

Electronics Design Center – Overview of Thin and Thick Film Interdigitated and 4-point Probe Electrodes Available for Research & Development

Thin Film Interdigitated Electrodes for Sale

The Electronics Design Center at Case Western Reserve University can provide thin film sputtered interdigitated electrodes for R&D testing purposes.

Thin film fabricated interdigitated electrodes are sputtered metal films deposited on one of three types of substrates. The first substrate is a silicon substrate with a layer of thermally grown silicon dioxide on a silicon substrate. The silicon dioxide provides electrical insulation between the interdigitated fingers and the silicon. The second substrate available is optically clear and electrically insulating Pyrex. The last substrate available (by special request) is highly polished Coors Tek Superstrate alumina.

The thickness of the metal interdigitated finger layers is 100 Angstroms of titanium adhesion layer and 2000 Angstroms of either gold or platinum. Other metals such as copper, aluminum or nickel are available by special request.

Custom electrode design and fabrication is available.

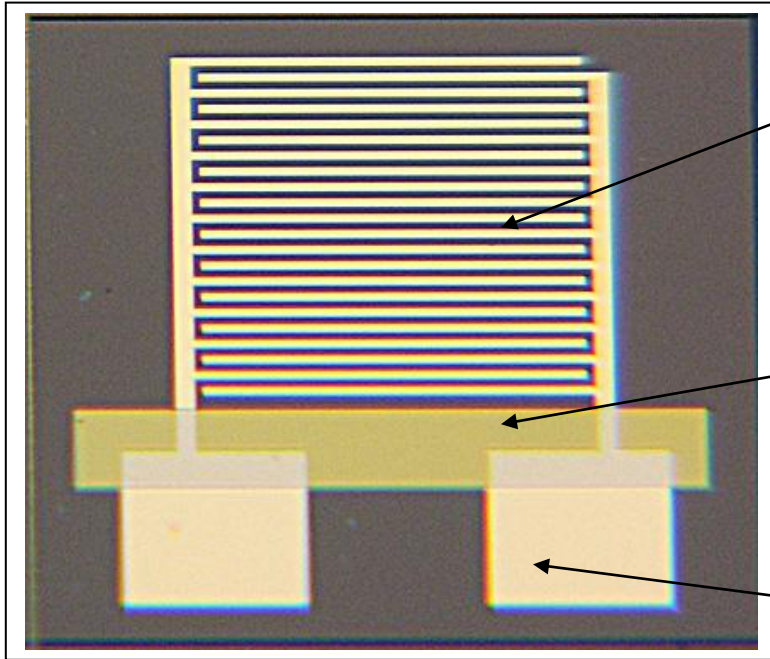
For all interdigitated electrodes listed: When line width and gap is talked about in the description it is as shown on the figure below.

For an interdigitated electrode that has a designated line width of 250 microns. A would equal 250 microns and both B gaps would equal 250 microns.

A = line width

B = line gap



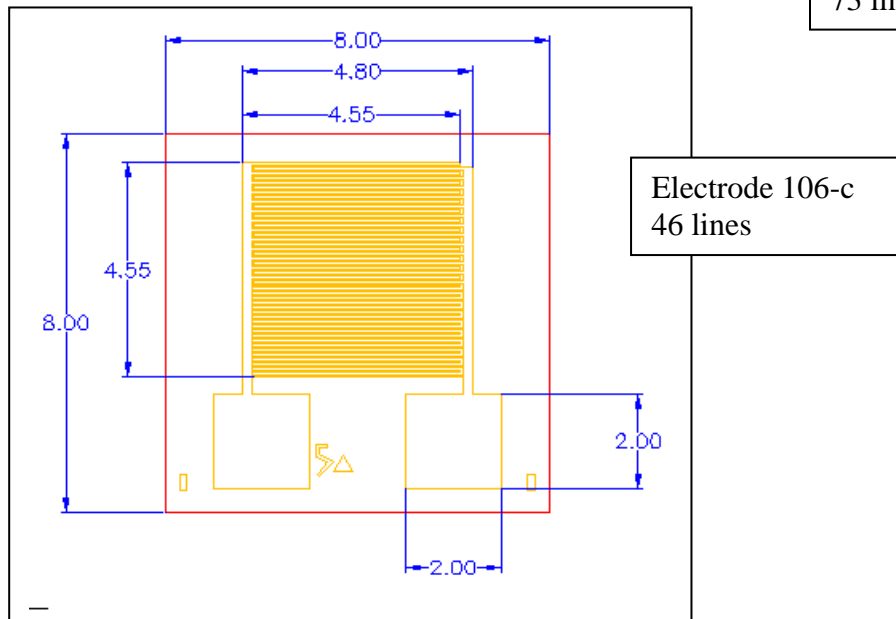
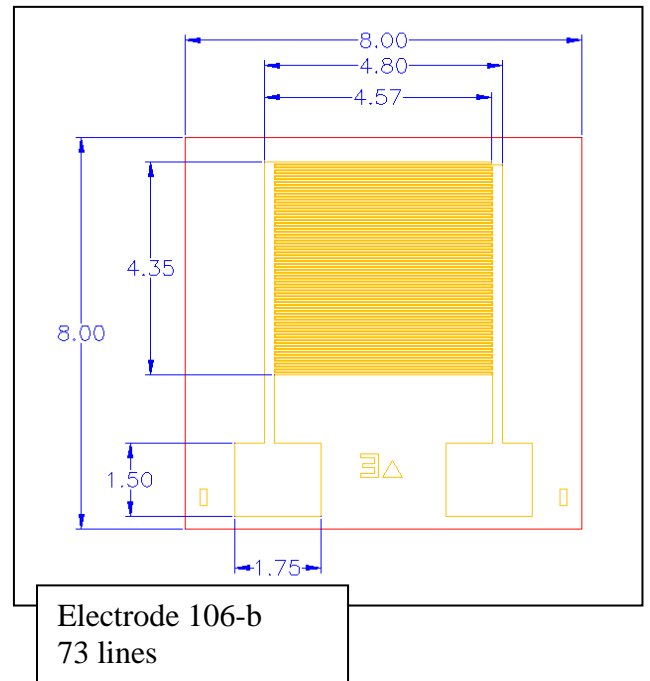
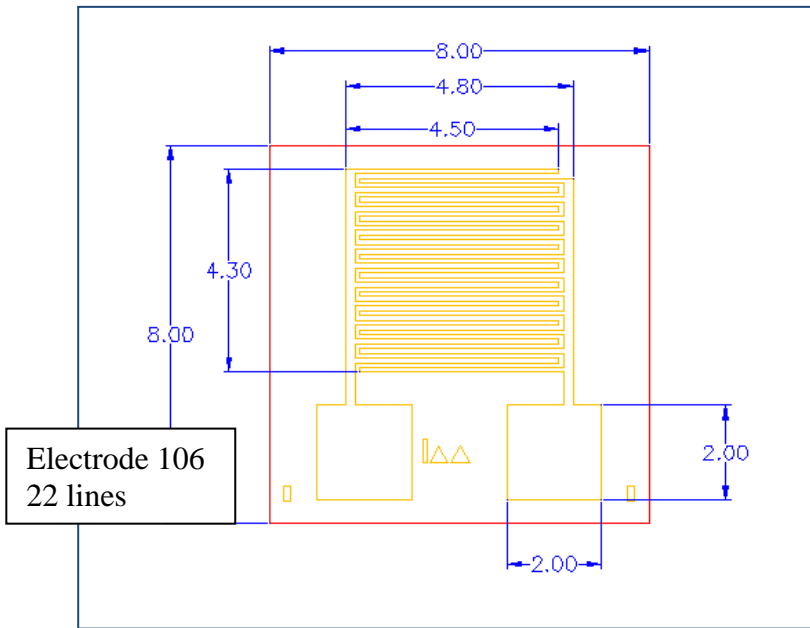


Interdigitated metal fingers

Silicon dioxide insulation layer between metal fingers and bonding pads available by special request

Bonding pads – gold bonding pads – do not use regular lead/tin solder, indium based solder or conductive epoxy

Photo of Electrode 106 on silicon substrate



Item # 106 -Thin Film Interdigitated Finger Electrodes

This thin film fabricated electrode consists of interdigitated platinum or gold lines on a silicon or Pyrex substrate. On silicon substrates there is 3000 Angstrom thick layer of thermally grown, electrically insulating silicon dioxide between the metallic interdigitated fingers and the silicon substrate. The overall dimensions of the silicon or Pyrex die are 8 mm x 8 mm. The electrode is generally used by spreading material of interest over the interdigitated fingers.

The thickness of the metal layers is 100 Angstroms (10 nm) of titanium adhesion layer and 2000 Angstroms (200 nm) of either gold or platinum.

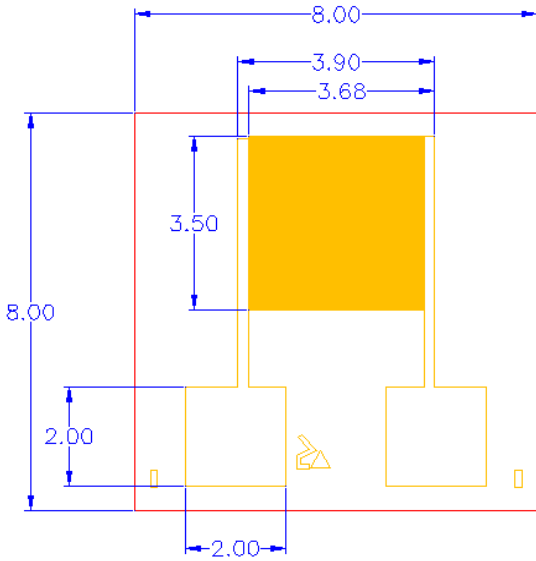
#106 electrodes have 100 micron line/spaces between the interdigitated fingers.

#106b electrodes have 30 micron line/spaces between the interdigitated fingers.

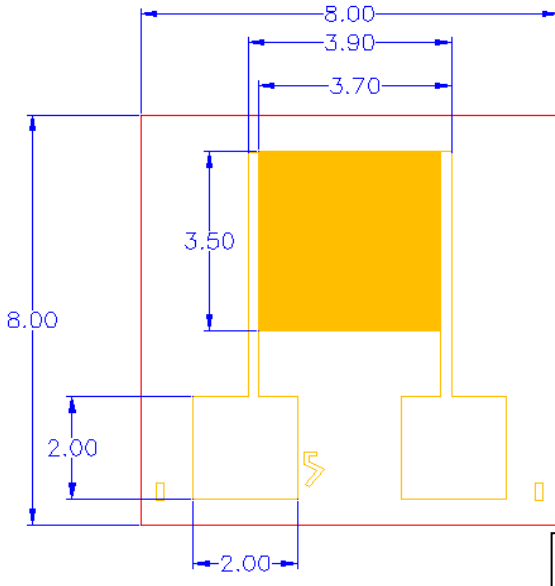
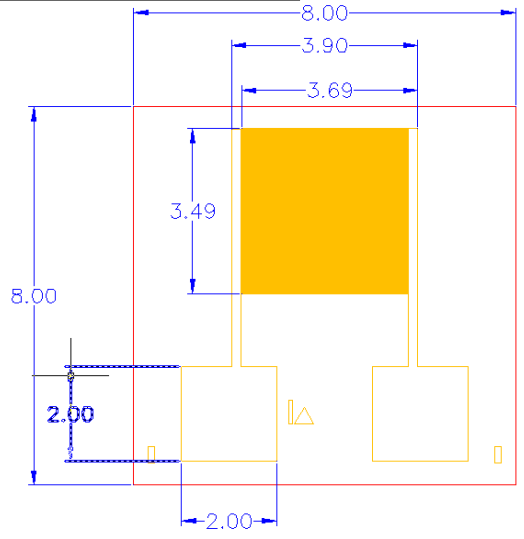
#106c electrodes have 50 micron line/spaces between the interdigitated fingers.

It is also possible to have special orders of the electrodes made on polished alumina substrates or quartz substrates instead of silicon or Pyrex substrates. Specify metal of interdigitated electrodes and substrate type when requesting pricing.

Electrode 112



Electrode 112-b



Electrode 112-c

Item # 112 -Thin Film Interdigitated Finger Electrodes

This thin film fabricated electrode consists of interdigitated platinum or gold lines on a silicon or Pyrex substrate. On silicon substrates there is a 3000 Angstrom thick layer of thermally grown, electrically insulating silicon dioxide between the metallic interdigitated fingers and the silicon substrate. The overall dimensions of the silicon or Pyrex die are 8 mm x 8 mm. The electrode is generally used by spreading material of interest over the interdigitated fingers.

The thickness of the metal layers is 100 Angstroms (10 nm) of titanium adhesion layer and 2000 Angstroms (200 nm) of either gold or platinum.

#112 electrodes have 20 micron line/spaces between the interdigitated fingers.

#112b electrodes have 10 micron line/spaces between the interdigitated fingers.

#112c electrodes have 5 micron line/spaces between the interdigitated fingers.

Electronics Design Center Thick Film Interdigitated Research Electrodes

Thick film interdigitated electrodes are metal films screen printed onto alumina (CoorsTek ADS-996). The metals available are platinum, gold and silver. Some thick film interdigitated electrodes are available with a backside platinum heater and a front side platinum resistance temperature device (RTD).

The inks are fired between 850 and 900 °C.

Custom electrode design and fabrication is available.

For all interdigitated electrodes listed:

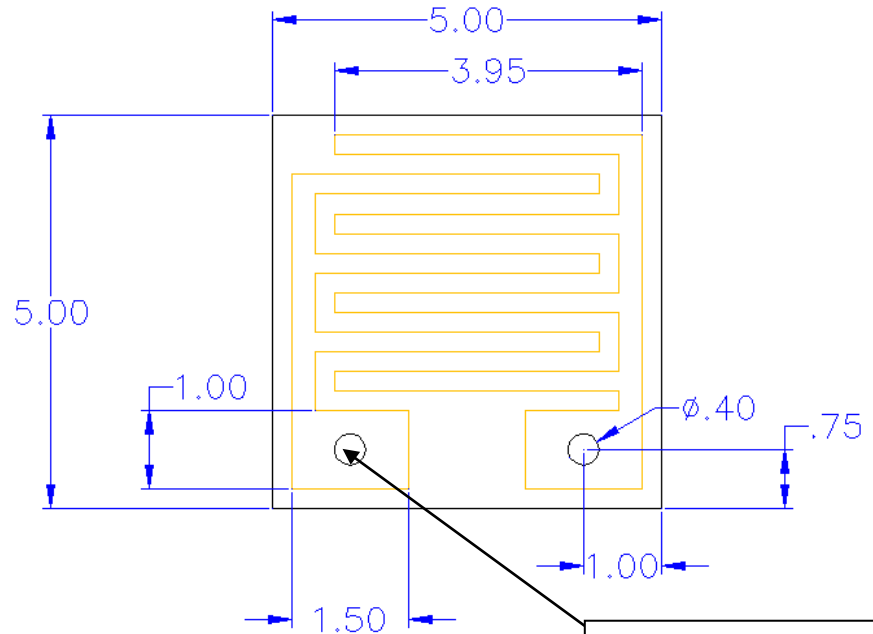
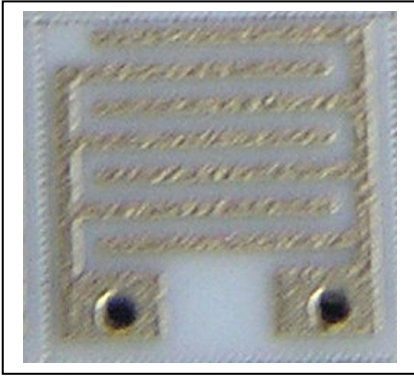
When line width and gap is talked about in the description it is as shown on the figure below.

For an interdigitated electrode that has a designated line width of 250 microns. A would equal 250 microns and both B gaps would equal 250 microns.

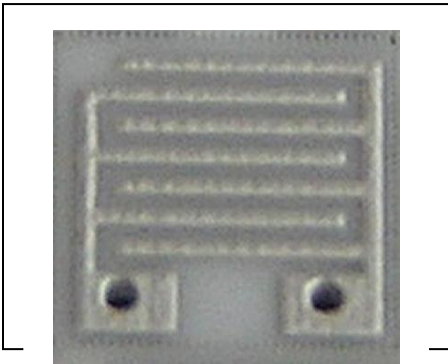
A = line width

B = line gap



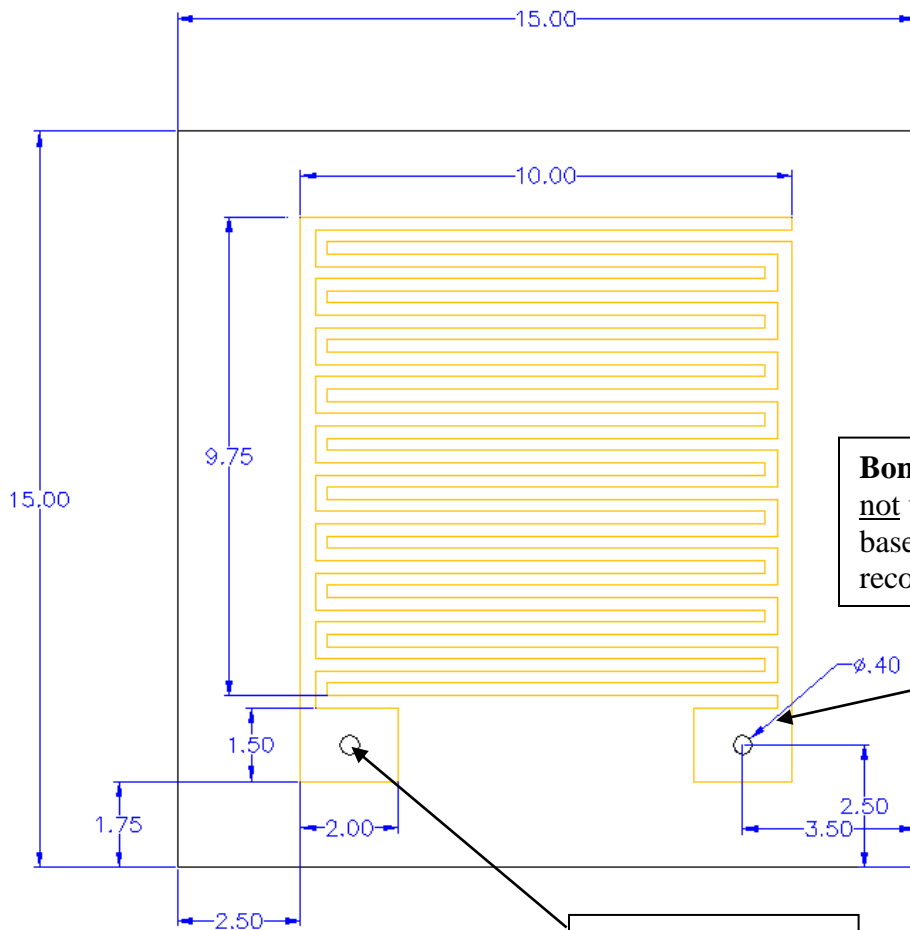


**0.4 mm diameter
Through Hole**



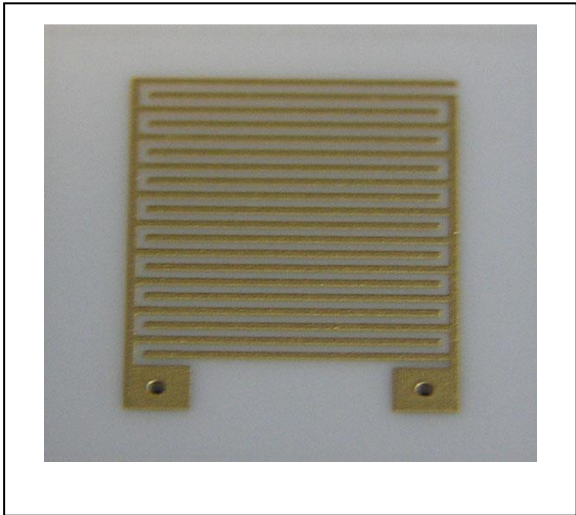
Item # 101 - Interdigitated Finger Electrode (5x5mm)

This electrode consists of thick film printed interdigitated platinum, gold, or silver lines on a 0.6 mm thick alumina substrate. Line width and gap is 0.25 mm. The overall dimensions of the alumina are 5 mm x 5 mm (see drawing above). The electrode is used by spreading material over the interdigitated fingers. The holes in the bonding pads allow wires to be threaded through them for electrical connection. Specify metal of interdigitated electrodes when requesting pricing.



Bonding pads – gold bonding pads – do not use regular lead/tin solder, indium based solder or conductive epoxy recommended for wire connection

0.4 mm diameter Through Hole

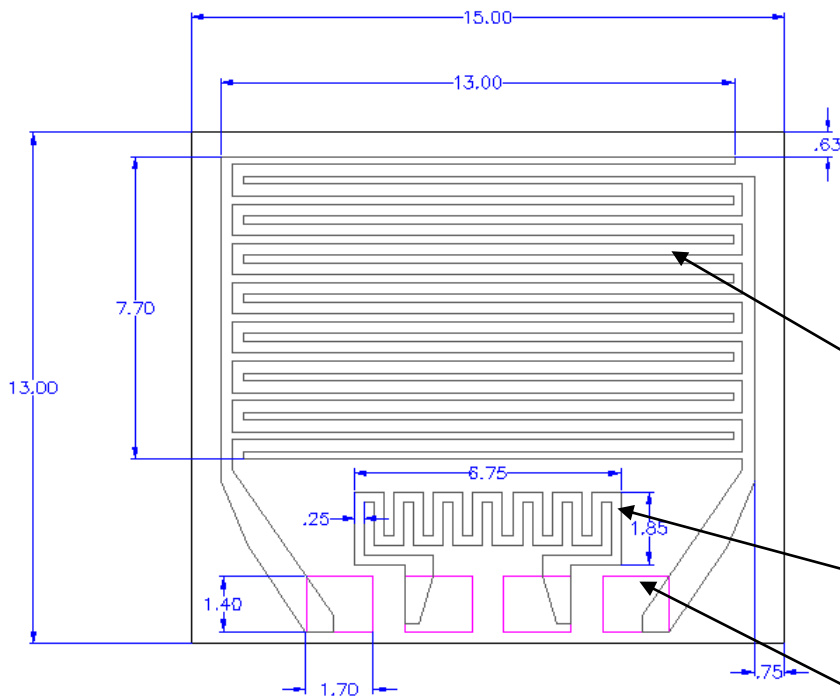


Picture of #102 - interdigitated finger electrode

Item # 102 - Interdigitated Finger Electrode (15x15mm)

This thick film printed electrode consists of interdigitated gold lines on a 0.6 mm thick alumina substrate. The overall dimensions of the alumina substrate is 15 mm x 15 mm. The electrode is used by spreading material over the interdigitated fingers. The holes in the bonding pads allow wires to be threaded through them as an aid for electrical connection. The gold thick film screen printed electrode fingers are 250 μm wide with 250 μm spacing between them.

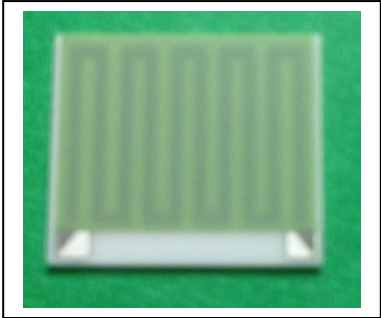
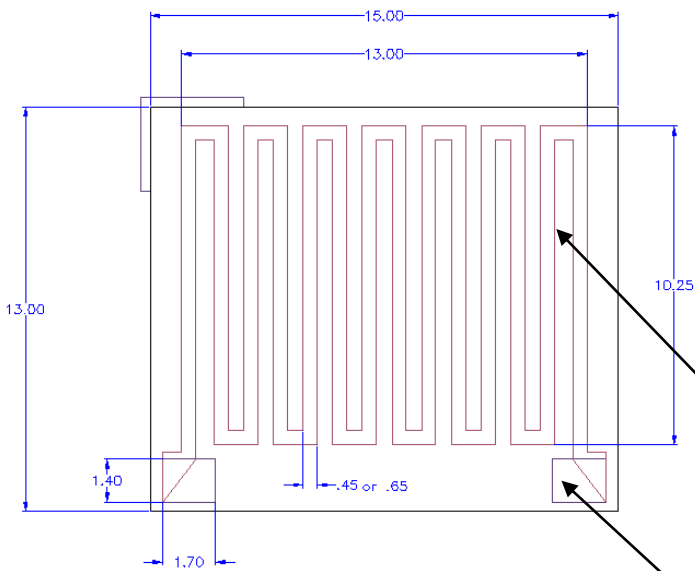
The 102 can be made in platinum by special request.



Platinum Interdigitated Fingers – 0.25 mm line width and gap

Platinum Resistance Temperature Detector

Silver Bonding Pads

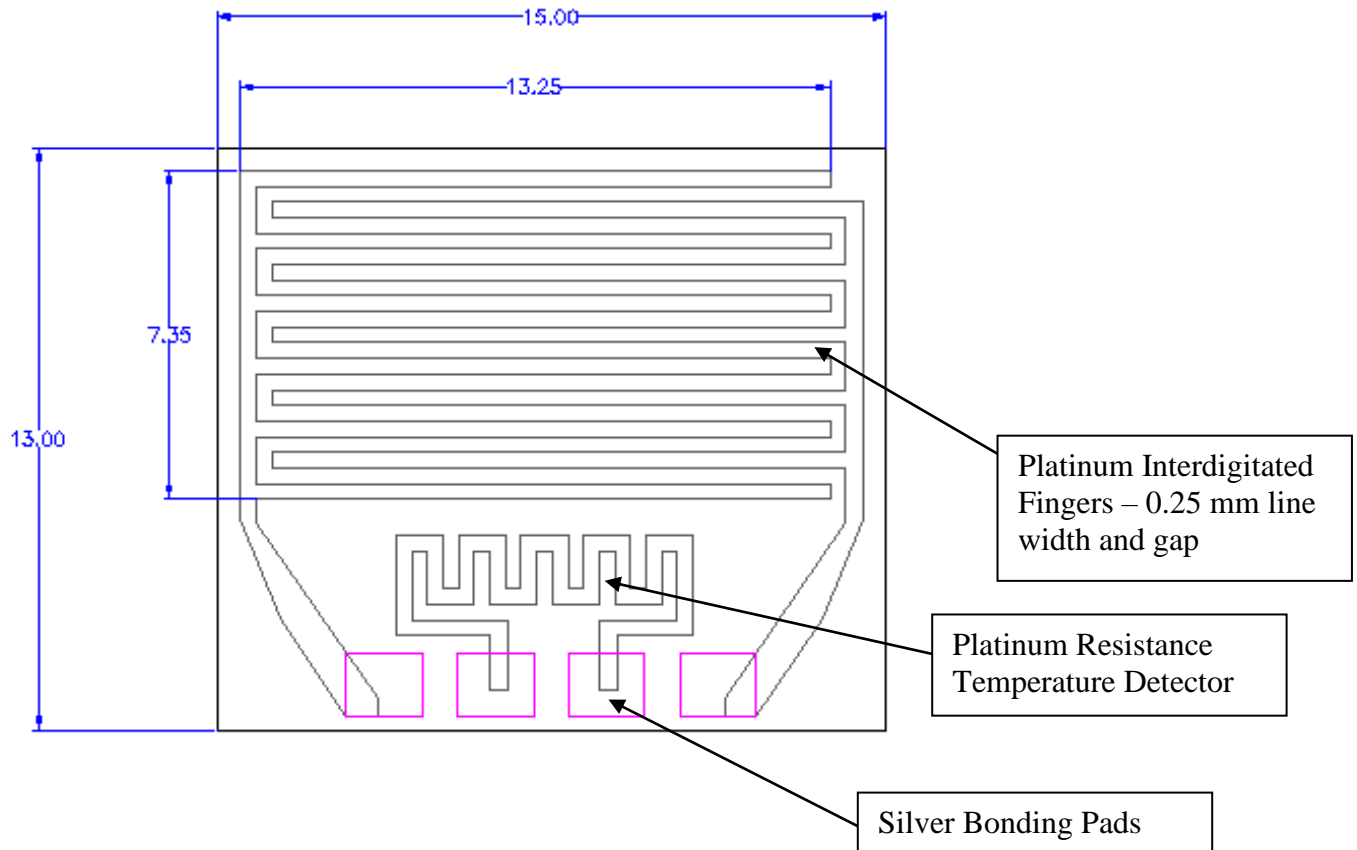


Platinum Resistance Heater with a layer of glassy insulation over it to prevent shorting.
Substrate Temperature can be taken to 100 – 300 °C depending on ambient conditions and electrical connection method. Inks used in making device can withstand 900 °C.

Silver Bonding Pads

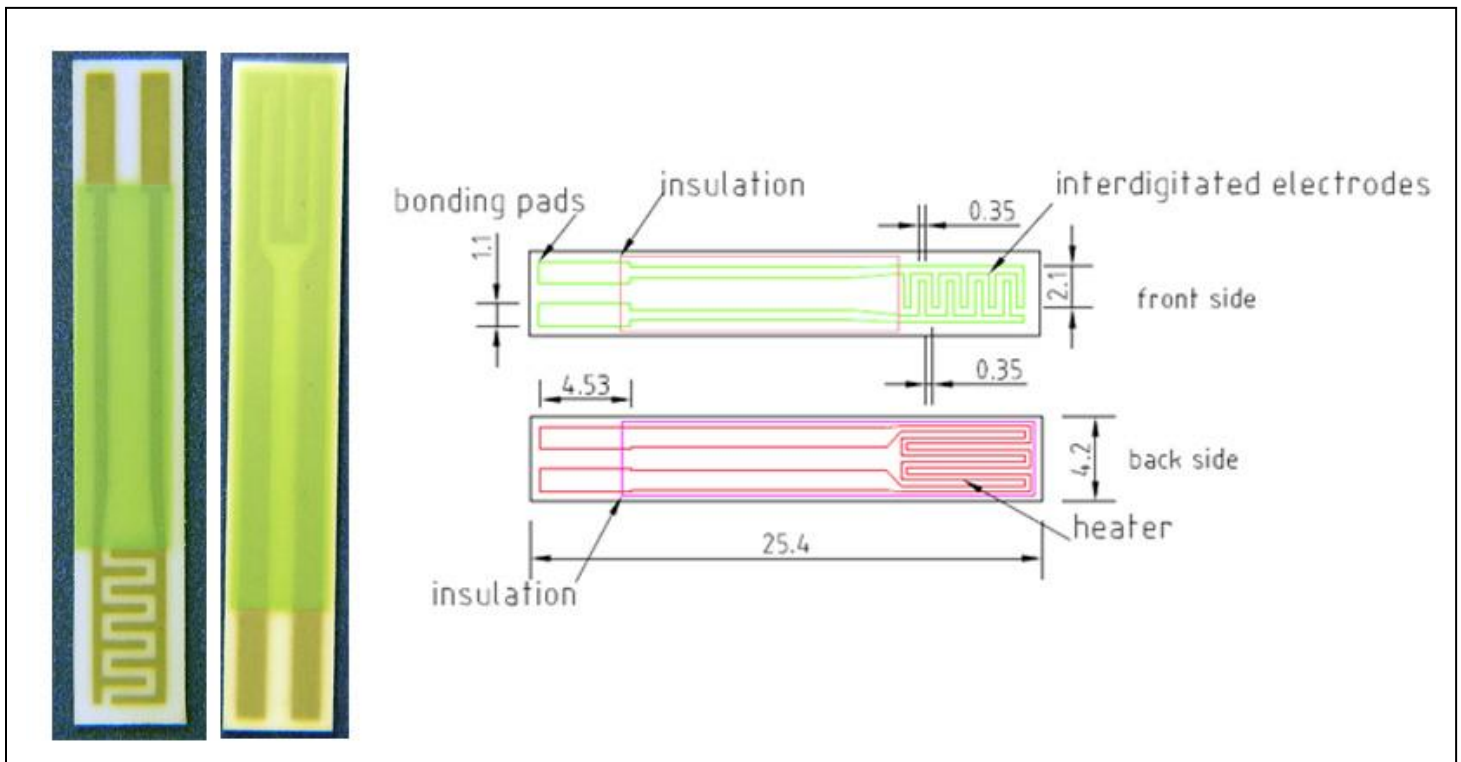
Item # 103 - Interdigitated Finger Electrode with heater and temperature detector

This electrode consists of thick film printed interdigitated platinum lines (250 μm width and spacing) and platinum resistance temperature detector (RTD) on one side of an alumina substrate and a platinum heater on the other side. The overall dimensions of the alumina is 15 mm x 13 mm (see drawing above). The bonding pads are silver for easier soldering.



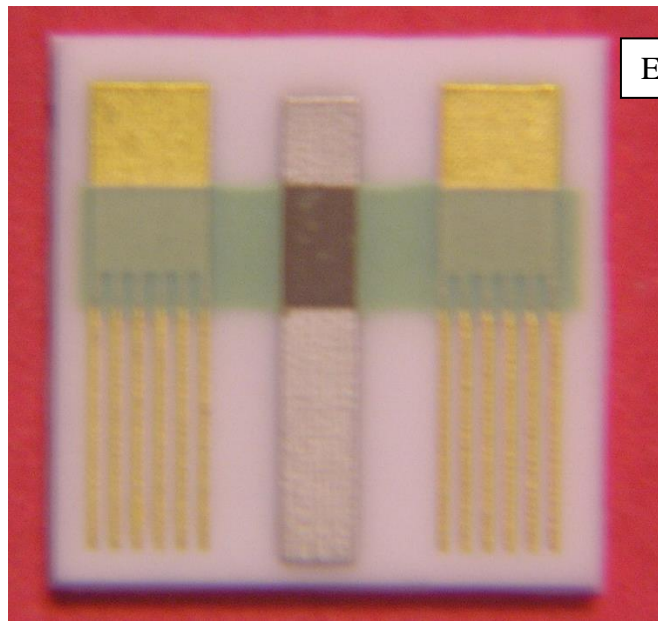
Item # 103a - Interdigitated Finger Electrode with heater and temperature detector

A less costly version of Item 103, the 103-a, has thicker lines (350 μm) with a larger gap between them (350 μm). This electrode consists of interdigitated platinum lines and platinum RTD on one side of an alumina substrate and a platinum heater on the other side. The backside heater is identical to the one shown in the 103 figures. The overall dimensions of the alumina is 15 mm x 13 mm (see drawing above). The bonding pads are silver for easier soldering.

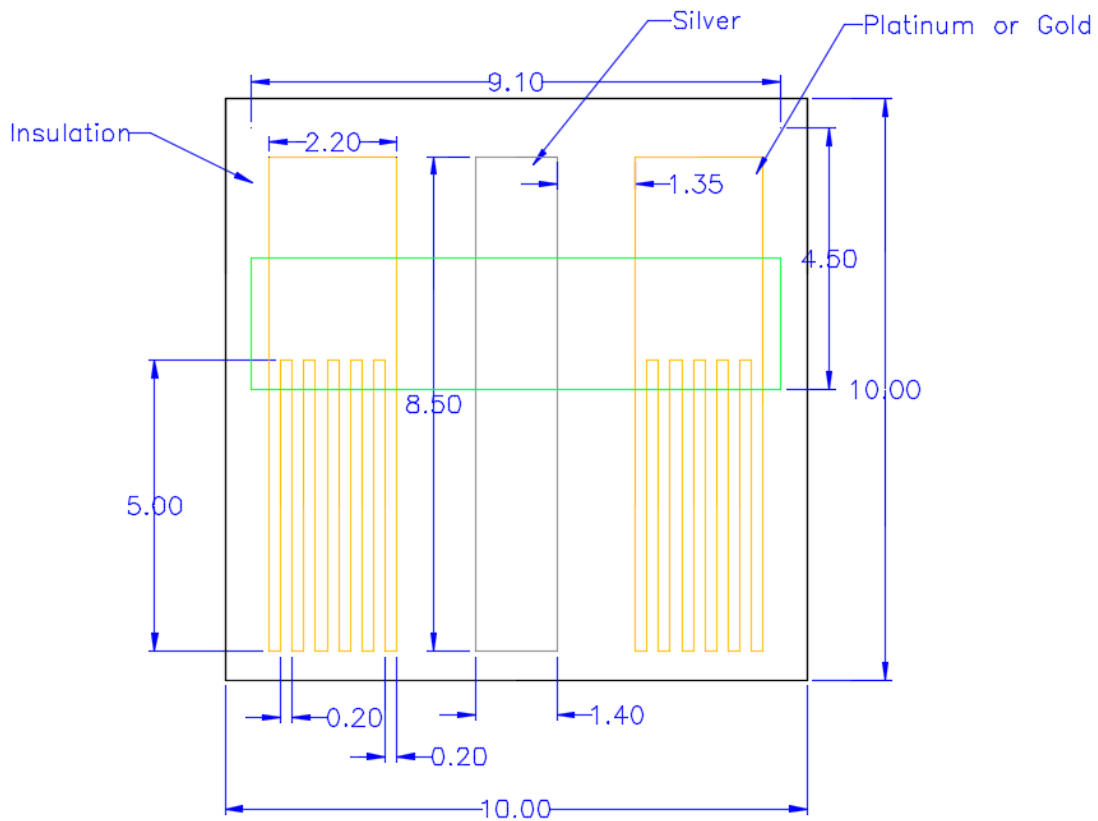


Item # 110 –Interdigitated Finger Electrode with backside heater

This thick film printed electrode consists of thick film printed interdigitated platinum lines (350 μm width and spacing) on one side of an alumina substrate and a platinum heater on the other side. The substrate is alumina with overall dimensions of 25.4 x 4.2 mm. The bonding pads are platinum.



Electrode 113

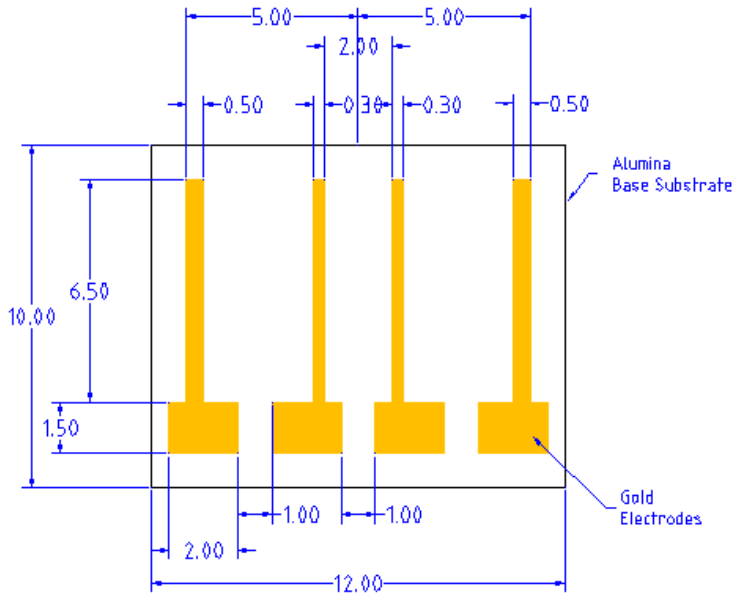


Item # 113 - Interdigitated Finger Electrode with Silver Reference Electrode

This electrode consists of thick film printed interdigitated gold or platinum lines (200 μm width and spacing) with a silver electrode in between the two interdigitated electrodes. The substrate is alumina with overall dimensions of 10 mm x 10 mm.

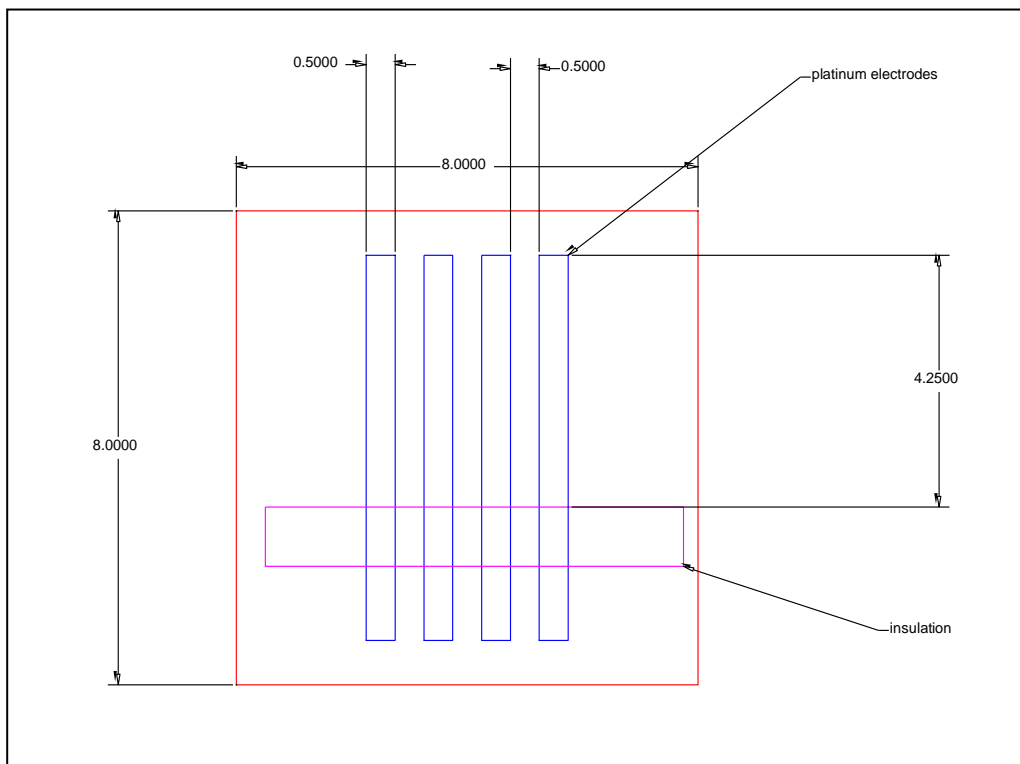
Electronics Design Center 4 Point Probe Electrodes for Sale

The Electronics Design Center sells thick film printed and thin film sputtered electrodes for R&D testing purposes. Please email lx3@cwru.edu for pricing. Silicon substrates have a layer of thermally grown silicon dioxide on the side the metal electrodes are deposited on for electrical insulation between the metal and the silicon. All alumina used is CoorsTek ADS-996. All dimensions are given in millimeters.



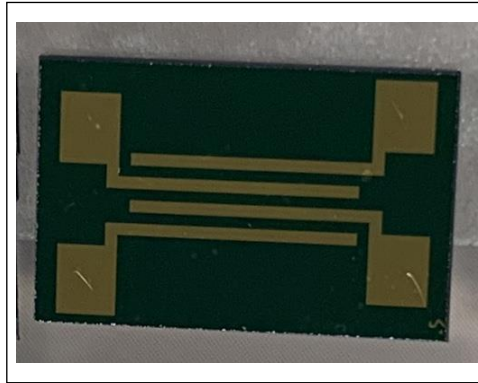
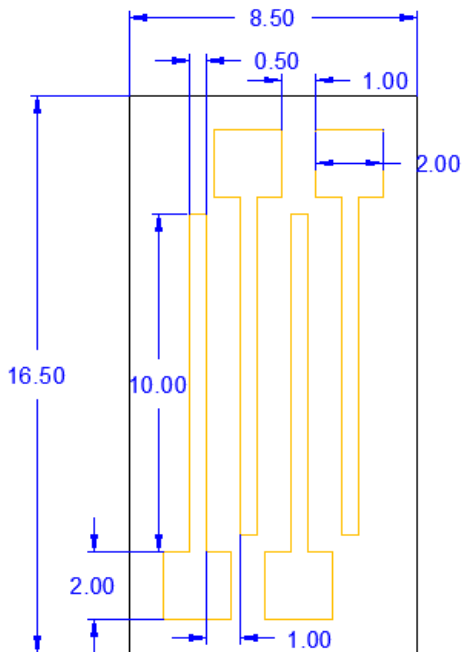
Item # 100 – Thick Film Gold 4-Point Probe Electrode

This electrode consists of four thick film gold lines on an alumina substrate. The overall dimensions of the alumina is 12 mm x 10 mm. The thickness of the gold lines is between 10 and 15 microns thick. The electrode is used by spreading material over the four electrodes and then testing the resistivity of the material.



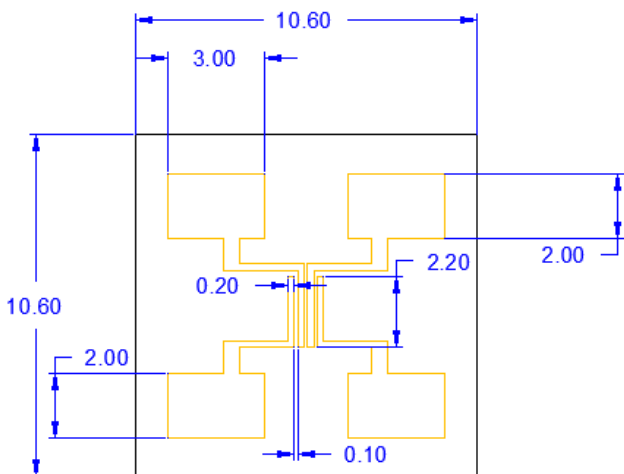
Item # 107 - Thin Film Platinum 4 Point Probe Electrodes

This electrode consists of four thin film sputtered platinum electrodes on a silicon substrate with a 300 to 500 nm layer of thermally grown silicon dioxide between the platinum and silicon as an electrical insulator. The overall dimensions of the silicon die are 8 mm x 8 mm. The platinum thickness is between 100 and 200 nm. Line spacing on this item is 500 microns.



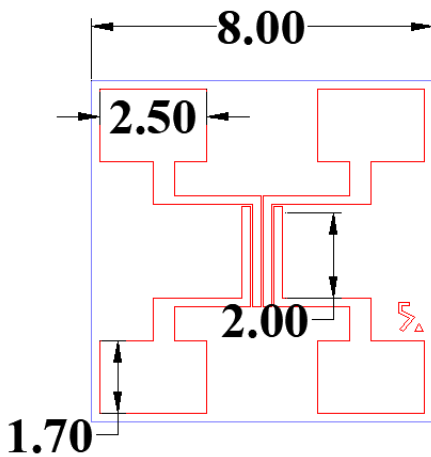
Item # 120 – 0.5 mm Gap 4 Point Probe Electrodes

This electrode consists of four thin film sputtered gold electrodes on silicon substrate with a 300 to 500 nm layer of thermally grown silicon dioxide between the gold and silicon as an electrical insulator. The overall dimensions of the silicon die are 16.5 mm x 8.5 mm. The gold thickness is approximately 200 nm (there is a 10 nm titanium adhesion layer underneath the gold). Line spacing on this item is 0.5 mm with a line width of 1.0 mm.

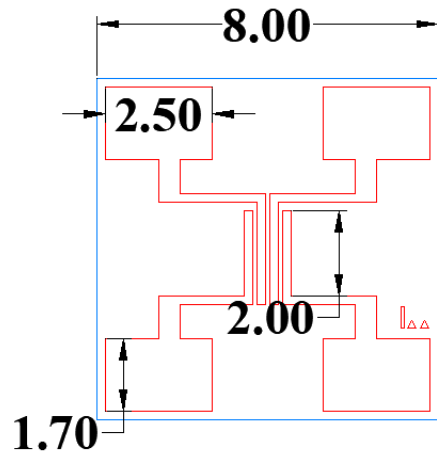


Item # 121 – 0.1 mm Gap 4 Point Probe Electrodes

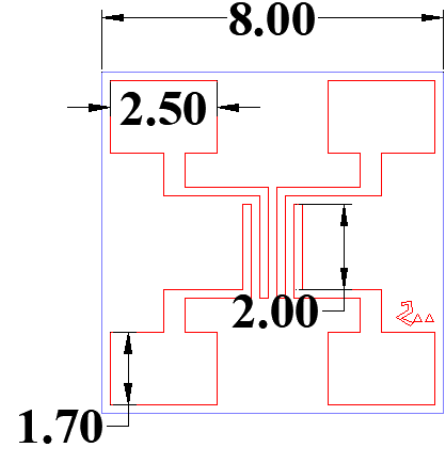
This electrode consists of four thin film sputtered gold electrodes on silicon substrate with a 300 to 500 nm layer of thermally grown silicon dioxide between the gold and silicon as an electrical insulator. The overall dimensions of the silicon die are 10.6 mm x 10.6 mm. The gold thickness is approximately 200 nm (there is a 10 nm titanium adhesion layer underneath the gold). Line spacing on this item is 0.1 mm with a line width of 0.2 mm.



**Line Width - 200 microns
Line Gap - 50 microns**



**Line Width - 200 microns
Line Gap - 100 microns**



**Line Width - 200 microns
Line Gap - 200 microns**

Item # 125 – Platinum 4 Point Probe Electrodes on Silicon/Silicon Dioxide

This electrode consists of four thin film sputtered platinum electrodes on silicon substrate with a 300 to 500 nm layer of thermally grown silicon dioxide between the platinum and silicon as an electrical insulator. The overall dimensions of the silicon die are 8 mm x 8 mm. The platinum thickness is approximately 100 nm (there is a 10 nm titanium adhesion layer underneath the platinum). Line spacing on this item is varies according to subtype (given below)

125-A – 200 micron lines – 50 micron spacing

125-B – 200 micron lines – 100 micron spacing

125-C – 200 micron lines – 200 micron spacing