

# Wafer Chucks



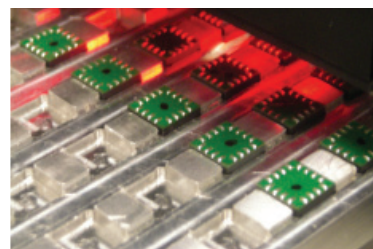
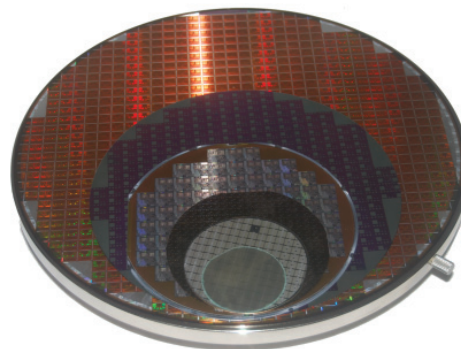
## Selection Guide

SemiProbe manufactures several different types of standard and customized chucks that are mounted on our probe systems.

Chucks are available in a variety of sizes, shapes and materials. Most chucks fall into two (2) categories – non-thermal (ambient) and thermal (hot and cold). Ambient chucks have no heating or cooling capabilities. Thermal chucks are manufactured by a few different vendors and selecting which one to use is based on the desired technical specifications, the temperature range and the budget.


Most chucks are either round or square and vary in size from 50 mm to > 450 mm. The device under test (wafer, substrate, PCB, wafer frame, waffle pack) is usually affixed to the chuck via vacuum or mechanical clamping. The vacuum pattern on a chuck is usually one of concentric circles or vacuum holes. Concentric circles (rings) are used quite often on thicker devices that have not been thinned or lapped. Vacuum holes are primarily used on thin and fragile wafers usually made out of III/V compounds. Vacuum holes put less stress on the wafers and don't deflect the device as much as vacuum rings.

Chucks are mounted to a probe system via a chuck adapter. Thermal chucks require a chuck adapter and a routing cable kit to minimize cable and cooling line drag on the stage. The underside of the chuck usually has an isolation material that prevents electrical conductivity through the probe system. Chucks can be biased or grounded. Most contain a 1/4" vacuum fitting that the vacuum hose is connected to. Some chucks require




separate vacuum manifolds that enable the user to turn on or off selected zones on the chuck. Steel is the most often used material to manufacture a chuck but other materials are also used based on the application. The plating on most chucks is usually nickel but gold is also used sometimes. Other plating materials are also available.

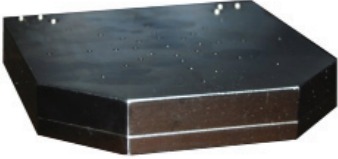
### CHUCK – AMBIENT – ROUND

	INFORMATION	APPLICATION
	<p>The majority of the chucks manufactured are round. Vacuum patterns usually are concentric ring or vacuum hole. Materials used most often are steel with nickel plating.</p>	<p>Round is the most often designed chuck and is primarily used to hold wafers – full, partial, individual die</p>


## CHUCK – AMBIENT – SQUARE

	INFORMATION	APPLICATION
	<p>Some applications require a square chuck to be used. Vacuum patterns are usually square. Materials most often used are steel with nickel plating. In some cases a continuous vacuum pattern is acceptable or a multi zone chuck with independent vacuum control is required.</p>	<p>A square chuck is primarily used for holding substrates, printed circuit boards and photovoltaics</p>

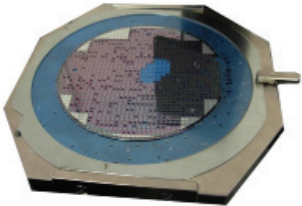
## HIGH FREQUENCY CHUCK – AMBIENT – SQUARE


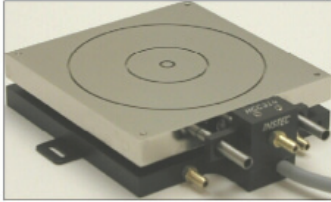

	INFORMATION	APPLICATION
	<p>High Frequency chucks are often manufactured to hold a wafer as well as two calibration substrates or a calibration substrate and a contact substrate. They are provided with a vacuum manifold kit that provides independent vacuum control to three quadrants. Most are manufactured with vacuum holes to minimize stress on thinned wafers.</p>	<p>Used to test devices at High Frequencies (HF), thinned wafers and III/V compound materials</p>

## DOUBLE SIDED PROBING (DSP) CHUCKS – AMBIENT – ROUND

	INFORMATION	APPLICATION
	<p>Double sided probing chucks are used with the SemiProbe DSP probe systems. They are typically designed so there is no support in the center so emission microscopy or solar simulator systems have a clear path to the topside and backside of the device under test.</p>	<p>Topside, bottom side or simultaneous probing of devices</p>

## WAFER INSPECTION/FILM FRAME CHUCKS – AMBIENT – SQUARE

	INFORMATION	APPLICATION
	<p>Designed to mechanically clamp the device or wafer frame on the chuck without the use of vacuum. Mechanical clamps hold the wafer in place and dowel pins aid in the alignment process.</p>	<p>Used when vacuum fixation is not possible</p>

	INFORMATION	APPLICATION
    	<p>SemiProbe provides a number of thermal chuck solutions using well known third party providers as well as our own in-house designs. We integrate a number of different models into our probe systems. The type of thermal chuck we integrate depends on variables including temperature range, chuck size, thermal stability, electrical measurement requirements and budget. The integration includes a thermal chuck adapter and a thermal chuck routing kit to make sure all hoses and cooling cables are routed in a manner to minimize stage drag and impact on specifications. The customer has several options to select from and it is important to understand the technical application and budget requirements.</p> <p>Thermal chucks are available in a number of sizes (round or square), plating surfaces (gold or nickel) and temperature ranges. The most common sizes are 100 mm, 150 mm, 200 mm and 300 mm and they are typically round. Some of the most common temperature ranges are:</p> <p>Ambient to:            150 °C            200 °C            300 °C            -55 °C to 200 °C            -55 °C to 300 °C            -65 °C to 200 °C            -65 °C to 300 °C            -80 °C to 300 °C</p> <p>The price of the thermal chuck depends on the type of electrical measurements the customer is making, the wafer size and the temperature range. Ambient to elevated temperature thermal chucks are less expensive and easier to integrate in comparison to the negative temperature chucks. An environmental chamber of some sort and a cooling source is required in order to keep the device under test from frosting up during negative temperature testing. The cooling source and the environmental chamber add considerable cost to the system.</p>	<p>Used when devices need to be tested at hot or cold temperatures</p>