

## Introduction

Image sensors are now widely used in cellular phone and digital still cameras. As manufacturers of these devices seek solutions to improve test economics, tester companies develop new systems equipped with versatile and high parallel test capabilities. Part of the complete test solution is a probing technology that can not only meet the high parallelism requirement but also accommodate the illuminator system.

Conventional cantilever probe cards are adequate for prototype testing of imaging devices. However, they impose several limitations when considering the special requirements for image sensor testing. These include:

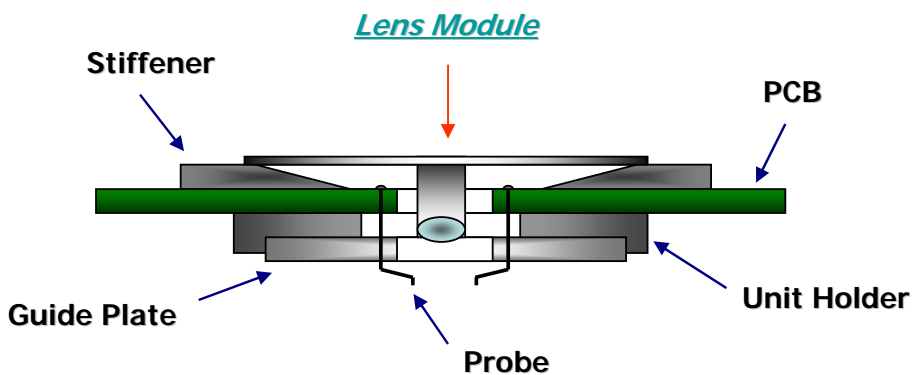
- Limited multi-DUT testing capability with in-line or diagonal DUT layout
- Limited opening area for mounting the lens module
- Limited ability to shorten the lens module-wafer distance
- Limited planarity performance for large probing areas

## Development of VE-Series Probe Cards

**VE-Series Probe Cards** were developed to overcome the limitations of conventional probe cards. As a result, VE-Series was designed as a hybrid of cantilever and vertical technologies with the following features:

- **Enhanced Light Intensity From Illuminator System**

VE-Series Probe Cards are specially designed to accommodate an illuminator system (light source) for image sensor testing. As shown in the figure below, the probe card structure permits a close distance between the lens module and wafer. As the distance can be 2.5mm or less based on the size of the lens, light intensity from lens modules is enhanced.



# Advanced Technology for High Parallelism Testing of Image Sensor Devices

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## Development of VE-Series Probe Cards (Cont.)

### ■ High Parallelism Testing

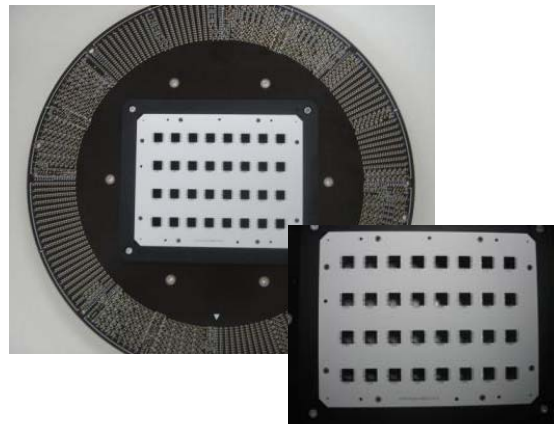
VE-Series probes are vertical in structure. The space required is less compared to conventional cantilever probes, which allows more flexibility in DUT layout for high parallelism testing. Layouts such as 4x4 or 8x4 can be achieved.

VE-Series probes are fixed with guide plates, resulting in very stable planarity performance even for large probing areas.

32-DUT VE Card (Top View)



32-DUT VE Card (Bottom View)



### ■ Better Probing Efficiency

To compare probing efficiency, we built a 8-DUT cantilever card and two VE-Series cards with 24 DUTS & 32 DUTS. We compared the number of towndowns required to test a 8" and 12" wafer.

The table below clearly shows that VE-Series probe cards have much higher probing efficiency than conventional cantilever cards. The benefits are reduced test time and higher throughput.

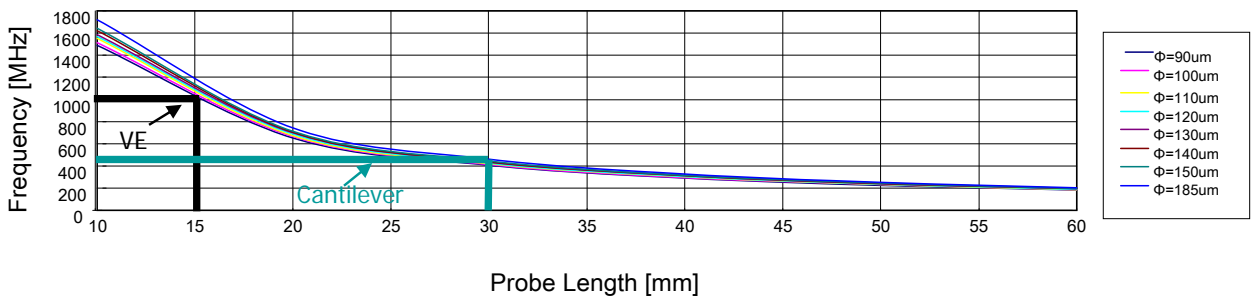
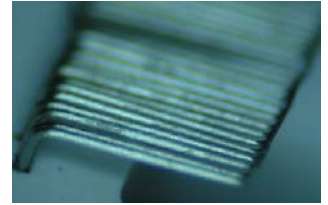
DUT Configurations	8" Wafer	12" Wafer
Cantilever type 8DUT (Diagonal)	70	166
VE type 24 DUT (1x2 skip chip)	24	56
VE type 32 DUT (1x2 skip chip)	24	45

## Development of VE-Series Probe Cards (Cont.)

### Higher Test Frequency

VE-Series probes have shorter probe length than cantilever probes, enabling higher test frequency.

Based on a SPICE simulation, VE-Series Probe Cards can accommodate test frequency of 1GHz or higher while cantilever probe cards can only handle less than 500MHz.



**VE:** 80um wire dia., 15mm probe length

**Cantilever:** 150um wire dia., 30mm probe length

## Future Work

We will continue to expand the capability of VE-Series Probe Cards in the following areas:

- Increase multi-DUT capability from current 32 DUTS to 64 DUTS.
- Enlarge probing area from current 100mm<sup>2</sup> to 160mm<sup>2</sup>.
- Reducing pad pitch capability for different DUT configurations.

## Contact Information

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