

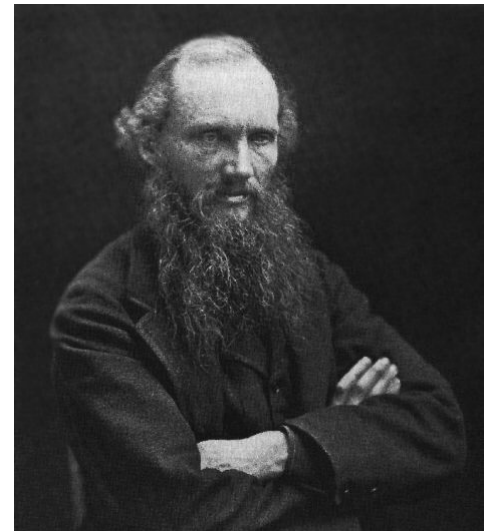
## INSIDE THIS ISSUE:

**NEW PROBE  
CARDS 2****KELVIN  
MEASUREMENT 2****SLIM METAL  
BLADE PROBE 2****PROBE TIP 3****OPEN TEST  
ARCHITECTURE 3****PARTNER  
PROFILE 3****TRADE SHOW  
SCHEDULE 4****THE LEGACY OF LORD KELVIN**

Sir William Thomson was a Scottish engineer, mathematician and physicist, who investigated and contributed in many areas of science as well as numerous branches of physics. His inventions and theories provide the basis for a wide range of technologies and industrial developments in widespread use today. Absolute zero at  $-273^{\circ}\text{C}$ , or OK(elvin), is a fundamental unit of temperature measurement.

While over contributing in science he was also known for his self-confidence. Like many current day titans where hindsight proved them less than twenty-twenty visionaries, he was quoted as saying "heavier-than-air flying machines are impossible", "I have not the smallest molecule of faith in aerial navigation other than ballooning", and "There is nothing new to be discovered in physics now. All that remains is more and more precise measurement."

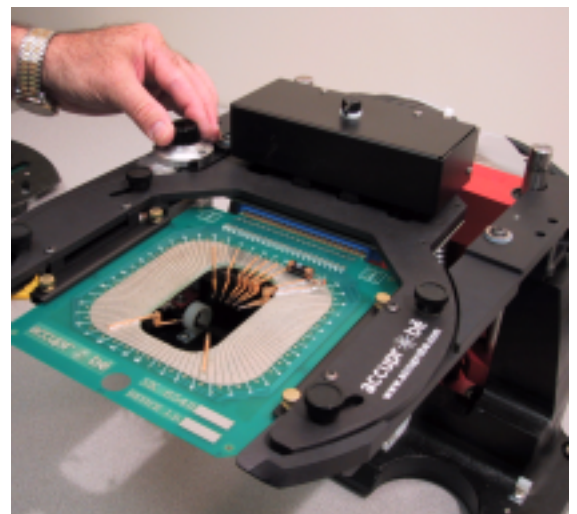
Precision measurement systems are one of the requirements of the probing industry and Lord Kelvin's work provided the basis for Kelvin probing discussed further in this issue of Probity.



Lord Kelvin (Sir William Thomson) 1824-1907

**ESI-43XX SERIES CARDHOLDER**

Accuprobe is pleased to offer the model ESI-43xx probe card holder as a replacement for the original cardholder with the ESI models 43xx and 4210 laser trim systems with step and repeat tables. The Accuprobe designed cardholder provides the ability to adjust the probe card up to  $4^{\circ}$  each way in the theta-plane, reducing device setup time and increasing throughput and productivity. The cardholder has interchangeable probe card rails that will accommodate 4.5, 6.0 and 6.5 inch wide probe cards with 48, 70, 100 or 120 pin edge connectors. The Accuprobe cardholder is simple to install and operate. It is a bolt on replacement for the original ESI cardholder and uses the same interface connector assembly. The Accuprobe cardholder has been carefully designed to meet the precise dimensions of the ESI Model 43xx system, and is manufactured for long-term durability and maintenance free operation.

**PROBE  
APPLICATIONS**

- Wafer sort
- Device test
- Laser trim
- Process control
- Parametric test
- Reliability studies
- Signal integrity

## NEW PROBE CARDS

The LAT45240 is a general-purpose 4.5" probe card specifically designed to support Accuprobe's Linear Array Technology. This card can accommodate 240 probe needles and a probe area of 2.5" x 2.0" may be accessed. Probe access holes in the card may be specified based on individual device geometry. Probe needles from 1" to 2" in length can be accommodated, with a minimum needle spacing of 100 microns. Over/under needle arrangements to allow four rows of pads to be accessed, or for extremely tight pad geometries, are supported on the LAT45240. The card has two 120-pin edge connectors. The card is available to suit 3.4", 4.025", or 4.65" centers of rotation and can also accommodate 12 blade or z-adjustable probes on the periphery for Kelvin or other measurements.

Accuprobe probe cards and components are widely used to support parametric test applications. Keithley Instruments offers a wide

range of DC and RF parametric test systems including the S400, 600 and 900 series. Accuprobe has recently released the KP-9139A probe card which is able to be used in the S400 and S900 series parametric testers. This card supports 64 metal or ceramic probes. Keithley's PC-based Model S900NT Parametric Test System is a comprehensive, cost-effective test solution for semiconductor process monitoring and device characterization. Model S400UX is a UNIX-Based Parametric Test System. Customers are assured that critical parametric measurements necessary for superior wafer test yield are obtainable with the Keithley and Accuprobe combination.

Apart from this new probe card, Accuprobe has a full range of probe cards including Ceramic Blade, Epoxy-Ring, and Coax- Epoxy for parametric test applications.



Accuprobe offers a wide range of industry-standard probe cards

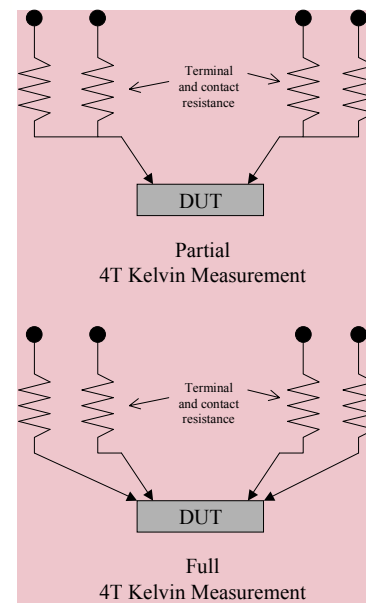
## KELVIN MEASUREMENTS

Kelvin Terminal or four-terminal resistance measurement is a means for testing or making measurements in electronic devices and circuits, particularly when small impedances are being measured. Two sets of leads are used at each test point, similar with respect to thickness, material and length; one set carries the test signal and the other connects with the measuring instrument.

The effect of resistance in the leads is thus eliminated. Four terminal leads are often specified for low ohm current sensing applications where lead resistance is a significant factor in total resistance. The Kelvin connection removes the voltage drop error in the current leads, since the sensing leads are attached at a fixed point and carry no large current. The closer the four terminals can get to the actual device under test the more accurate the measurement.

The Kelvin measurement system is essentially a four wire forced voltage current nulling bridge and, depending on the resistance to be measured, wire pairs connected either at the probe or to two independent probes in contact with the pad. This technique affords resistor measurement with an accuracy of better than 0.1%.

Kelvin measurements are typically used in parametric test and resistor laser trim applications where high accuracy of measurement is a requirement.



## MINATURE METAL BLADE

With ever decreasing device geometries, probe blade thickness and size is critical to facilitating test in many applications. To meet this need Accuprobe have recently released a slimmed down metal blade, profile BH, which has a thickness of less than 18mils including a 10 mil needle. The new blade targets a working depth of 144mils and measures just 490mils in length. Typical applications are

test of fine pitch devices with pad sizes of 3-4mils in the semiconductor segment. The new blade is available immediately with a choice of 6-10mil Tungsten or BeCu needles with a 230mil tip extension and 15mil tip length.



BH Metal Blade

## PROBING FLIP CHIPS AND BUMPS

Flip chip packaging is one of the leading contenders for new packaging designs. This technique involves mounting the active side of the chip (with the surface bonding pads) towards the substrate. This package design provides the shortest path from the device to the substrate producing good electrical connection and facilitating high-speed designs.

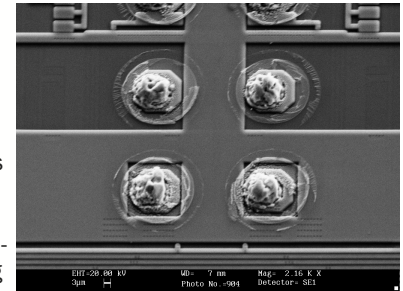
Solder bumps, especially those used to interconnect flip chips, provide a unique

challenge for probing. Small bond pad diameters, dense pitch, as well as use of area arrays make probing a difficult enough proposition, without having to worry about the probe being deflected off the pad due to the presence of a bump.

Flip chip packaging is attractive for MEMS (micro-electromechanical systems) and other promising technologies due to this density and also to the improved signal characteristics over

traditional wire bonding. Blade spring probes, traditional cantilever beam technology and vertical probes can be used to effectively probe a wide range of bumps providing the system is well designed for the particular device to be tested, and standard procedures for ensuring probe accuracy and maintenance are implemented.

For further details about probing flip chips and bumps see probe technical tips at [www.accuprobe.com](http://www.accuprobe.com)

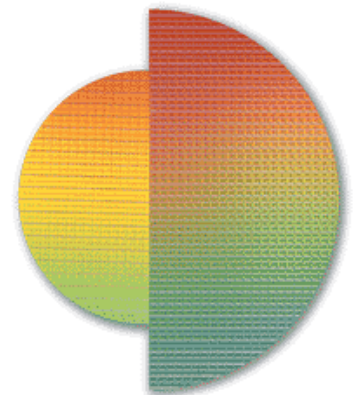


Flip Chip Bumps

## SEMICONDUCTOR TEST OPEN ARCHITECTURE

Advances in semiconductor manufacturing, from the introduction of copper interconnects and sub-0.13-micron device geometries, to 300mm wafers provide significant increases in performance and efficiency for chip manufacturers and end customers. However, these advanced technologies create significant test challenges and the cost of test is increasing as a proportion of total manufacturing cost. A number of companies are proposing standardization of test platforms to more effectively address these new technologies and reduce the overall cost of test

Advantest Corporation announced at the recent Semicon trade show in San Francisco its plans to establish the Semiconductor Test Consortium- an industry-wide collaboration aimed at solving the challenges of cost-effectively testing complex logic devices, such as systems-on-chip (SoCs). This nonprofit consortium is planned to focus on supporting the development of a **Semiconductor Test Open Architecture**, a new framework created to enable open test solutions and hardware and software interoperability. Currently, Advantest has active participation from half of the world's top 10 semiconductor companies, involved in a working group committed to launching the consortium. The current plan is for the founding members to begin reviewing the draft architecture by next month, with the ultimate goal of publishing the architecture and releasing the complete developer's kit-including software, hardware, documentation and training-in the first half of 2003. For additional information visit [www.advantest.com](http://www.advantest.com)



Comparison of 200mm (8") and 300mm wafers

## PARTNER PROFILE—MOZAIK TECHNOLOGY

Accuprobe is represented in Russia and parts of Eastern Europe by Mozaik.

Mozaik Technology Ventures Limited is a UK company with offices in Russia, Poland and Czech Republic. The company was founded in 1993 and specializes in doing business in the field of electronics production and electronic materials, specifically in the Eastern Europe region. Mozaik has extensive knowledge of the Russian electronics industry and can provide representation, sales and marketing support and consultancy services to clients who wish to develop business or establish joint ventures in electronics manufacturing in the Region.

Мозаик Текнолоджи Венчез Лтд. – Британская фирма с региональными офисами в России, Польше и Чехии, основанная в 1993 г. Область деятельности – оборудование и материалы электронной техники, особый интерес – Восточная Европа. Мозаик обладает обширным знанием Российской электроники. Готовы обеспечить представительство, оказать поддержку продаж и маркетинга, а также консультационные услуги тем, кто желал бы развития бизнеса в восточноевропейском регионе или учреждения совместного предприятия в области электронного производства.

Steve Muckett at London office. Tel: +44 20 7357 7376, E-mail: [stevem@mozaik.co.uk](mailto:stevem@mozaik.co.uk)  
Валев С. Н., Российский офис: +7 0842 579 823 E-mail: [valev\\_mozaik@kaluga.ru](mailto:valev_mozaik@kaluga.ru)



Moscow

**Celebrating our 26th Year**

**[www.accuprobe.com](http://www.accuprobe.com)**

**ACCUPROBE, INC.**

1 Harrison Ave

PO Box 1044

Salem, MA 01970

USA

Phone: +1-978-745-7878

Fax: +1-978-745-7922

Email: [info@accuprobe.com](mailto:info@accuprobe.com)



**Probing the World of Microelectronics**

Accuprobe manufactures fixed pattern probe card assemblies for use by semiconductor producers. Probe cards are used for semiconductor wafer sort and Hybrid circuit laser trim applications. Accuprobe also manufactures probe card assembly and repair equipment which allows customers to assemble their own probe card assemblies using Accuprobe needles, tips, blank probe cards, edge sensors and other related components. Accuprobe offers Epoxy Ring, Z Adjustable, Metal Blade, Ceramic Blade and Blade Spring probes.

For further information or subscription changes contact: the Editor at [editor@accuprobe.com](mailto:editor@accuprobe.com)

**SEE US AT THESE TRADE SHOWS AND EVENTS**



**IMAPS 2002**

September 4-6 - Denver, CO

**MOEMS Workshop**

October 10 - Bethlehem, PA