

Pyramid Probes: New Core Inspection

This guide describes the visual inspection process for new Pyramid Probe cores. Visual inspection should be performed first visually, and then with a microscope. The recommended procedure employs two microscopes:

**Low-magnification microscope
(with a large working space)**

- Commonly used for PCB inspection and soldering stations
- Used for inspecting the entire probe, core window, components and membrane wing
- Magnification range should be approximately 7x to 90x

High-magnification microscopes

- Used for inspecting the probe face, probe tips and beams
- Recommended microscope objectives include 5x, 20x, and 50x

When saving photos, be sure to include the serial number in the file name.

Use the Pyramid Probes Certificate of Conformance to verify the following:

- The serial number on the core frame matches the Pyramid Probes Certificate of Conformance.
- The product name on the Pyramid Probes Certificate of Conformance matches the product to be tested.

For a more detailed description of documents shipped with a new core, see the *Pyramid Probe Core User Manual*.

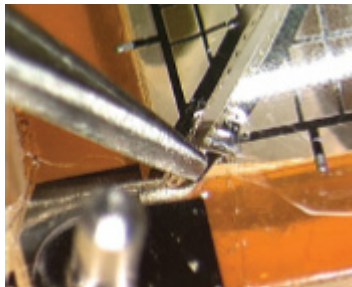
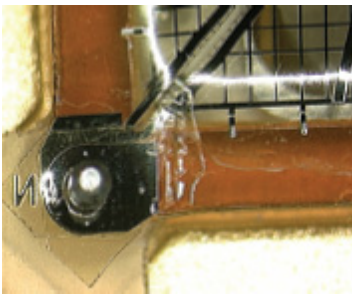


Step1: Edge Sense Inspection

Pyramid Probes used on manual probe stations have an edge sense type mechanical switch installed. The edge sense needle contacts a glass pad on the spring in some Pyramid Probes. When installed on larger frame cores, the edge sense needle contacts the core spring directly. This step applies only to manual probe stations.

Inspection Area	Criteria
Edge Sense (if glass pad is installed)	Are there cracks in the glass pad? Contact local support for instructions.
	Is the glass pad securely in place? Contact local support for instructions.
	Is the needle touching the glass pad, and roughly centered? Contact local support for instructions.

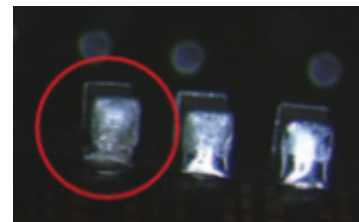
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Step 2: Low Magnification Microscope Inspection

Inspection Area	Criteria	
Membrane	<p>Are there any tears noted anywhere on the membrane? A membrane tear is defined as a torn membrane caused by mishandling or equipment malfunction. Tears on a new core that have been repaired by the factory are acceptable, as long as the repaired patch does not exceed 1000 μm .</p>	
	<p>Has the membrane come off the alignment pin? WARNING: Do not install in a box or board until repaired. Contact local support for instructions.</p>	<p>Tear in membrane</p>
	<p>Is there any damage to the membrane? Escalate to a higher magnification inspection to determine if there is a failure.</p>	
	<p>Is the probe face clean of any debris? Follow the procedure in <i>Pyramid Probe Core Off-line Cleaning With Brush</i> to clean the face after incoming inspection is complete.</p>	<p>Repaired membrane, acceptable</p>
	<p>Are there scratches on the wings with exposed metal? Scratches on the wings are acceptable as long as the metal is not exposed.</p>	
Plungers	<p>Are there any cracks in the plunger beams from the tester side? These types of cracks are not acceptable on new cores.</p>	 <p>Tester Side</p>
	<p>Are there any cracks in the plunger beams from the wafer side? These types of cracks are not acceptable on new cores.</p>	 <p>Wafer Side</p>

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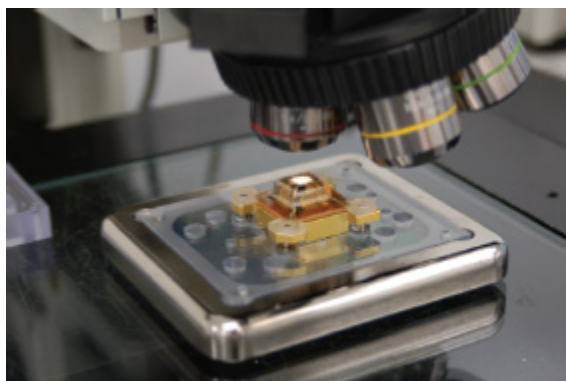
Inspection Area	Criteria
Components	<p>Is there any damage to installed components?</p> <p>Small scratches from the assembly process are acceptable.</p> <p>Damage to the body of a component is not acceptable on new cores.</p>



Damaged component, not acceptable

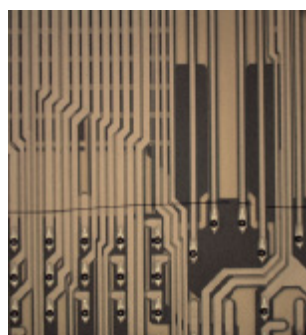
Step 3: High Magnification Microscope Inspection

1. Place the core on a high-magnification fixture with the probe tips facing up.

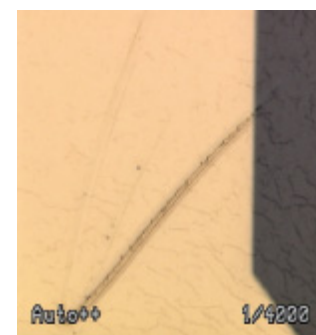


2. Inspect the core using the 5x objective.

Inspection Area	Criteria
Probe face	<p>Are there any scratches on the probe face?</p> <p>New cores will have no scratches greater than 1000 μm.</p>



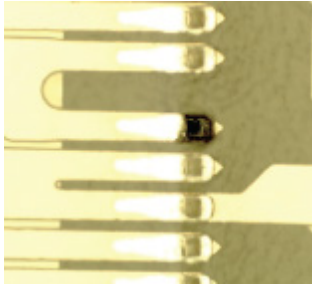
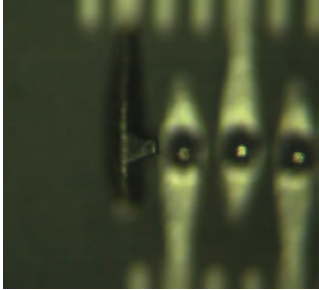
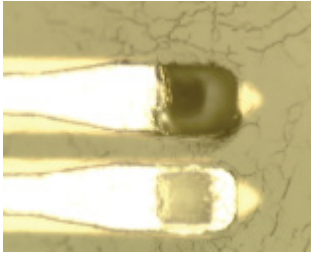
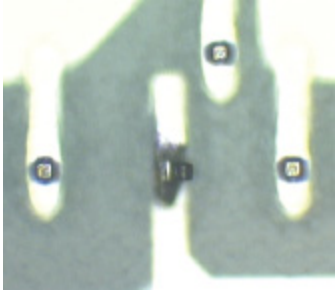
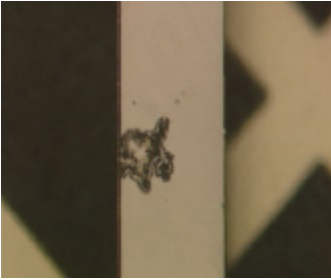

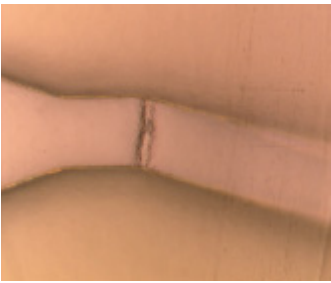
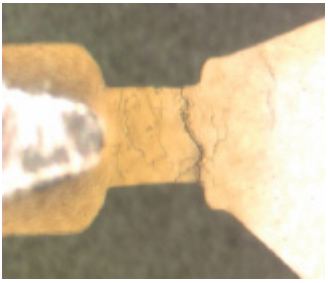
Scratch >1000 μm , not acceptable



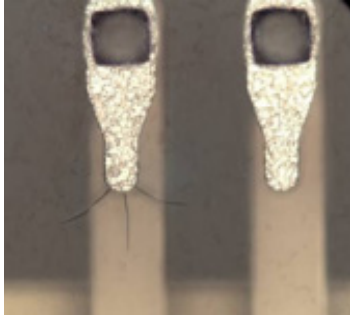
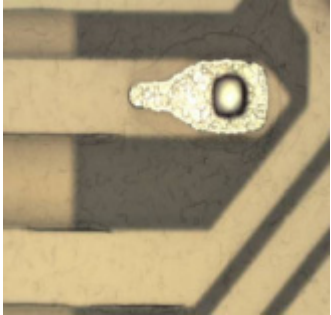
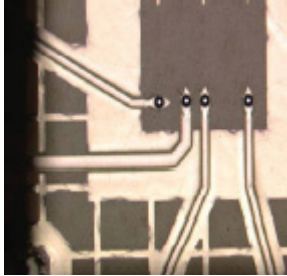
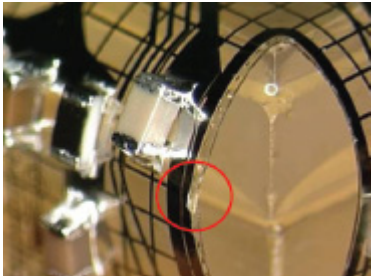

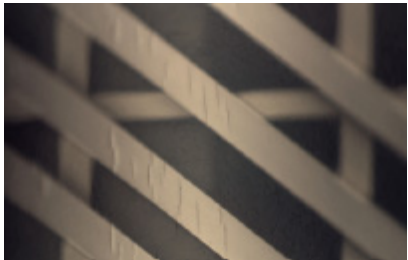
Scratch >1000 μm , not acceptable

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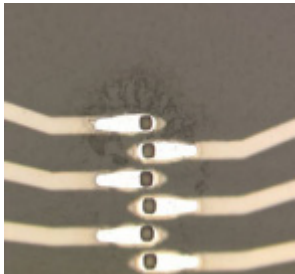
3. Inspect the core using the 20x objective.

Inspection Area	Criteria
<p>Tips</p>	<p>Do all tips appear uniform in size and shape? On a new core, fail for any tips that are missing, tilted or crushed.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Missing probe tip, not acceptable</p>  </div> <div style="text-align: center;"> <p>Tilted tip, not acceptable</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>Missing probe tip (close up), not acceptable</p>  </div> <div style="text-align: center;"> <p>Tilted tip, not acceptable</p>  </div> </div>
<p>Electrical traces</p>	<p>Are any anomalies present that affect the electrical trace metal? An anomaly is something different, abnormal, peculiar or not easily classified. Anomalies greater than 50% of an electrical trace width and found within the probe face are considered a reject on new cores. Anomalies less than 50% of an electrical trace width and found within the probe face are considered acceptable on new cores. Anomalies affecting the ground grid are acceptable.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Anomaly >50% of the trace</p> </div> <div style="text-align: center;">  <p>Anomaly >50% of the trace</p> </div> </div> <p>Are there any cracks in the electrical traces? Cracks greater than 50% of an electrical trace width are considered a reject on new cores. Cracks less than 50% of an electrical trace width are considered acceptable on new cores. Cracks affecting the ground grid are acceptable.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Crack >50% of the trace</p> </div> <div style="text-align: center;">  <p>Crack >50% of the trace</p> </div> </div>

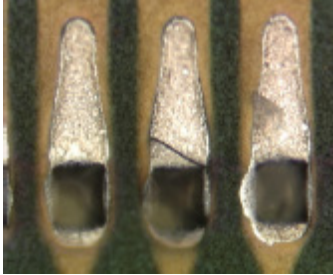
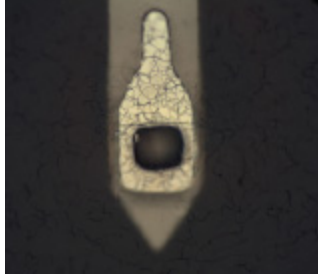
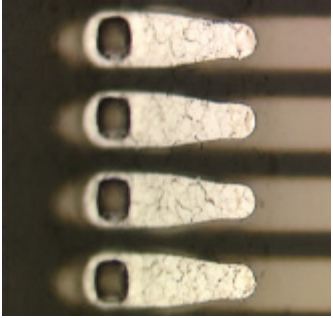

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Inspection Area	Criteria
<p>Surface layer cracks</p>	<p>Cracks may be present in the surface layer of the polyimide.</p> <ul style="list-style-type: none"> • Cracks originating from the beam are acceptable • Cracks parallel to an electrical trace, but not within 20 μm of the beam are acceptable. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Cracks originating from beam</p> </div> <div style="text-align: center;">  <p>Cracks parallel to trace</p> </div> </div>
<p>Middle layer polyimide</p>	<p>Are there any cracks in the Middle Layer Polyimide that do not come to the surface?</p> <p>This type of crack is acceptable unless it is causing other damage to the membrane, such as separation between the layers or cracks through the entire membrane.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Acceptable</p> </div> <div style="text-align: center;">  <p>Not acceptable. Membrane is cracked and has some separation.</p> </div> </div>
<p>Stress cracks</p>	<p>Are there any cracks in the surface layer of the membrane where it bends at the edge of the face?</p> <p>These cracks are not in the metal. They are in the polyimide.</p> <p>Change the focus of the microscope to confirm the cracks are in the polyimide. Cracks in the polyimide are acceptable.</p> <p>If cracks also appear in the electrical traces, refer to the appropriate criteria in Electrical traces on page 4.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>

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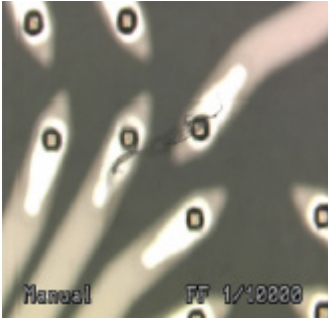

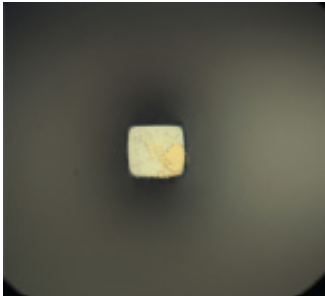
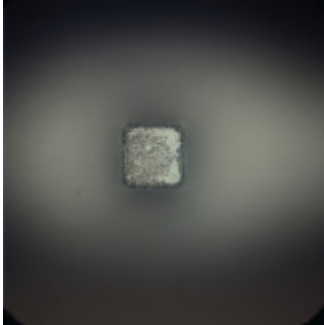
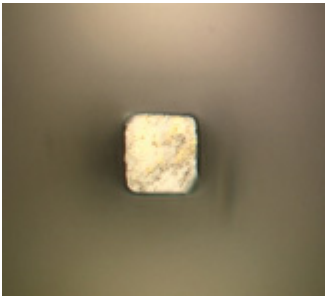
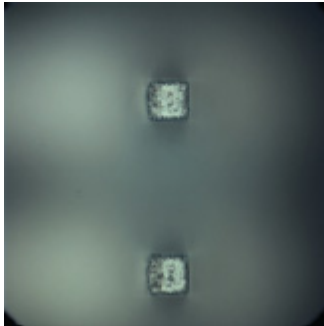
Inspection Area	Criteria
Membrane surface	<p>Have any particles penetrated the membrane (poly2) surface after the thinfilm fabrication process? The presence of External Embedded Particles is unacceptable on a new core.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center;">Unacceptable</p>
	<p>Were any particles created or formed below the membrane (poly2) surface during the thinfilm fabrication process? Internal Embedded Particles are acceptable as long as they pass all other specifications.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Acceptable</p> </div> <div style="text-align: center;">  <p>Acceptable</p> </div> <div style="text-align: center;">  <p>Cross section with internal embedded particle</p> </div> </div> <p>Polyimide may appear rough and discolored around the beams, component attachment pads, or any other plated metal area forming part of the membrane surface:</p> <ul style="list-style-type: none"> • On the probe face, this is acceptable up to 200 μm radius around the beams or other plated metal area forming part of the membrane surface. • On the wings and the interface area, this is acceptable in all areas. <div style="text-align: center; margin-top: 20px;">  </div>

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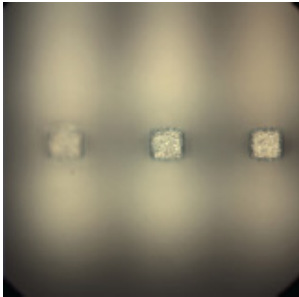
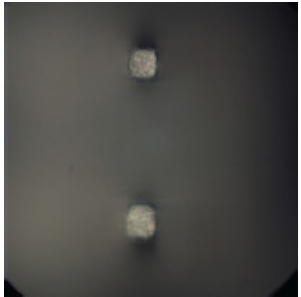

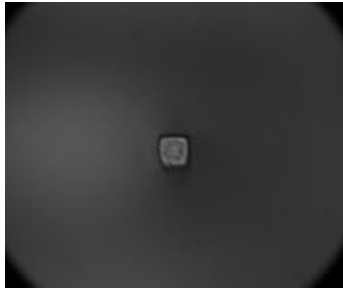
Inspection Area	Criteria
Beams	<p>Are there any cracked beams? Cracked beams are not acceptable on new cores.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center;">Cracked beam, not acceptable Cracked beam, not acceptable</p>
	<p>Is beam slope greater than 5 μm? Beam slope greater than 5μm on new cores is not acceptable. See the <i>Pyramid Probe Core User Manual</i> for more details on beam slope measurement procedure.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center;">Beam slope <5 μm Beam slope <5 μm</p>

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4. Inspect the core using the 50x objective. The primary goal at this magnification is to inspect the surface of the probe tip.

Inspection area	Criteria
<p>Probe tips</p>	<p>Is there any organic buildup or fibers on tips?</p> <p>New cores should have no debris or fibers on the surface of the probe tips.</p> <p>To remove contamination, see the procedure in <i>Pyramid Probe Cores Off-line Cleaning With Brush</i>.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Fiber on probe face, not acceptable</p> </div> <div style="text-align: center;">  <p>Fiber on probe face, not acceptable</p> </div> </div>
	<p>Is there any metal present on the probe tips?</p> <p>Gold on probe tips used in applications for probing gold is acceptable as long as the metal isn't loose.</p> <p>Gold on probe tips used in the factory to test on an Impedance Standard Substrate (ISS) is acceptable as long as the metal isn't loose.</p> <p>Aluminum on probe tips used in applications for probing aluminum pads is acceptable as long as the aluminum does not exceed 25% of the tip surface.</p> <div style="display: grid; grid-template-columns: 1fr 1fr; gap: 20px;"> <div style="text-align: center;"> <p>Au on probe tip surface, acceptable</p>  </div> <div style="text-align: center;"> <p>Al on probe tip surface, acceptable</p>  </div> <div style="text-align: center;"> <p>Au on probe tip surface, acceptable</p>  </div> <div style="text-align: center;"> <p>Al on probe tip surface, acceptable</p>  </div> </div>
	<p>Are the probe tips textured?</p> <p>Probe tips for gold pads do not need texture, but can have a textured tip surface.</p> <p>Probe tips for probing all other metals must have texture on 25% of the tip surface.</p>

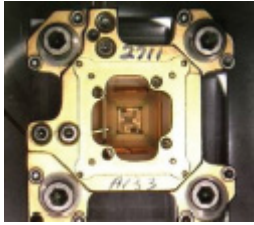
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Inspection area	Criteria
Probe tips (cont.)	<p>Do the probe tips match the Outgoing Report Tip Measurement Data specs for height and diameter dimensions?</p> <p>For new cores, refer to the specs in the Pyramid Probe Outgoing Report Tip Measurement Data for the core you are inspecting.</p>
	<p>Do adjacent probe tips have a height difference greater than 2 μm ?</p> <p>Adjacent probe tips with height difference greater than 2 μm are considered a reject on new cores, unless by design.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Adjacent tip 2.5 μm shorter, not acceptable</p> </div> <div style="text-align: center;">  <p>Adjacent tip 1.5 μm shorter, acceptable</p> </div> </div>
	<p>Is the tip cupped greater than 1 μm ?</p> <p>Tip cupping greater than 1 μm on new cores is not acceptable.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Example: No tip cupping</p> </div> <div style="text-align: center;">  <p>Example: tip cupping greater than 1 μm</p> </div> </div>

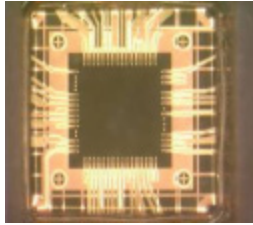
Pyramid Probes: New Core Inspection

Example Images

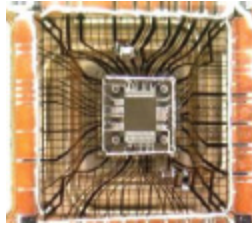
Low magnification scope



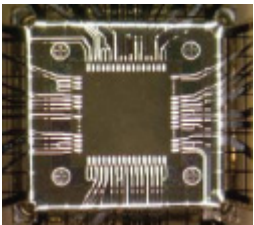
Entire probe



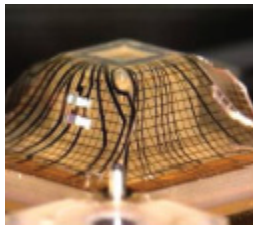
Core window



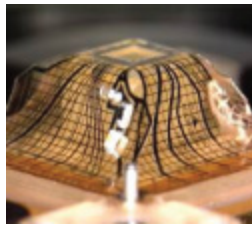
Entire membrane



Probe face

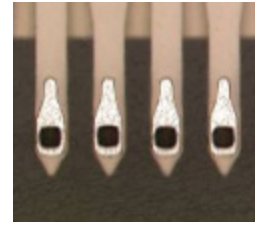


Wing, North and East

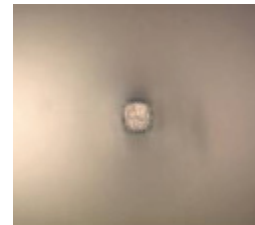


Wing, South and West

High magnification scope



Beams @ 50x



Probe tips @ 50x

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