NEWS RELEASE

Hamamatsu Photonics has developed a highly functional and reliable pulsed laser diode for in-vehicle LiDAR.
Mounted in a ceramic package with excellent heat dissipation, this new pulsed laser diode ensures stable operation even at high temperatures up to 105°C.

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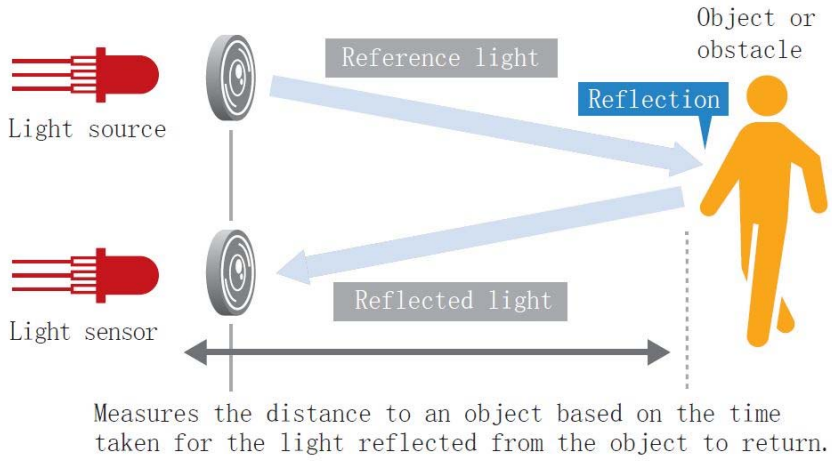
Hamamatsu Photonics succeeded in developing a “4-channel pulsed laser diode” that uses a ceramic package with excellent heat dissipation to ensure high reliability required for automotive applications and still emits stable light even in high temperature environments up to 105°C.

Using this new pulsed laser diode as the light source for in-vehicle LiDAR modules allows more accurate measurement of objects at far away distances and over wide areas. We will start shipping sample products of this new pulsed laser diode from next year to automotive manufacturers planning full-scale mass production of self-driving cars that are expected to be available in the near future.

This new pulsed laser diode will be on display at the Hamamatsu Photonics exhibition “PHOTON FAIR 2018” to be held for the first time in 5 years at Act City Hamamatsu (Naka-ku, Hamamatsu City, Japan) for 3 days from November 1 (Thursday).

[NOTE] LiDAR: A surveying technique that measures the distance to an object and its 3-dimensional information such as shape by irradiating the object with laser light and detecting he reflected light.



Principle of distance measurement

<Overview of new PLD>

For automotive applications such as collision avoidance, Hamamatsu Photonics already manufactures and sells pulsed laser diodes (PLD) mounted in metal can packages that deliver stable operation even in high temperature environments up to 105°C. Among in-vehicle LiDAR applications, there is recently a growing demand for long-range LiDAR that measures objects more accurately at far distances and over wide areas. This will also increase demand for PLD with higher output power and faster response time. However, enhancing the performance of metal can package PLD to meet such needs is very difficult from the viewpoint of cost and size.

Our new PLD employs a hollow ceramic package that exhibits high reliability equivalent to the can package type and emits stable laser light even at high temperatures. The new PLD also incorporates 4 PLD chips in the ceramic package and so provides a high output power 4 times greater than currently available can package types. These 4 PLD chips are directly mounted (surface mounted) in the package to minimize and optimize electrode wiring patterns and so shorten the laser light pulse width by 20% and enhance the response time as well. The PLD chips are also mounted at a high density that reduces the cubic size of the package to a mere one-fifth the size of the can package type. This makes our new PLD easier to mount into in-vehicle LiDAR modules and so helps meet the demand for self-driving cars that are expected to go into full-scale mass-production in the near future.

Since LiDAR systems use a light emitter (PLD etc.) and light sensor (photodiode etc.) together as one set, the performance characteristics of the light emitter and sensor must be optimized to match each other. Hamamatsu Photonics is one of few companies in the world that manufacture both light emitters and sensors and so can offer both light emitters and sensors that best meet customer and market needs.

Aiming at boosting output power and response time even further, we will continue to develop PLD chips and ceramic packages that respond to ever growing market needs.

<Features of new PLD>

(1) Stable operation at high temperatures up to 105°C

Using a hollow ceramic package with excellent heat dissipation guarantees stable operation even in high temperature environments up to 105°C and satisfies the tough reliability requirements needed for automotive applications.

(2) High laser power generated by multichannel output

The 4 PLD chips mounted in the package deliver high output power that is about 4 times that of a single-channel PLD, allowing laser irradiation onto objects at far off distances and over wide areas.

(3) Short pulse and high repetition rate operation due to optimized electrode wiring patterns

The optimized electrode wiring patterns formed within the package shorten the laser pulse width by 20% compared to the can package type, achieving pulse operation at a high repetition rate. This increases the amount of information obtained per unit time and so allows more accurate measurement of the distance and shape of objects even from a moving car.

(4) Greatly miniaturized by high-density mounting of PLD chips

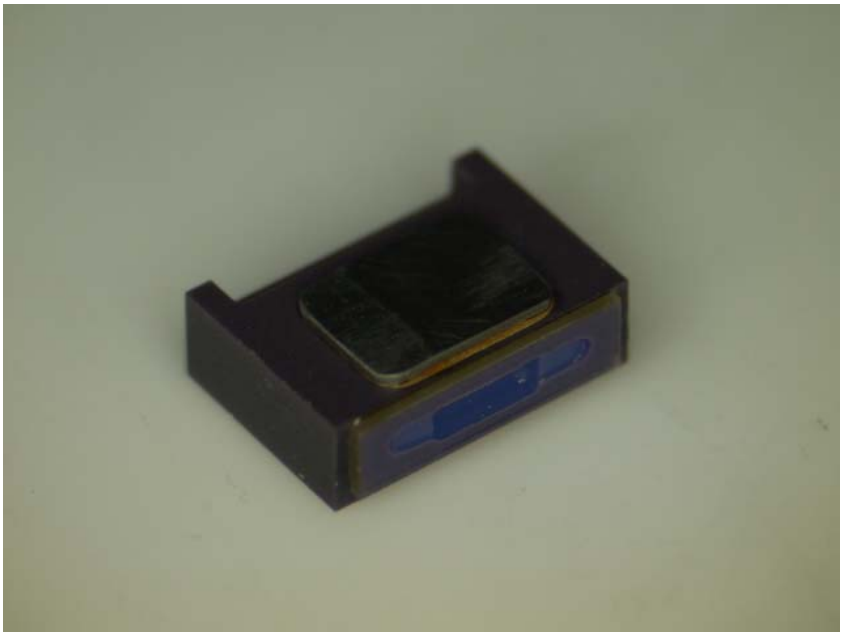
The ceramic package allows flexible high-density surface mounting of 4 PLD chips. This has greatly miniaturized the ceramic package to sizes as small as 5.5mm×3.8mm×1.7mm (W×D×H) which is only about one-fifth the volume of the can package type.

<Background of development>

The spread of self-driving cars is expected to create a new social infrastructure since they are a promising way to reduce traffic accidents, improve distribution efficiency of goods, and solve various social problems. To make self-driving cars a reality, it is essential to accurately recognize surrounding objects such as people, cars, and obstacles to detect their distance, shape and condition. So, intensive efforts are being made to promote the practical use of in-vehicle cameras, radars and LiDAR which serve as the eyes of cars. Among these, LiDAR is becoming more and more important in applications such as advanced driving support systems, automatically guided vehicles, and distance measurement. This requires high-power fast-response PLD capable of short-pulse operation at a high repetition rate and having reliability high enough to meet needs in automotive applications.

●Main specifications

Peak oscillation wavelength	905nm
Number of light-emitting channels	4 channels (can be driven separately)
Peak optical output power (per channel)	100 W
Operating temperature range	-40°C to +105°C
Dimensions (W×D×H)	5.5mm×3.8mm×1.7mm



4-channel pulsed laser diode