

NEWS RELEASE

New high-speed InGaAs area image sensor with a wider dynamic range, and increased speed and accuracy for plastic sorting and similar applications

October 10, 2023

Hamamatsu Photonics K. K.

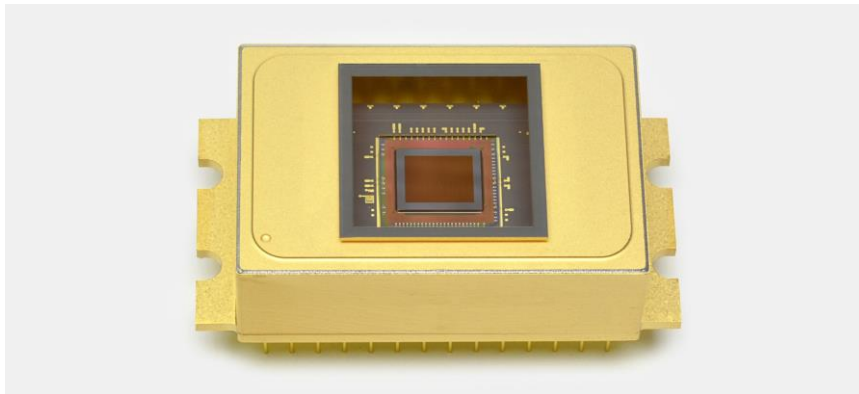
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By leveraging our unique circuit design technology, Hamamatsu Photonics has successfully designed and developed a new near-infrared area image sensor. It boasts a high speed and a wide dynamic range¹ which has increased by up to two times compared to current products for hyperspectral cameras². Named the G16564-0808T, it is made from indium (In), gallium (Ga), and arsenic (As) materials. The user can select the signal read-out wavelength, making it widely applicable to the imaging and measurement of objects with different material compositions and sizes such as for plastic recycling and quality control in drugs and foods including plant-based alternatives.

As we strive for a more sustainable society, we envision that this new area image sensor will be essential for decarbonization and used as a countermeasure to cope with food shortages caused by population growth.

Sales of the G16564-0808T will start on Wednesday, November 1 this year for domestic and overseas manufacturers of industrial cameras. The G16564-0808T will also be on display at PHOTON FAIR 2023 which is an all-inclusive Hamamatsu Photonics exhibition showing off our advanced technologies and products held from November 16 at Act City Hamamatsu (Naka-ku, Hamamatsu City, Japan).

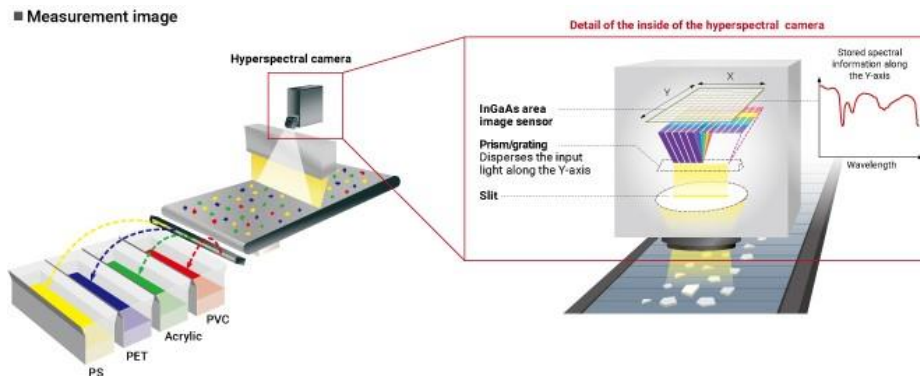


G16564-0808T InGaAs area image sensor

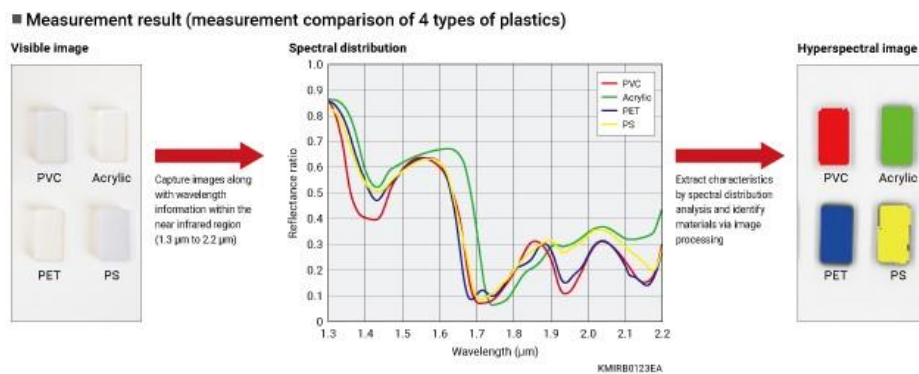
- 1: Ratio of the minimum to maximum intensity of light that is discernable. The larger this ratio, the more accurately the higher and lower intensity of the light can be simultaneously measured.
- 2: A special camera that can capture the intensity of light reflected from an object while separating the light into wavelengths. It is capable of imaging the differences in the material and composition of objects that cannot be seen with a normal camera.

Product overview

Hyperspectral cameras are used to sort out plastics containing flame-retardant resins by capturing clear images. For these cameras we have been developing, manufacturing and selling image sensors capable of detecting near-infrared light up to 2.55 μm which is the world's longest wavelength detectable by area image sensors made of indium gallium arsenide (InGaAs).



Concept image of measurement using a hyperspectral camera



Measurement results obtained with a hyperspectral camera

The plastic recycling and food screening/sorting (detection of water decay in fruits and component analysis of drugs) markets have seen a rise in demand for area image sensors with different shapes, faster readout speed, and wider dynamic range than found in currently available products.

We have redesigned the image sensor readout circuit to process electrical signals in parallel and in this way boosted the signal readout speed up to 2 times faster than ever before. At the same time, we added a function that reads out only signals at specific light wavelengths of the target object to achieve even higher speeds. The redesigned signal processing circuit also improves the signal current flow and increases the dynamic range by approximately 2-fold, allowing utilization of target object information that was undetectable up to now.

In plastic recycling, for example, it will screen large volumes of plastic material in the same amount of time as before, yet with better sorting/screening accuracy. Furthermore, this sensor is applicable across a wider range of fields and to countless tasks such as paper recycling and detecting deterioration in concrete and housing construction materials to name a few.

We will also continue designing and manufacturing camera modules integrated with this area image sensor as well as other types of area image sensors having a wider spectral response range from 0.95 to 2.55 μm .

Main features

1. Up to two times increase in readout speed and dynamic range

The electrical signal readout speed has been increased up to about 2 times by using a decoder circuit in the readout circuit. The dynamic range was also improved up to about 2 times by using a depression type signal processing circuit that lowers the threshold voltage to improve electrical current flow.

2. Multi-line readout

A multi-line readout function was added to the circuit to read signals at specific light wavelengths. The readout speed can be boosted even further by focusing the readout on just near-infrared wavelengths that are easily reflected by the target object for screening.

●Main specifications

Parameter	G16564-0808T	Unit
Spectral response range	1.7 to 2.55	μm
Number of pixels	320 × 256	ch
Pixel pitch	20	μm
Frame rate ¹	503	fps
Dynamic range ²	3000	-

1: Higher frame rate settable by selecting readout lines. For example, in the case of 5-line readout, the frame rate can be enhanced up to about 46 times when compared to that of all-pixel readout.

2: Two times greater than dynamic range of our currently available products.