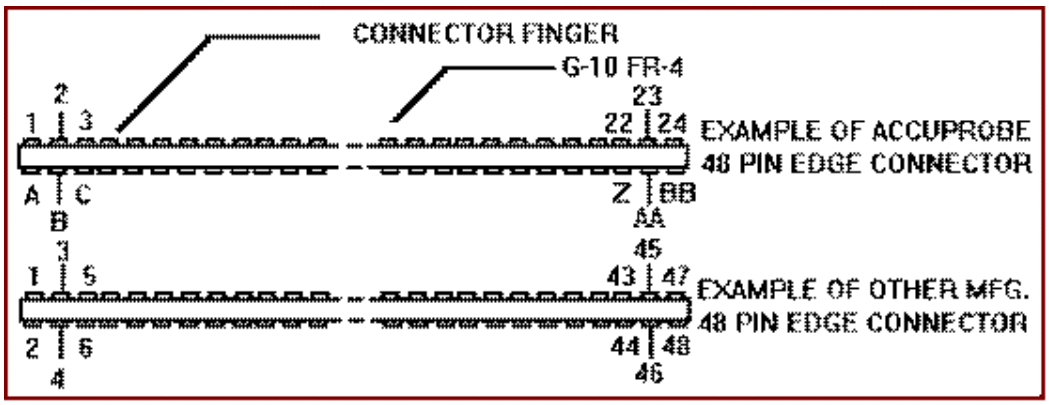
accuprobe *Probing the World of Microelectronics*

PROBE TIPS #5

A Technical Bulletin for Probing Applications

Probe Card Wiring

Probe card wiring can be confusing especially when crossing over from one manufacturer. There seems to be no standard for probe card edge connector pin numbering. While all edge connectors of a given size are of equal physical configuration, the various manufacturers have taken different approaches to identifying the connector fingers on probe cards.

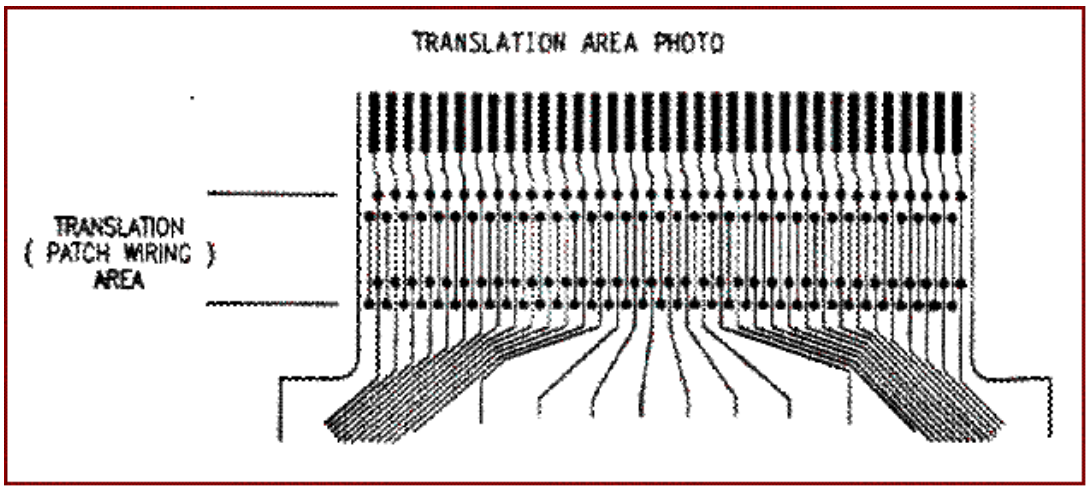


To avoid confusion for the probe card assembly or maintenance personnel, an edge connector translation table should be constructed to avoid mis-wiring of the card assembly. An example is shown below.

48 Pin Conn.			
Accuprobe		Other MFG.	
TOP	Bottom	TOP	Bottom
1	A	1	2
2	B	3	4
3	C	5	6
4	D	7	8
5	E	9	10
etc	etc	etc	etc

Many probe cards will have a patch wiring area, which is often referred to as a translation area. Typically these translation areas have pc trace jumping the translation area connecting the probe land to a connector finger. These traces can be cut and rewired to effectively reprogram the card to conform with a pre-existing test program. It is interesting to note that a translation area will create higher trace to trace capacitance which could affect test results particularly when AC testing.

TRANSLATION AREA PHOTO



The principle objective of a probe card is to properly connect a test pad to a probe through the printed circuit traces to the edge connector, which interfaces with the tester. A particular test pad ultimately connects to one port of the tester, which is sometimes referred to as a scanner.

The wiring of a probe card can affect the performance of the card due to the dielectric around the wiring and its impact on leakage or capacitance between traces. Most high quality probe cards will offer a high dielectric solder mask to minimize leakage due to contamination, humidity or other environmental factors. Capacitive coupling between traces is a function of trace thickness, width, space between traces, etc. Therefore, capacitance is more a function of the board layout and design. However, some probe cards are available without probe land to connector traces. Such a probe card design could be applied to probe and trim capacitors for example. Low capacitance wire would then be used in place of pc traces to connect the probe land to the appropriate connector finger.

Kelvin measurement requires twice the wiring of a conventional probe card to provide for the force and sense lines. (See Probe Tip Bulletin “Measurement Accuracy and Kelvin Probing”) The accuracy of the measurement depends on where the Kelvin measurement is terminated. Probe cards which are designed for Kelvin measurement have designed in dual traces with cuttable etches to permit Kelvin termination either at the probe land or extend measurement lines through separate probe needles to terminate Kelvin at the test pad.

Mother /Daughter boards introduce other factors which must be considered. A daughter board, which contains the probes, will be connected to the mother board by pins on the daughter plugging into sockets on the mother board. Orientation of the daughter board is usually determined by on offset pin serving as a key. While the offset is usually in the same location from one manufacturer to another the probe lands may be numbered differently. Again, what is important is that a particular pad be connected with a particular edge connector. As a side comment, we always recommend that all pins be soldered to the daughter board rather than just the active probe lands. This will insure planarization stability between the mother and daughter boards.

Wiring documentation can be important when troubleshooting a probe card and is highly recommended as a part of each probe card file. An example of a probe card wiring list is shown below.

PROBE CARD WIRING RUN LIST DATE *Today* DEVICE ID *ABC*			
PROBE CAD	PROBE LAND	CONNECTOR	COMMENTS
4	23	4	SCANNER#1
4	23K	D	SCANNER#2
	24	17	SCANNER#3

Such a control form can serve as a source document when originally building the card or serve as a reference document when repairing the card. Associated with the wiring run list should be a copy of the device drawing with the probe pads identified and marked for probing. These pad identifications are the pads referenced on the run list.

The ease of probe card wiring or wiring repair can be greatly enhanced through a systematic approach organizing and recording the wiring details of each probe card assembly. Creating forms and a filing system and then implementing such a system will reduce wiring errors and reprogramming time as well as facilitate the duplication of an existing probe card assembly.