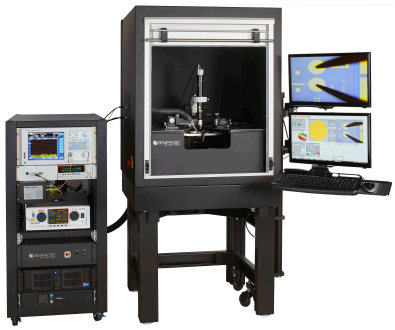
SPECIALTY PROBE SYSTEMS

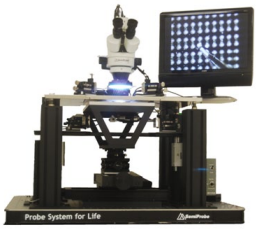
DATA SHEET

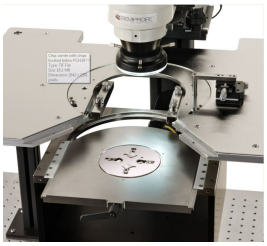
Double Sided Probing (DSP) Systems



SemiProbe manufactures a family of manual and semiuatomatic Double Sided Probing (DSP) systems. More and more applications are requiring the ability to probe from both sides of a die or wafer. Most DSP solutions involve one of the following scenarios:

- Simultaneously probe from both sides
- Probe from the top, detect an output from the bottom
- Probe from the bottom, detect an output from the top

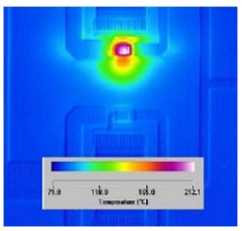




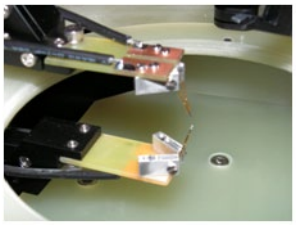
THE HISTORY OF DOUBLE SIDED PROBING

Double Sided Probing (DSP) was initially created for two applications - Failure Analysis and Discrete Devices. The Failure Analysis (FA) application involves Emission Microscopy, which required contact on the top or active side of the wafer while imaging from the opposite side with intensified or IR cameras. The wafer was usually mounted with the backside of the wafer facing upward towards the Emission Camera and the topside of the wafer facing downwards. This streamlined
finding failure sites and determining the root cause of the failure. A few companies, including SemiProbe have a solution for this application. Depending on the type and manufacturer of the emission microscope, the probing side may be either top or bottom facing.

The second type of DSP system was created to probe discrete high power devices including thyristors, diodes, rectifiers, voltage suppressors, power transistors and/or IGBTs. Because of the power used in testing these devices, accurate results are not accessible by biasing the chuck for a common backside contact. Accurate results are gained by making individual contact on the back of the DUT (Device Under Test). Additionally, because of the power used in these tests, multiple probes are often required.



As the semiconductor industry strives to continue to increase the capability of devices while reducing their costs, new technologies are emerging into the mainstream of product design and production that require DSP solutions - MEMS, Optoelectronics, Through-Silicon Vias and more. One such development has been the use of Through-Silicon Vias(TSV). These tiny channels enable devices on both sides of the wafer, as well as stacks of chips, to communicate at high bus speeds. Other devices have patterns on both sides of the wafer that communicate through the silicon. To test these device types, a capability to contact both sides of the wafer simultaneously is required. Another emerging DSP application involves mounting solar simulator heads above or below the wafer to stimulate the device as the other side is biased. For design work and characterization, SemiProbe has pioneered some innovative DSP solutions for probing these devices.



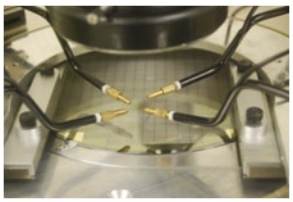
SYSTEM ARCHITECTURE

The Double Sided Prober (DSP) is built using our patented Probe System for Life (PS4L) adaptive architecture, which provides unsurpassed flexibility and significant capital equipment savings. Unlike traditional probe systems, all foundation modules – bases, stages, chucks, microscope mounts, microscope movements, optics, manipulators and more - are interchangeable, making the PS4L the consummate solution for many different applications and budgets. This unique modular design enables customers to acquire test capabilities that precisely match their requirements. More important, as the environment or test conditions change, the PS4L can easily be field-upgraded to meet these new demands. With this design philosophy, PS4L customers realize substantial time and cost savings over traditional probe systems because they do not need to invest in a new platform when wafer size, levels of automation, or test requirements change.

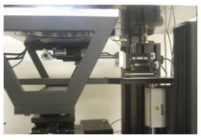
THE SEMIPROBE DSP SOLUTION- Simultaneous Probing

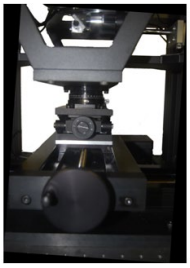
Utilizing a dual platen system, the engineer can control each platen separately to land and separate probes from contact. The platens can also be moved in unison to contact and separate the probes from the DUT (Device Under Test). The lower platen is equipped with plates on each side to accommodate magnetic-based manipulators as well as a BSC (Back Side Camera) for back side probe alignment. This platen is normally in the down position and moves up to contact the probes and bring the BSC into focus. The camera and manipulators are controllable in X, Y and Z.

The top platen is a full sized platen with the capability of moving in a downward direction when system controls are activated. The probes are set into position with the platen in the lowered position and then they can be completely moved free of the wafer and probing area with the probe platen control. When moved into the lower position, the platen moves down in a controlled descent slowing just as the probes are coming into contact. This enables the user to control and visualize the probe contact and overdrive (scrub).



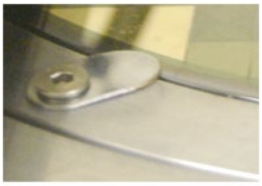
On the top side platen, individual manipulators with probe arms or a standard 4.5” probe card may be used. The manual or programmable stage provides 200 mm of X-Y movement with high Z force stage to accommodate the size of the chuck carrier holder assembly. This entire assembly can be moved in theta for 2-point alignments. Using the precision Z stage, the engineer can break contact with the upper probes by lowering the chuck carrier. Prior to doing this, the lower platen must be lowered to prevent over drive of the back side probes. Using this technique, the probe tips can stay very close to the wafer to allow the user to move from die to die on the wafer and make a precision adjustment. For top side alignment, a trinocular Stereo Zoom microscope is provided with CCTV capability. A video switch enables the user to rapidly switch from top side to back side to check probe alignment without touching the prober.





THE WAFER CARRIER SYSTEM

The system requires a unique carrier for every wafer size. Carriers for partial wafers and chip trays are also available. These carriers are mounted into a chuck carrier holder on the top of the prober stage. The carrier holder is planarized on the system and when wafers are exchanged via the clamping system, maintains the planarity for each wafer loaded. The wafer is set into a shallow groove and then locked into place using small spring clips.



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PRECISION ALIGNMENT

Both top and bottom platen movement is guided by precision mechanics to provide repeatable and fast contact and separation.

PROBING

The system is designed to use standard DC probes on individual manipulators, probe cards, probing wedges or HF/Microwave probes. The user has the option of using them to contact the device from the top or bottom sides. Manipulators are held in place using magnetic, vacuum or bolt down bases. Bolt down bases provide the most strength and rigidity.

SPECIFICATIONS

Stages	Manual or Programmable up to an X-Y Travel of: 205 mm x 205 mm (8")	
	Z Travel:	Manual or Programmable up to 20 mm (0.79")
	Theta:	Manual (> 30 degrees) or Programmable (+/- 4 degrees)
Microscope Movement	Manual or Programmable - several travels available ranging from 50 x 50 mm to 200 mm x 200 mm	
Chuck Carriers	75 mm, 100 mm, 150 mm, 200 mm	
	Partial Wafers	
	Chip Trays	
Platens	Top Side: AL with nickel plated steel cap	
	Bottom Side: AL with nickel plated steel cap	
Optics	Several Available - Most are stereo zoom - 100x magnification	
	Bottom: Digital zoom scope	
	Camera: Both optics have CCTV camera's connected to a single monitor using a video switch	
Utilities	Power: 110 - 240 V AC, 50-60 Hz, 10A	
	Air: 100 PSI minimal flow	
	Vacuum: 23 Hg or -0.8 bar	
Options & Accessories	Vibration isolation table	
	Dark Box	
	Wafer stages and travel ranges	
	Microscope movements and travel range	
	Manipulators, probe arms and bases	
	Probe tips	
	Probe Card Holder	
	Additional wafer carrier sizes	

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