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Probe Card Specifications

Purpose:

The purpose of this document is to define the assembly specifications for probe cards built on a defined standard procedure. The tolerances specified are derived from the general consensus of probe card manufacturing and are considered "industry standards". Industry Standards are used to maintain consistent probing results. Deviations from these specifications are expected due to individual measuring skills. In general all specification will have the notation for minimum and maximum tolerances.

Tolerances and Specifications:

The following specifications are separated for new and repaired probe cards. Because of the quality of a new probe card, the repair specification will allow for a greater margin of error as noted.

Specification	New probe card	Repaired probe card
Tip Diameter	.0015 +/- .0002	.0015 +/- .0005
Tip Length	.007 +.002 / -.001	.007 +/- .002
Epoxy Tip to board (bottom)	.080 +.010 / -.005	.080 +.010 / -.006
Shaft angle from horizontal	15 degrees +/- 2 degrees	15 degrees +/- 2 degrees
Minimum clearance	.010	.007
Shaft Diameter (Standard)	.010 +/- 1% by weight	.010 +/- 1% by weight
Leakage	30.0 pA @ 5v	
Edge Sensor/Switch Specs.		
Tip Length (ground)	.012 +/- .002	.012 +/- .002
Tip Diameter	.002 +/- .0002	.002 +/- .0005
Tip Length (switch)	.008 +.002 / -.001	.008 +/- .002
Tip Diameter	.002 +/- .0005	.002 +/- .0005
Shaft Diameter	.010 +/- 1% by weight	.010 +/- 1% by weight

Assembly Tolerances and Specifications:

Edge Sensor:

The standard E/S tip length should be 12 mils. The E/S switch tip should appear horizontal or parallel to the probe card board, the standard length is 8.0 mils. The switch tip should cross the E/S 0-15 mils back from the bend of the vertical contact probe. The amount of the switch tip to the right and left of the vertical probe shank should be approximately equal, except when the switch has to be shorter to clear adjacent probes.

The E/S tip "vertical contact" probe must contact the wafer at a point specified by the documentation, typically on or off the scribeline. The standard E/S must contact the wafer at .0003 (+.0002 / -.0001) before the first probe. The E/S switch must break or open at .0003 (+.0002 / -.0001) after the last probe has contacted the wafer.

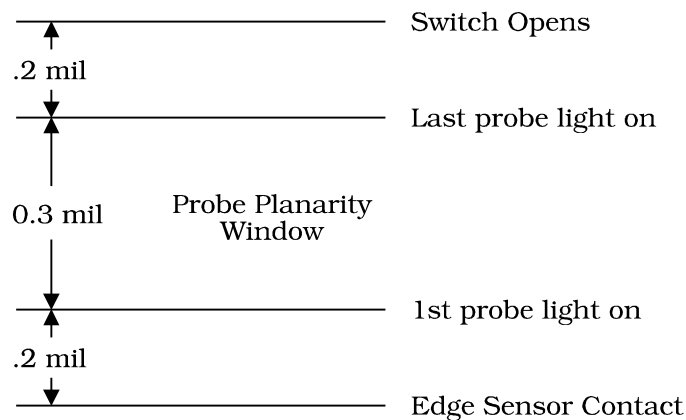
When a customer specifies a non-standard edge sensor/switch setting, the edge sensor and switch must be on and off on the given specification within tolerances of +.0002 / -.0001.

Isolated E/S when required should do the following; the vertical contact probe will be isolated with a glass or epoxy bead that has been inspected to be free of cracks. The bottom of the bead should appear to be planer with the other probe tips. When setting the switch, a jumper wire must be plugged from the light box to the trace on which the isolated E/S is located in order to a light on the planerizer box.

Planerization:

Probe cards with less than 100 probes should have a maximum planarity of 0.5 mils total. 100 probes to 350 probes the maximum planarity should be 1.0 mils. No probe card will have a total planarity greater than 1.5 mils.

If a customer has specific planarity requirements, all probe tips must be within those limits.



Above is a diagram showing the events that take place as the wafer is brought up to the probe card. The edge sensor contact is made first the switch opening is the last event.

Alignment:

Standard alignment is evaluated when the probe card is in an overdriven condition. At this time all probes must be centered on their pads. Standard overdrive will be 3-4 mils unless otherwise specified by the customer.

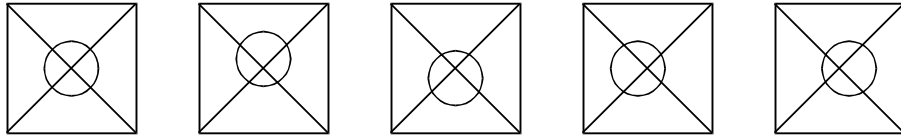
Probe marks should be located not more than 0.3 mil from the individual pad's center.

When using prints or wafers with no visible probe marks, the center of each probe tip cannot be more than 0.3 mil from the center of the pad.

Kelvin probes should be centered on the pad without touching each other. The distance between the two probes should not be less than 1.0 mil unless specified.

Acceptable Alignment

Probe Placement



Center

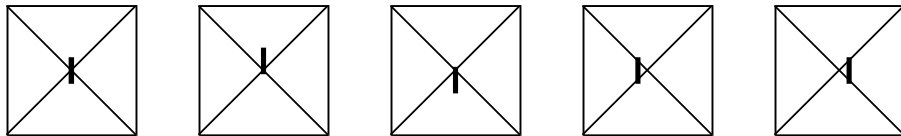
In

Back

Left Sided

Right Sided

Probe Marks



Visual Inspection:

Quantity of probes must correspond with the customers documentation.

Tips must be free of any contamination, flux, skin oil or cotton fuzz. The probe tips should be checked for flatness, tips should be consistently flat with slightly round edges, no splits or burrs. The exception to this would be radiused tipped probe cards.

Epoxy must be inspected for bubbles, cracks these lead to structural weakness in the ring. Holes should be filled with epoxy, particularly the areas above the probes. Make sure the epoxy thickness covers the probe completely so as not to allow the shape of the probe to be seen through the epoxy.

Solder joints are to be uniform in size and characterized by a shiny appearance. The height of a joint should not exceed .050 mil to avoid a potential of hitting the wafer before the tips. A dull finish is a sure sign of a cold solder joint. This will lead to intermittent opens. All pins in the board should be tight with signs of solder flow on both sides of the board.

Check for broken leads on the probe card. Also look for traces that are beginning to lift off the board.

The card should be checked for electrical shorts by touching each trace with a ground probe and monitor the light box to insure that the appropriate light illuminates. On high count probe card, check probe next to each other to determine if they are shorting.

Insure that the correct pin is wired to the correct probe by using the ground probe of the planarizer and contact each probe. Double check all patch wiring, look for cold solder joints or nicks in the wiring that may cause early wire failure.

Rotational Alignment should be checked. The X-Y lines on the die pattern must align with the X-Y lines of the probe card. The rotational angle must be within +/- 2-3 degrees.

Verify the build date and name of the device is clearly marked on the top of the probe card. Use the correct size box to securely hold the board. Place the box into a bubble pack shipper. Add a copy of the documentation and Check Point Data (Certificate of Testing).