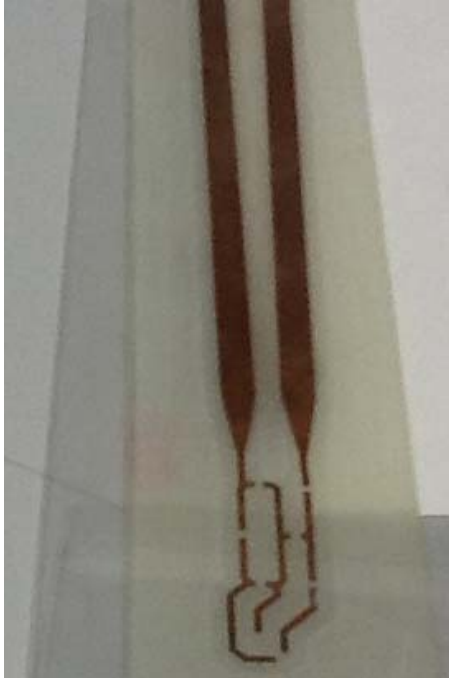


# Examples of Common Transmission Line Topologies

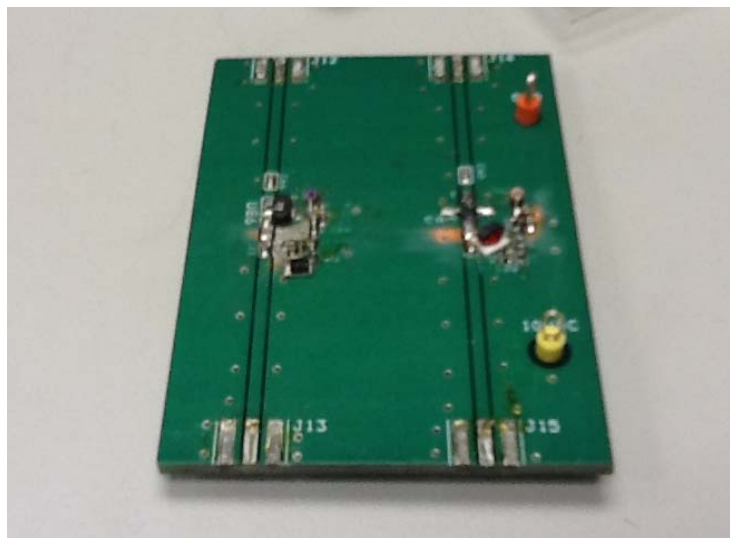
## Co-planar Strip



The photograph shows co-planar strip lines on a printed circuit board. All other metallization – top and bottom – has been scraped away to reveal a bare fiberglass resin dielectric. The circuit traces at the bottom are for implementing a discrete component *balun* – a device for converting and matching a change in transmission line topologies.

## Co-planar Waveguide

There are two co-planar waveguide traces (light green) that run the length of the board in parallel. Note how the metal has been left on the top of the circuit board other than two narrow channels that isolate the conductive traces. The bottom layer of the printed circuit board is solid conductor. The periodic dots that line both sides of the traces mark metalized vias that link the top metal to the bottom ground plane, isolating the signals traveling down the traces. Co-planar waveguide is very useful for microwave signals, which can shed waves inside the dielectric of the printed circuit board that “pop-up” in unexpected places elsewhere.



## Coaxial Cable

Below is an example of an SMA coaxial cable, designed for fifty-Ohm impedance. The inner conductor pit is shown in the blow-up photograph of the connector. A braided, flexible metal conductor surrounds the dielectric that insulates the outer conductor from the inner conductor. SMA cables are used in UHF and microwave signal measurements that require low-loss – the cost of this cable is much more than the coaxial cable that one buys at the consumer electronics store for television signals.



## Microstrip

Microstrip transmission lines consist of a solid ground plane (underneath the photographed printed circuit board) and a thin metal trace above. For the particular photographed example, the far end of the microstrip trace is connected to an SMA breakout, allowing connection to a coaxial cable. The near end of the microstrip trace connects to a rectangular area of metal – a patch antenna that resonates at 5.8 GHz to send and receive radio signals.

