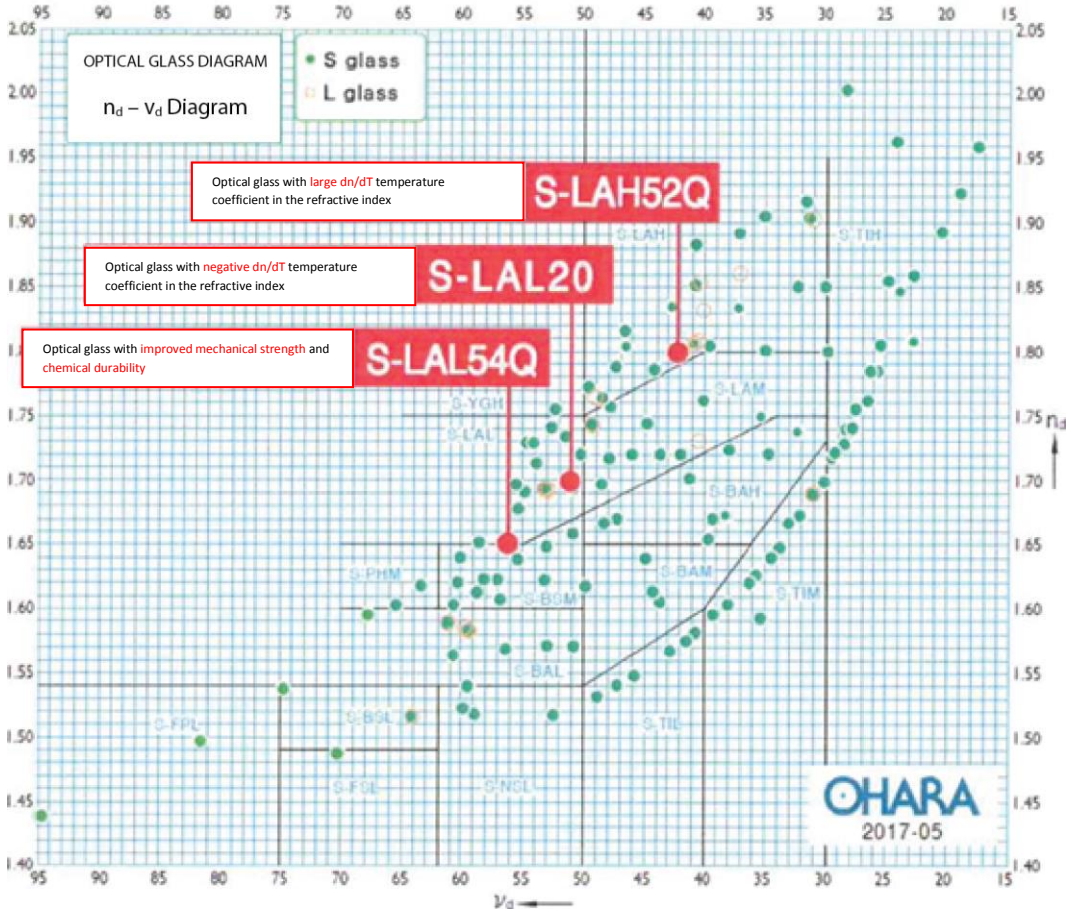
31 May 2017
OHARA INC.



The World's First Optical Glass for In-vehicle Camera Lenses

OHARA INC. announced on 31 May 2017 that it has developed optical glass for in-vehicle camera lenses the need for which has been increasing more and more in the world of automobiles.

Until now, optical glasses have been suitable for use in digital cameras, microscopes, etc., but has not been appropriate for in-vehicle cameras, which are used in more severe environments and require ideal lens ingredients to ensure environment resistance, shock resistance, and durability with respect to temperature changes. OHARA continued working on the development of optical glass that can be used for in-vehicle cameras, and has now succeeded in releasing **the world's first** specially-designed optical glass for in-vehicle cameras in 3 different varieties. The "S-LAL20" in particular achieved the world's first dn/dT value of **-1.2** (@ d line 40 °C ~ 60 °C) among low-dispersion glasses that have a refractive index (n_d) of more than 1.69. It is expected that these new optical glasses will greatly contribute to the improvement of sensing technology and the safety performance of vehicles.

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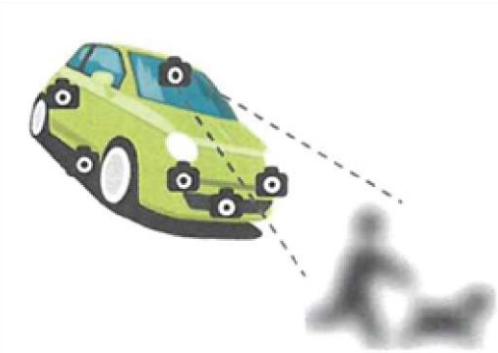
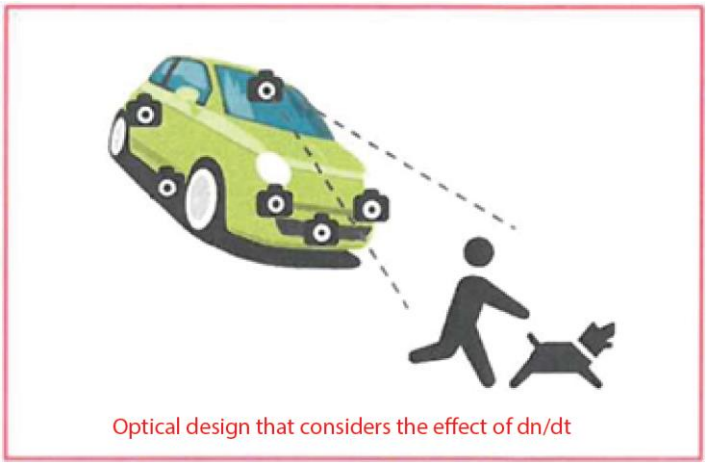
S-LAH52Q / S-LAL20 Optical Glass with Unique dn/dT

The in-vehicle cameras' optical systems are installed in every part of the car and are exposed to various thermal environments. Also, because it's necessary to guarantee the security of the optical system for a long period of time, fixed (single) focus elements are widely used instead of those with variable focus functions.

dn/dT measures the change in the refractive index associated with temperature changes. When the thermal environment of the in-vehicle camera changes, the refractive index of the lens changes as well, and as a result the focal point shifts and the camera is no longer able to capture clear images. Cameras that have variable focus functions can regulate such changes in the focal point caused by refractive index changes, which is something that fixed-focus cameras can't do. That's why it is crucial to use optical glass for which the refractive index does not change even if there are temperature changes when designing the lenses for in-vehicle cameras. S-LAH52Q and S-LAL20 have unique dn/dT values that have not been possible with optical glass up until now, so they can efficiently compensate for temperature drifts and make great improvements in the performance of in-vehicle cameras possible.



Optical design that doesn't consider the effect of dn/dt



Optical design that considers the effect of dn/dt

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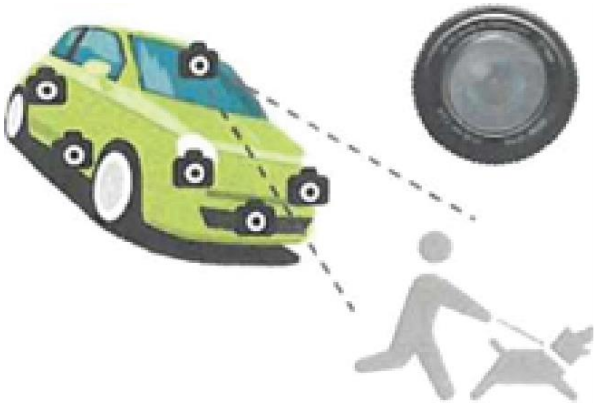
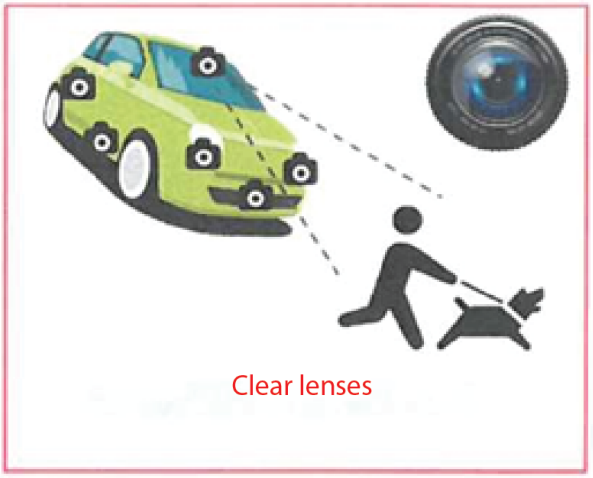
S-LAL54Q Optical Glass with Improved Chemical Durability and Mechanical Strength

With in-vehicle cameras, the chemical durability of the front lens elements that come in contact with the outside air is of great importance. Optical glasses with good chemical durability don't become cloudy when the surface of the lens wears off after coming in contact with the outside air, thus



Cloudy lenses



guaranteeing visibility for a long period of time.

In-vehicle cameras are installed in various places on the inside of vehicles, so the temperature changes the camera is exposed naturally influence the imaging characteristics of the optical system, but such changes can also lead to thermal shock. If, for example, the vehicle has been under the blazing sun and has become hot, then it's cooled quickly by rain, the glass undergoes thermal stress, and it's very possible that the lenses may break. However, by creating a design that takes chemical durability into consideration, the in-vehicle cameras become stronger, more resistant to heat and more difficult to break.

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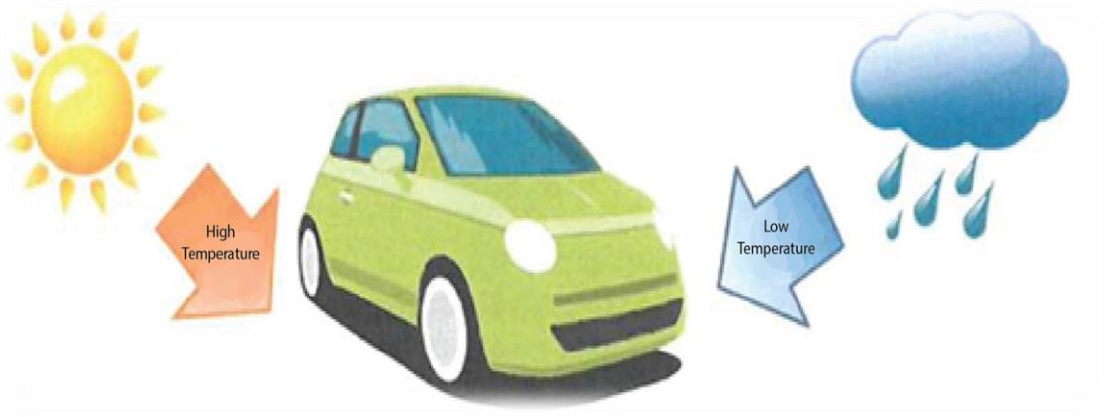
The vehicle cameras that are installed on the outside of vehicles are exposed to particles in the atmosphere and to small pebbles that are thrown up by tires, which can cause their lenses to be damaged by such negative factors. This makes it necessary to use optical glass that is resistant to scratches for the front lens elements.



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