTERFACE

*Japanese Legal Translation Services*

T. 202.393.3333

asami@japaninterface.com

### CERTIFICATION OF TRANSLATION

I, Asami Isomichi, hereby declare:

1. I am a Japanese language translator.
2. I have over 25 years experience translating technical, legal, and business documents from Japanese to English, and from English to Japanese.
3. I certify that the English translation of the document identified below is a true and correct translation, to the best of my knowledge and ability, of the original Japanese document:

- Japanese Unexamined Patent Application Publication No. S61-131690

I hereby certify under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 25th day of January, 2016.

By: \_\_\_\_\_

Asami Isomichi

---

P. O. Box 7527, Washington, DC 20044

(12) Publication of Unexamined Patent Application (A)

S61-131690

(51) Int. Cl.<sup>4</sup>

ID Code

JPO Reference No.

(43) Published June 19, 1986

H 04 N 5/335

8420-5C

H 01 L 27/14

7527-5F

Examination has not been requested. No. of Invention 1 (Total 3 pages)

(54) Title of the Invention SOLID-STATE IMAGE PICKUP DEVICE

(21) Application No. S59-251580

(22) Application Date November 30, 1984

(72) Inventor Tsunekazu Yoshino, c/o Toshiba Corporation, Yokohama Metal Plant, 8 Shinsugita-cho, Isogo-ku, Yokohama

(72) Inventor Takuji Yanagisawa, c/o Toshiba Corporation, Yokohama Metal Plant, 8 Shinsugita-cho, Isogo-ku, Yokohama

(71) Applicant Toshiba Corporation, 72 Horikawa-cho, Saiwai-ku, Kawasaki

(74) Agent Patent Attorney Kensuke Norichika and one other

## Specification

## 1. Title of the Invention

Solid-state image pickup device

## 2. Claims

(1) A solid-state image pickup device characterized by comprising a solid-state image sensor, a packaging substrate supporting said solid-state image sensor and having an opening tapered so as to expand the edge as it becomes more distant from said solid-state image sensor's photoreceptive surface, a light transmitting glass plate adhesive bonded to said packaging substrate so as to cover said opening, and electrode leads connected to said solid-state image sensor's bonding pads via a conductive bonding material.

(2) A solid-state image pickup device according to claim 1 characterized such that said packaging substrate comprises black ceramic at least on the light incident side.

3. Detailed explanation of the Invention  
(Field of the Invention)

The present invention relates to a solid-state image pickup device, particularly to a packaging structure for disposing a solid-state image sensor.

## (Background Art)

FIG. 2 is a sectional view showing an example of a conventional solid-state image pickup device. This solid-state image pickup device has a recessed section (1<sub>3</sub>) in the center of the packaging substrate (1) comprising a stepped section (1<sub>1</sub>) and a bottom section (1<sub>2</sub>), and electrode leads (2) are formed from the stepped section (1<sub>1</sub>) towards their ends so as to penetrate the packaging substrate (1). A solid-state image sensor (3) having a photoelectric conversion function is secured on the bottom section (1<sub>2</sub>) via a conductive adhesive (4), and the bonding pads (5) of the solid-state image sensor (3) and the bonding pads (6) of the electrode leads (2) are connected by metal wires (7). At the end of the opening of the packaging substrate (1), a light transmitting glass plate (8) is secured using an adhesive (9). A light-shielding frame (10) is provided in the peripheral section of the light transmitting glass plate (8) in order to prevent unnecessary light from being reflected and intruding inside to adversely affect the photoelectric properties of the solid-state image sensor (3).

## (Problems with the Prior Art)

For this solid-state image pickup device, however, space constraints are unavoidable because

extraction from the solid image sensor (3) to the electrodes is achieved via metal wires (7) by a bonding step performed for regular semiconductor devices. Therefore, the needs for more compact devices in the electronic camera field, or the like, cannot be fully addressed. The light-shielding frame (10), moreover, has a role of preventing false signals, such as flare, or the like, which is irrelevant to imaging, from being generated by the light reflected in the periphery of the solid-state image sensor. However, since the space between the light-shielding frame (10) and the solid-state image sensor (2) is expansive to some extent, it cannot fully prevent the light from intruding diagonally, and the effect described above is far from being completely achieved.

#### (Objective of the Invention)

The present invention was created in order to solve the shortcomings described above, and has an objective of providing a compact solid-state image pickup device capable of fully shielding the light from the periphery of the solid-state image sensor.

#### (Summary of the Invention)

The present invention is a solid-state image pickup device characterized such that the opening of the packaging substrate supporting a solid-state image sensor is tapered so that the edge of the opening expands as it becomes more distant from the solid-state image sensor's photoreceptive face, and extraction from the solid-state image sensor to the electrodes is achieved via a conductive bonding material.

#### (Example of the Invention)

The present invention will be explained in greater detail below with reference to the drawing.

FIG. 1 is a cross-sectional view of one example of the invention. In this solid-state image pickup device, the packaging substrate (20), for example, a black ceramic substrate, is constructed by stacking ceramic molded frames (20<sub>1</sub>) and (20<sub>2</sub>), and the electrode leads (21) are provided in a pin-socket format disposed so as to penetrate the packaging substrate (20) above the ceramic molded frame (20<sub>1</sub>). The light transmitting glass plate (22) is hermetically secured to the ceramic molded frame (20<sub>2</sub>) using black fritted glass beforehand so as to cover the tapered opening (23) of the packaging substrate (20). The solid-state image sensor (25) is placed so that the bonding pads (26) of the solid-state image sensor (25) are aligned

with the electrode leads (21), and the bonding pads (26) and the electrode leads (21) aligned therewith are connected via a conductive bonding material (27), for example, indium. The electrode leads (21) are coated with the conductive bonding material (27) by means of plating, brazing, or the like. By supporting the solid-state image sensor (25) in the packaging substrate (20) via a molded resin (28), a desired solid-state image pickup device is obtained. The edge of the interior face of the ceramic molded frame (20<sub>2</sub>) is tapered so as to expand as it becomes more distant from the photoreceptive face (25<sub>1</sub>) of the solid-state image sensor (25). The smallest area of the opening (23) formed by this is set to the size that can at least cover the effective photosensitive section of the solid-state image sensor (25). The opening (23), moreover, is established between the solid-state image sensor (25) and the light transmitting glass plate (22).

In this example, the electrode leads (21) and the bonding pads (26) are electrically connected by crimping while interposing the conductive bonding material (27), and thus the space can be reduced to make the device compact as compared to metal wire bonding. Providing the tapered shape to the opening (23), as shown in FIG. 1, can completely prevent the light irrelevant to the solid-state image pickup device's image capturing from being reflected in the periphery, eliminating the reflected light therefrom to adversely affect the photoelectric properties of the solid-state image pickup device. Furthermore, no heating is required in the step of incorporating the solid-state image sensor (25) into the packaging substrate (20) to which the light transmitting glass plate (22) has already been hermetically bonded. For example, a solid-state image sensor for capturing color images has an organic color filter formed on its surface, which normally has no tolerance to high temperatures of 150°C or higher. In this regard, not requiring heating is a significant advantage.

In this example, the electrode leads (21) take the form of a pin-socket, but they may be printed on the packaging substrate (20), or small terminals that can be directly soldered onto an external circuit. Moreover, the packaging substrate (20) is constructed with a black ceramic, but there is no need to be limited to this. Considering the light-shielding effect, however, it is desirably black colored.

#### (Effect of the Invention)

As explained above, the solid-state image pickup device of the invention is compact as it requires no space for metal wire bonding, and is fully capable of shielding light from the periphery of the solid-state image sensor as the shape of the opening of the packaging substrate is devised.

#### 4. Brief Explanation of the Drawings

FIG. 1 is a view showing an example of the present invention. FIG. 2 is a view showing an example of a conventional solid-state image pickup device.

- (20) --- packaging substrate
- (21) --- electrode lead
- (22) --- light transmitting glass plate
- (25) --- solid-state image sensor

FIG. 1

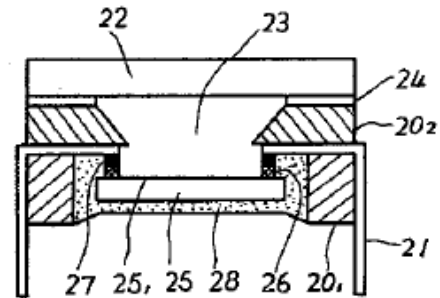
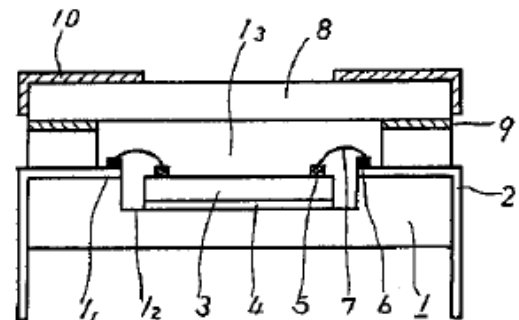


FIG. 2



Agent: Patent Attorney Kensuke Norichika  
(One other)