The F-Antenna

The F-antenna can be thought of as a tilted whip, where impedance matching is accomplished by tapping the antenna at the appropriate impedance point along its width. This antenna is used extensively because it is reasonably compact, has a fairly omnidirectional radiation pattern, good efficiency, and is very simple. Note that the currents in the ground leg are high and that an adequate ground plane is necessary to provide good efficiency.
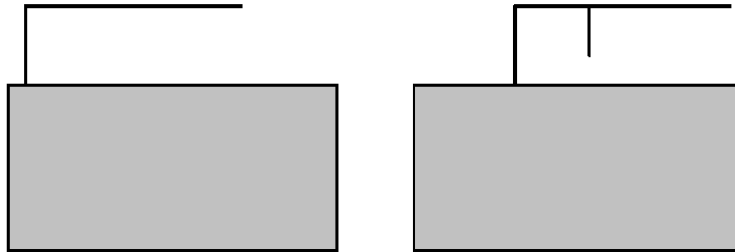

Figure 7. Tilted Whip and F-Antenna (Note the Ground Plane Area)

The following figure shows an F-antenna. Measurements are in millimetres.
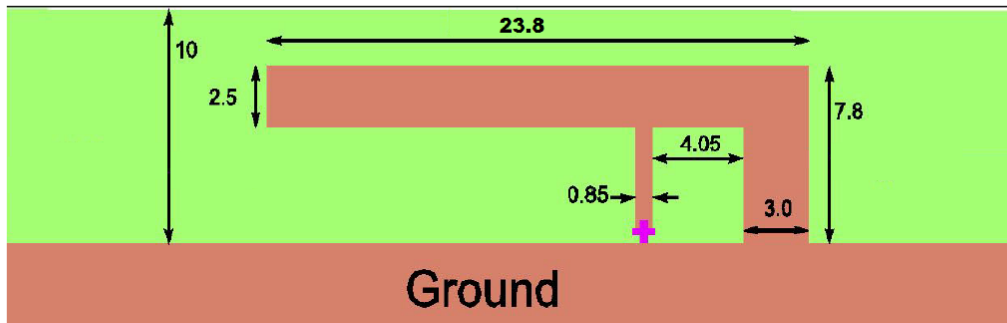

Figure 11. F Antenna

Figure 12 shows the EVK horizontal PCB radiation pattern. Red represents vertical polarization and blue represents horizontal polarization both measured in dBi.
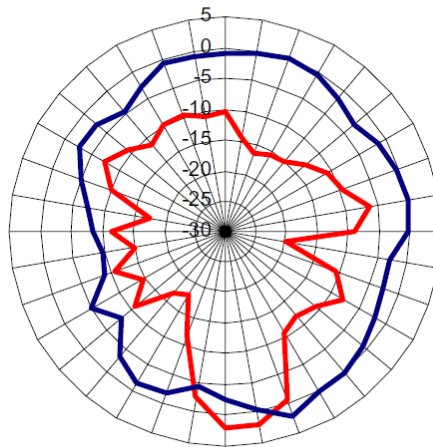

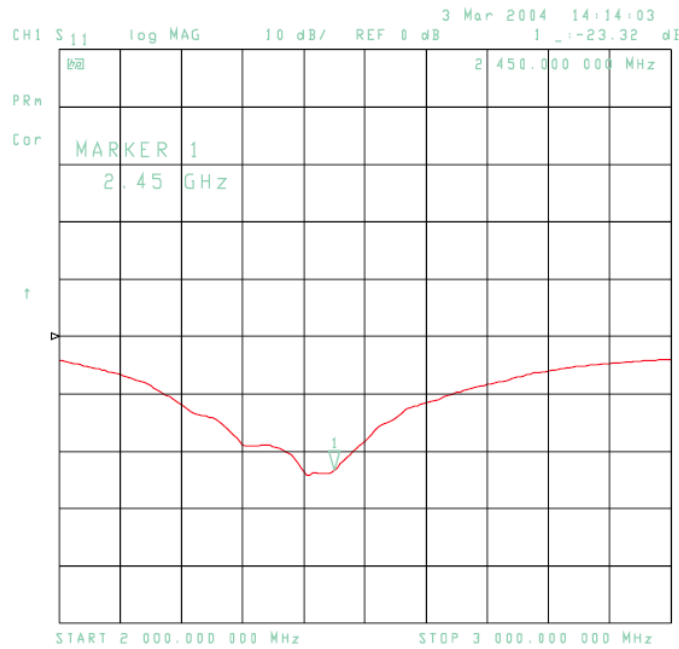Figure 12. F-Antenna Radiation Pattern (For Antenna as Shown in Figure 11)

Figure 13. F Antenna Return Loss and Bandwidth

RF Single Port Application with an F Antenna

Figure 16 shows a typical single port RF application in which part count is minimized and a printed copper F antenna is used for low cost. Only the RFIN port of the MC13202 is required because the differential port is bi-directional and uses the on-chip T/R switch. Matching to near 50 Ohms is accomplished with L1, L2, L3, and the traces on the PCB. A balun transforms the differential signal to single-ended to interface with the F antenna.

The proper DC bias to the RFIN_x (PAO_x) pins is provided through the balun. The CT_Bias pin provides the proper bias voltage point to the balun depending on operation, that is, CT_Bias is at VDDA voltage for transmit and is at ground for receive. CT_Bias is switched between these two voltages based on the operation. Capacitor C2 provides some high frequency bypass to the DC bias point. The L3/C1 network provides a simple bandpass filter to limit out-of-band harmonics from the transmitter.
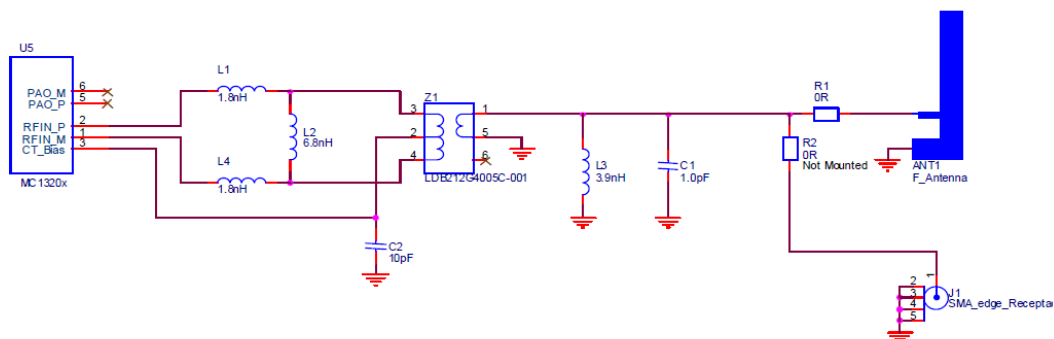

Figure 16. RF Single Port Application with an F-Antenna

Sources: Freescale documents 13202RM and AN2731