

November 7, 2018

## **Development of Automotive Head-Up Display (HUD) Projection Unit using Laser Scanning Technology**

RICOH Industrial Solutions Inc. (President: Katsunori Nakata) has developed Automotive HUD projection unit using laser scanning technology for Automotive Human Machine Interface (HMI)\*<sup>1</sup> industry, where new innovation is demanded due to development of Advanced Driver Assistance System (ADAS) technology centering on sensing technology and in-vehicle electronics technology.

HUD is a system to display vehicle information, such as speed and GPS navigation data to a windscreen. Compared to conventional GPS navigation systems, HUD helps reducing the amount of driver's eye movement, which relieves driver's fatigue and the risk of accidents caused by driver's inadequate attention. In addition to these benefits, HUD is expected to play a key role in calling for driver's attention and realization of Augmented Reality (AR)\*<sup>2</sup> technology in combination with various sensors mounted on the vehicle. To live up to these expectations, RICOH Industrial Solutions Inc., using RICOH's superior laser scanning technology achieved through the long-time development and production of copiers, and also 2-axis MEMS\*<sup>3</sup> mirror device newly developed for HUD, succeeded in developing a projection unit that enables to effectively call for driver's attention by using bright colors which do not blend in to the background.

The use of a laser scanning technology also enables higher contrast\*<sup>4</sup> and display of broader range of color\*<sup>5</sup>. Laser scanning technology also has a strong point that, compared to TFT technology, even with the same luminance, it is recognized brighter.

These strong point enables to reduce the influence of postcard effect\*<sup>6</sup> which is a nuisance factor to draw driver's attention effectively and for AR expression. In addition, by using unique algorithm which takes account of driving situation and human factor, accurately transmitting important information is enabled. Furthermore, to overcome particular issues that are image quality and reliability of laser scanning technology, RICOH Industrial Solutions Inc. in-house developed a screen\*<sup>7</sup> using micro-lens technology, and 2-axis MEMS mirror device to realize high image quality and reliability\*<sup>8</sup>.

Aiming to start serial production from 2020, RICOH Industrial Solutions Inc. will accelerate its activities towards productization.

\*1 HMI (Human Machine Interface):

A method enabling human to exchange information with machines, and hardware, software required to enable this.

\*2 AR (Augmented Reality):

A technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view.

\*3 MEMS (Micro Electro Mechanical Systems):

A technology that combines tiny electronic and mechanical parts to create systems with moving parts on a scale ranging from microns to a millimeter, typically using silicon or silicon-based fabrication methods. (Figure 1)

\*4 More than 10,000: 1

\*5 NTSC Rate: Approx. 190% (Figure 2)

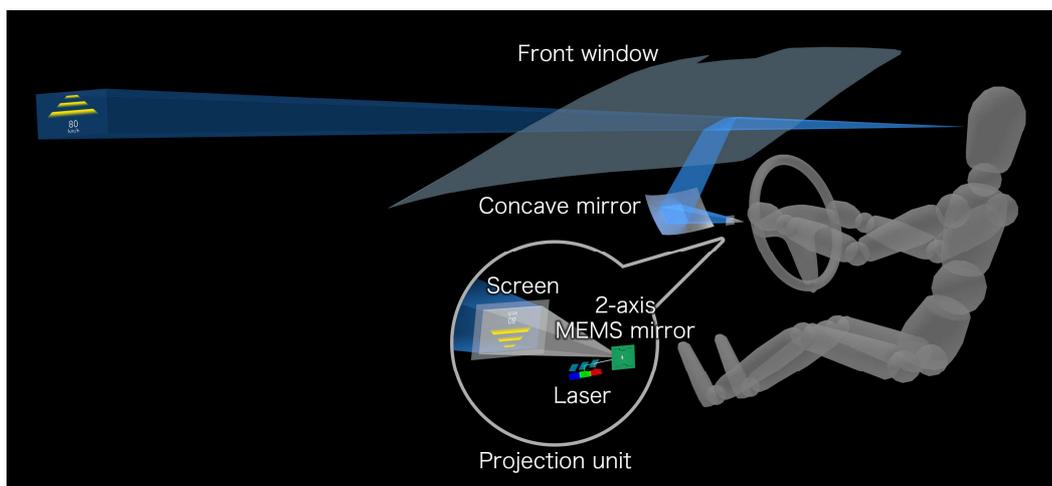
\*6 A square shape leak light from the back light, seen in a TFT system, particularly in low illuminance environment

\*7 Screen (Figure 3)

\*8 Reliability Level: Equivalent to AEC-Q101



Automotive HUD projection unit using laser scanning technology



Instrumented Image

<Reference Image>

Figure 1: MEMS

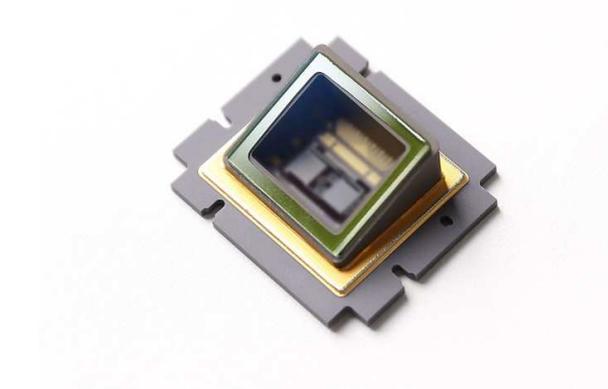


Figure 2: Chromaticity diagram

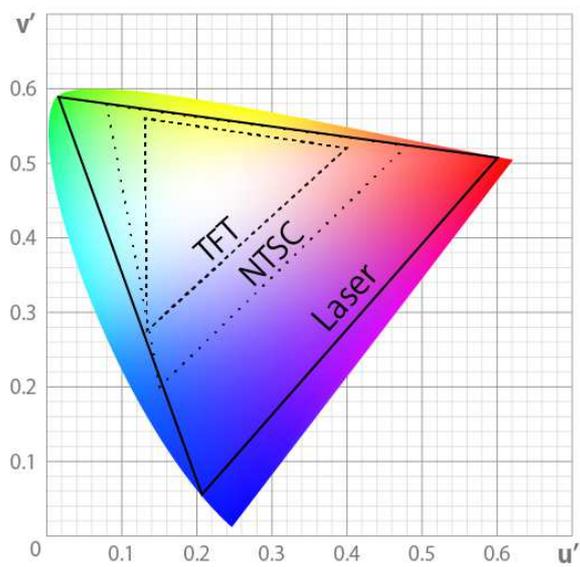
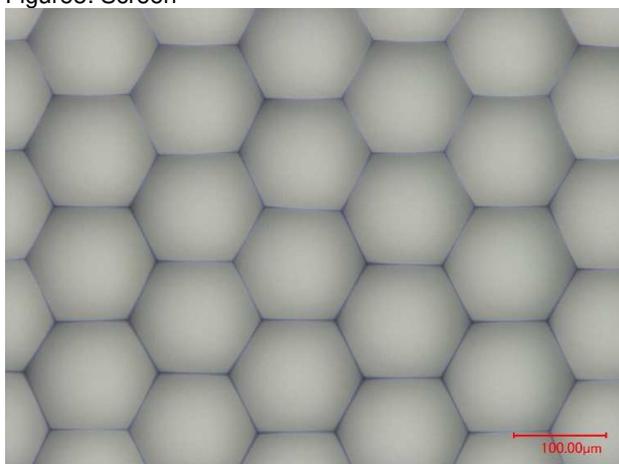


Figure3: Screen



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Headquartered in Tokyo, Ricoh Group operates in approximately 200 countries and regions. In the financial year ended March 2018, Ricoh Group had worldwide sales of 2,063 billion yen.

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