

## **3 Description of the PCB Antenna**

The antenna described in this document is a meandering monopole. Since the impedance of this antenna is approximately matched to 50 ohm no external matching components are needed. The geometry of the ground plane affects the impedance of the antenna. Thus the length of the antenna should be tuned according to the size and shape of the ground plane. This PCB antenna reference design has included the option for one series and two shunt components at the feed point of the antenna. These can be used to compensate for detuning caused by plastic encapsulation and other object in the vicinity of the antenna. For further information on impedance matching and impedance measurements, see DN001 Antenna Measurement with Network Analyzer [1] and ISM-Band and Short Range Device Antennas [2].

### **3.1 Implementation of the Meandering Monopole Antenna**

To obtain optimum performance it is important to make an exact copy of the antenna dimensions. The antenna was implemented on a 0.8 mm thick FR4 substrate. Since there is no ground plane beneath the antenna the PCB thickness is not critical, but if a different thickness is being used it will be necessary to tune the length of the antenna to obtain optimum performance.

One approach to implement the antenna in a PCB CAD tool is to import the antenna layout from a Gerber file. Such a file is included in the CC1110EM Meander Antenna Reference Design [3], and is called "antenna.spl". If the antenna is implemented on a PCB that is wider than the antenna it is important to avoid placing components or having a ground plane close to each side of the antenna. If the CAD tool being used does not support import of Gerber files, Figure 2 and Table 1 can be used.

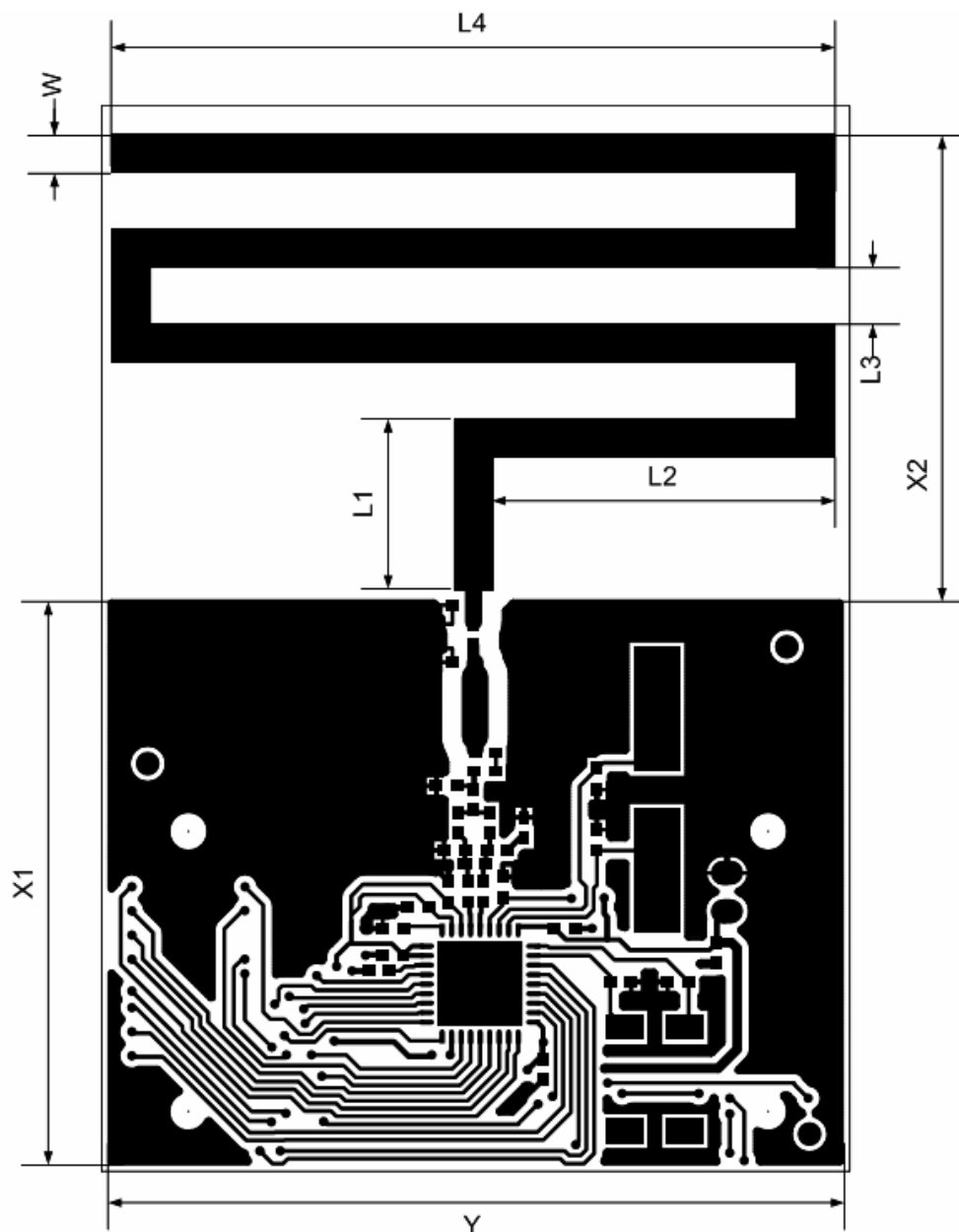


Figure 2. Antenna Dimensions

L1	9.0 mm	Y	39.0 mm
L2	18.0 mm	X1	30.0 mm
L3	3.0 mm	X2	24.0 mm
L4	38.0 mm	W	2.0 mm

Table 1. Antenna Dimensions

Optimum length for the last antenna segment is dependent on the geometry of the ground plane. With this ground plane (30 x 39 mm), L4 (for the last segment) should be approx. 32 mm for 868 MHz and 22 mm for 915 MHz. The antenna can also be used for 955 MHz but then the total length of the antenna has to be reduced more than the length specified for 915 MHz. For bigger ground planes L4 would have to be further reduced.