

3.2 Radiation Pattern

The radiation pattern for the antenna implemented on the TPL3135 reference design has been measured in an anechoic chamber. Figure 7 through Figure 12 shows radiation patterns for three planes, XY, XZ and YZ, measured with vertical and horizontal polarization. All these measurement were performed without connecting the dongle to a computer. Figure 13 and Figure 14 shows the radiation pattern when the dongle is connected to a laptop. All measurements were performed with 0 dBm output power. Figure 6 shows how the different radiation patterns are related to the positioning of the antenna.

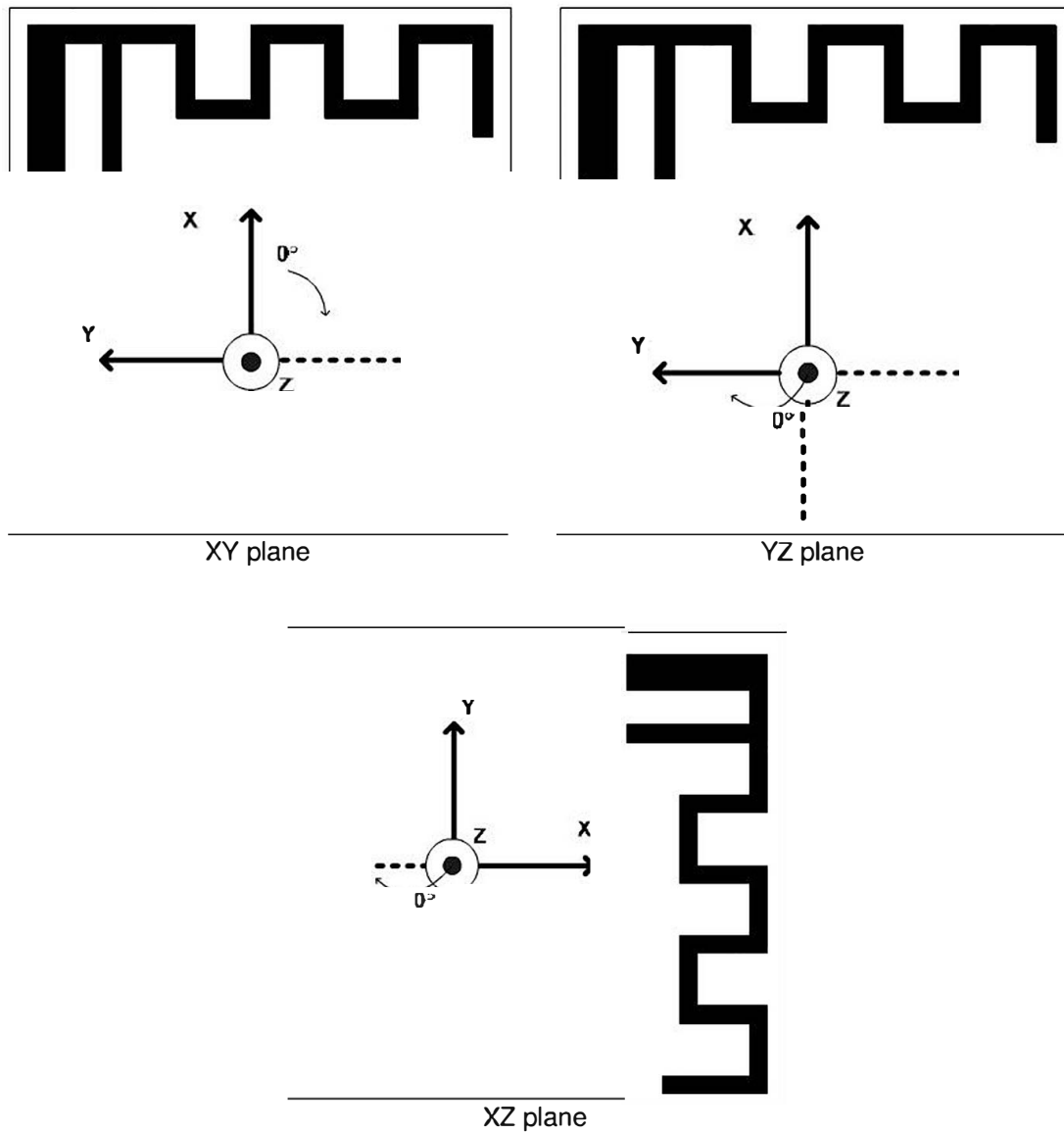
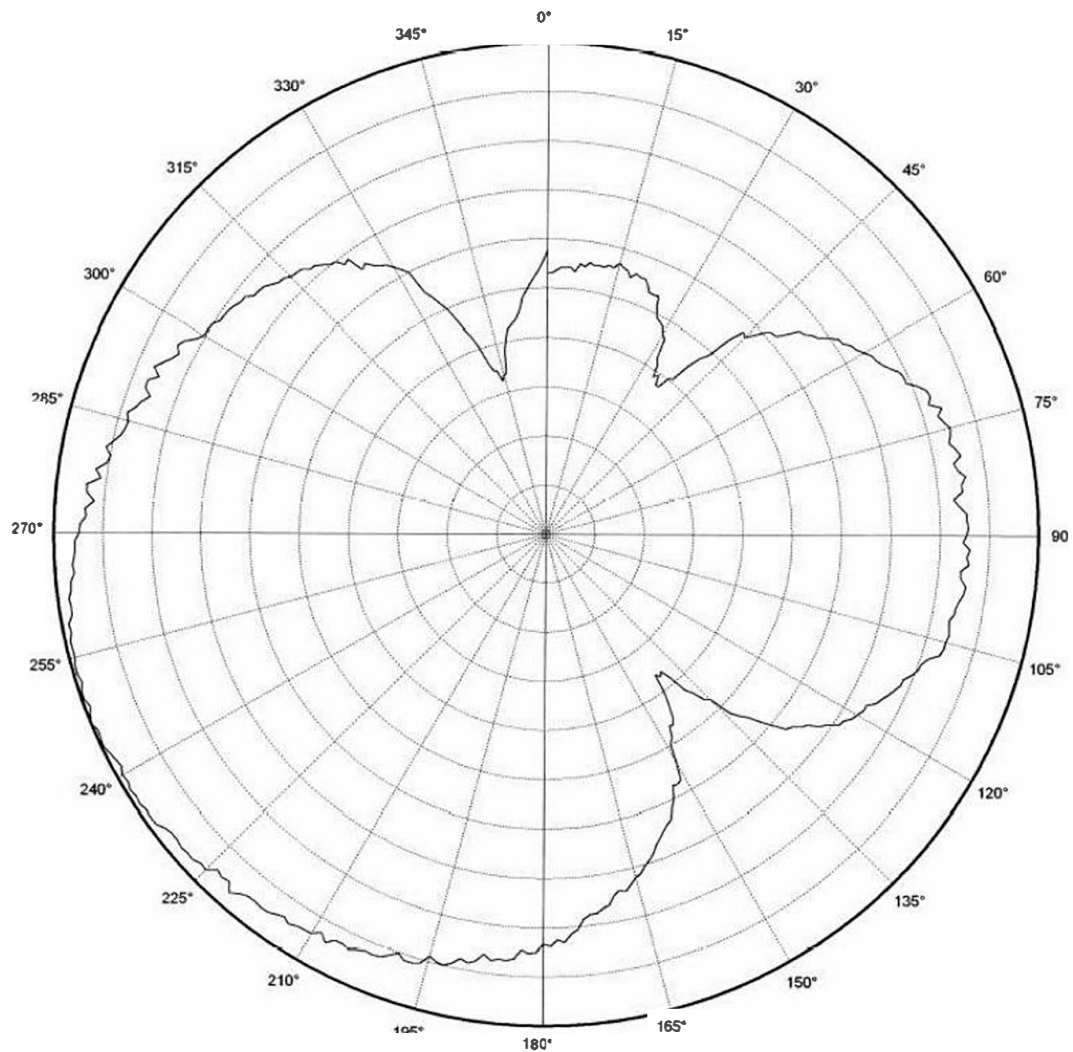


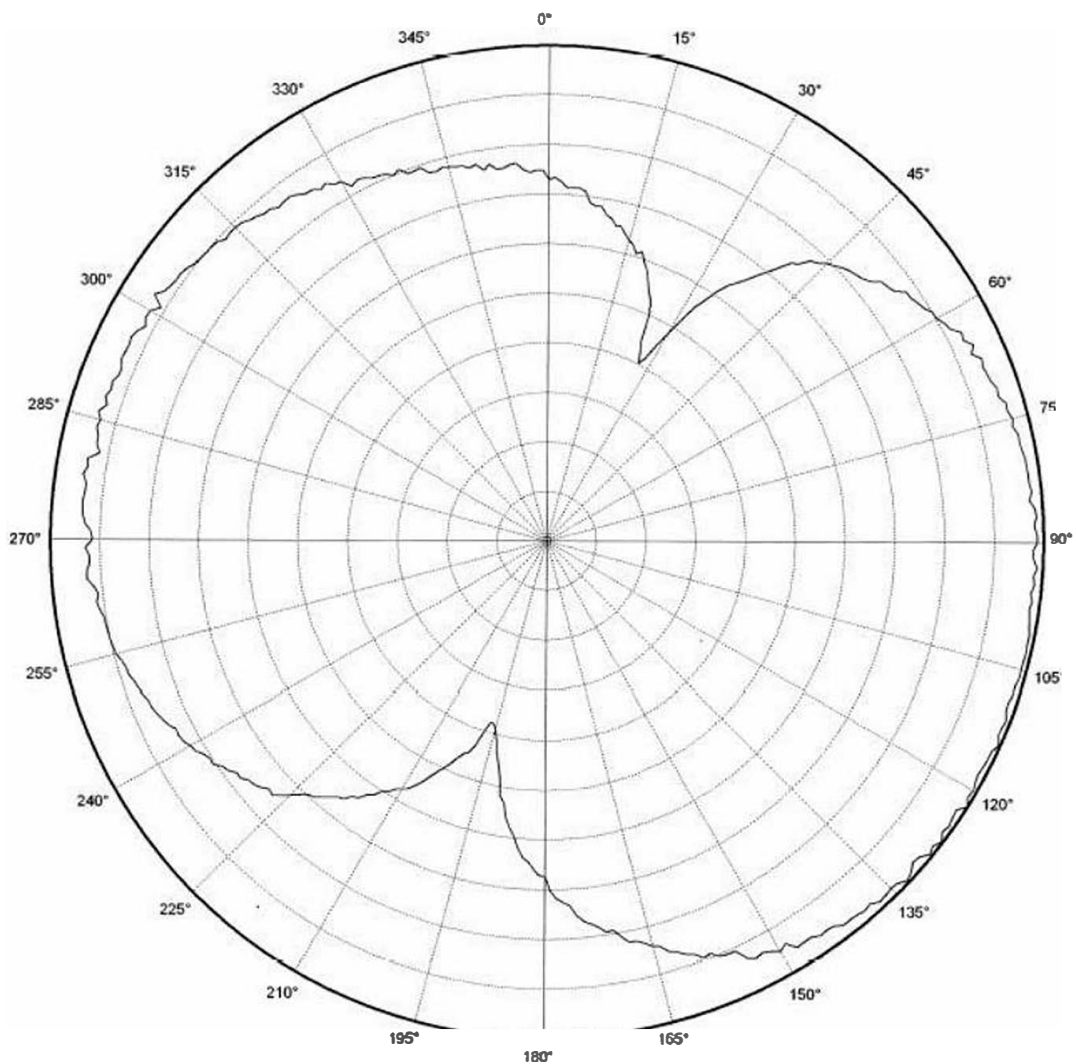
Figure 6: How to Relate the Antenna to the Radiation Patterns



Vertical Polarization
usb XY

CF 2450.000 MHz
4 dB/ div
Ref Lev: -2.5 ... dBm

Figure 7: TPL3135 XV Plane



Horizontal Polarization

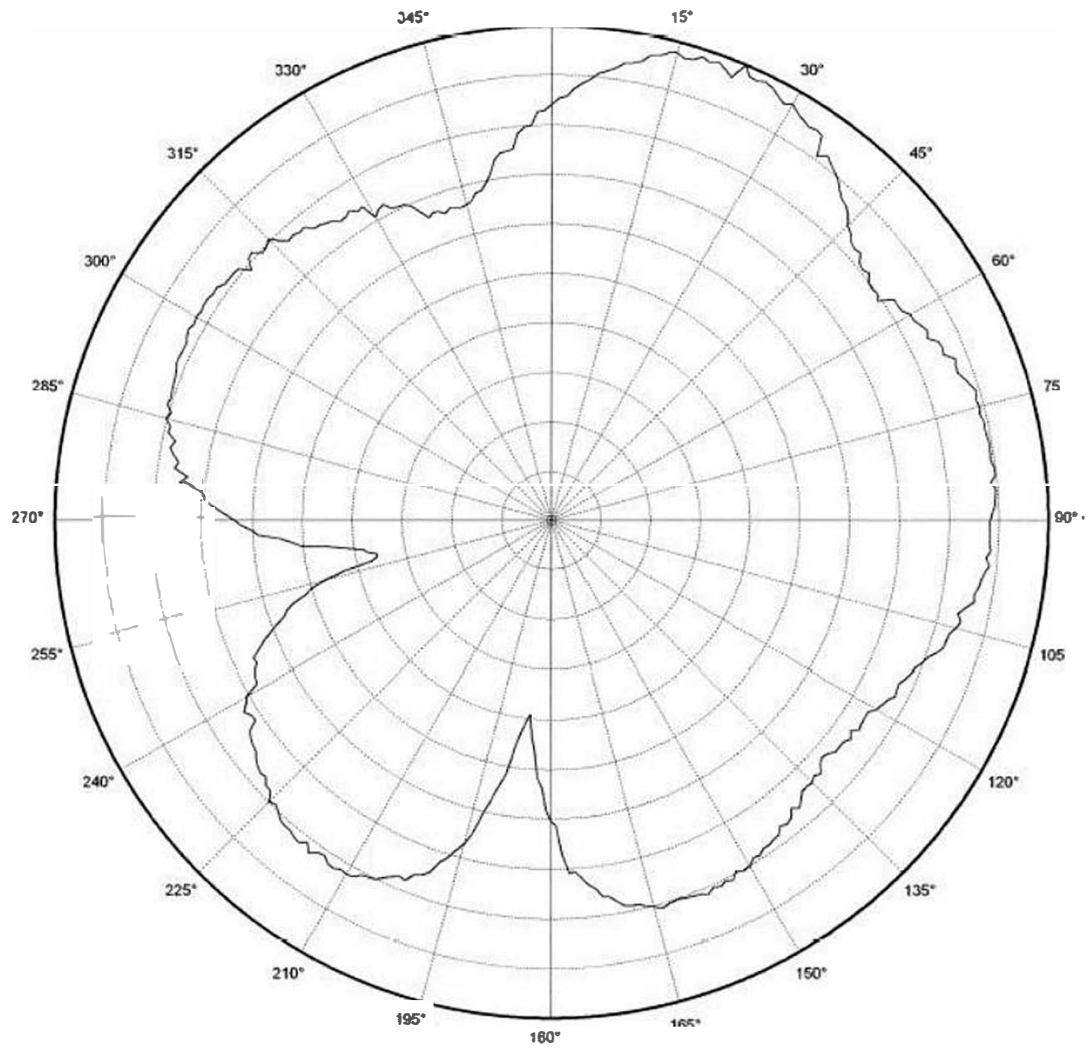
usb XY

CF 2450.000 MHz

5 dB/ div

Ref Lev: 45 dB

Figure 8: TPL3135 XV Plane



Vertical Polarization

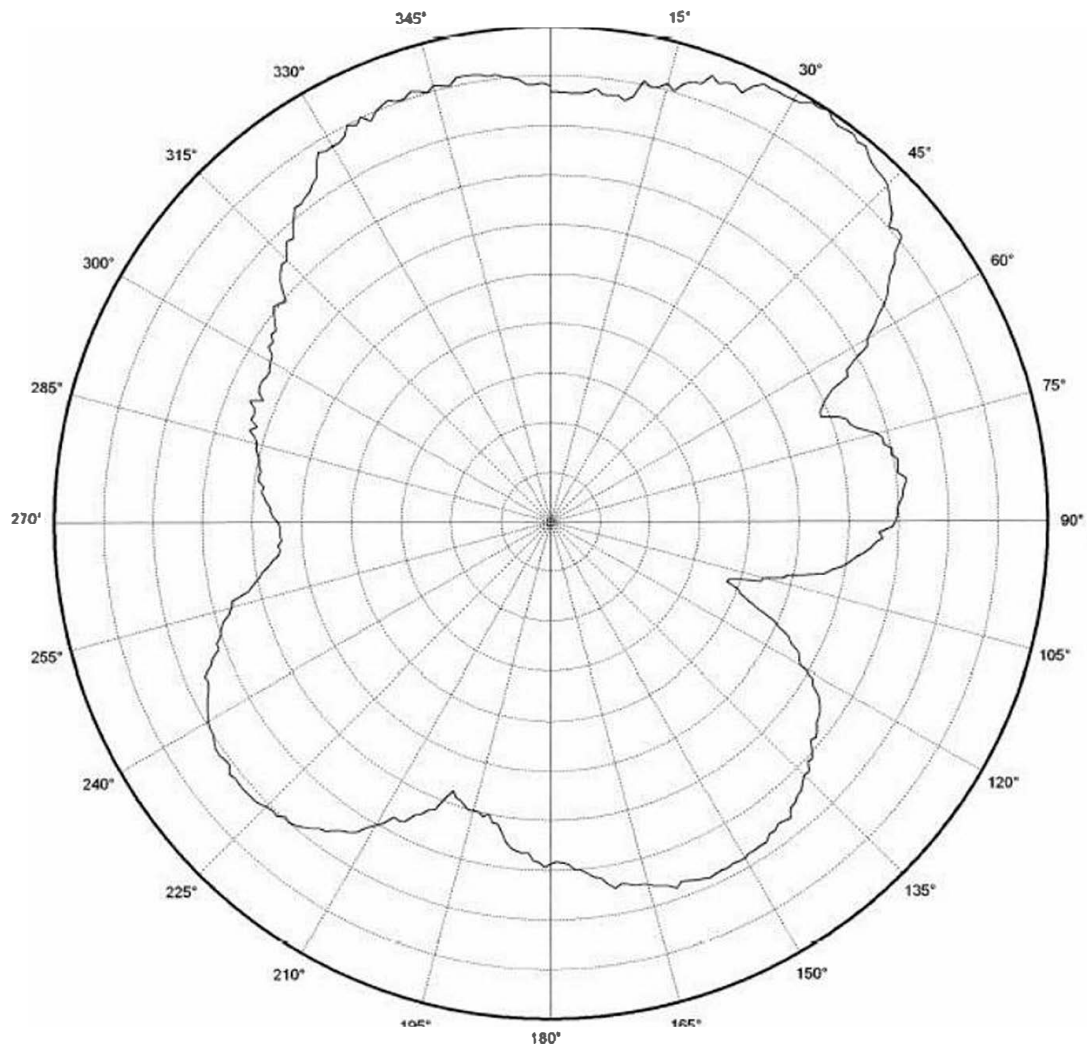
usb XZ

CF 2450.000 MHz

4 dB/ div

Ref Lev: 2.2 dBm

Figure 9: TPL3135 XZ Plane



Horizontal Polarization

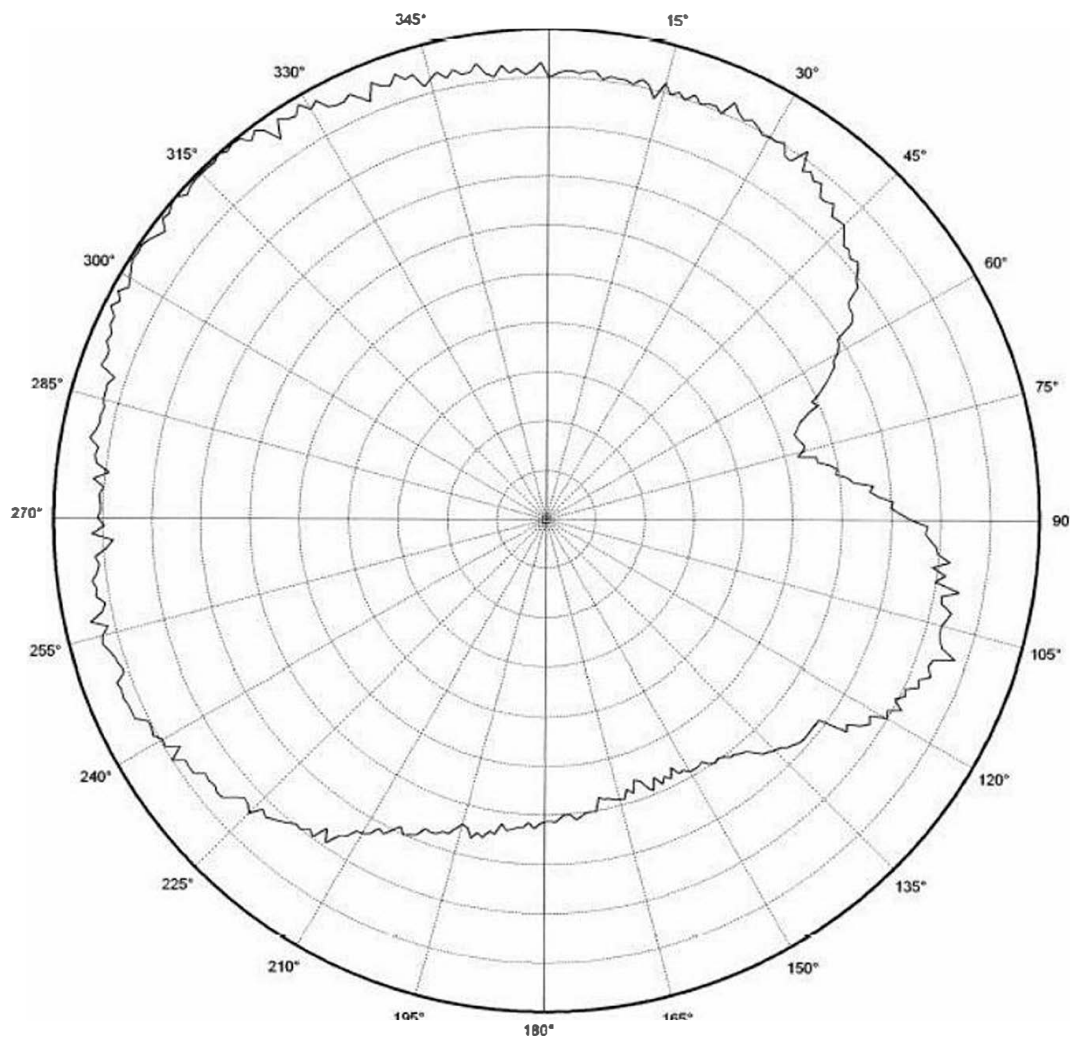
XZ

CF 2450.000 MHz

4 dB/div

Ref Lev: 5.3 dBm

Figure 10: TPL3135 XZ Plane



Vertical Polarization

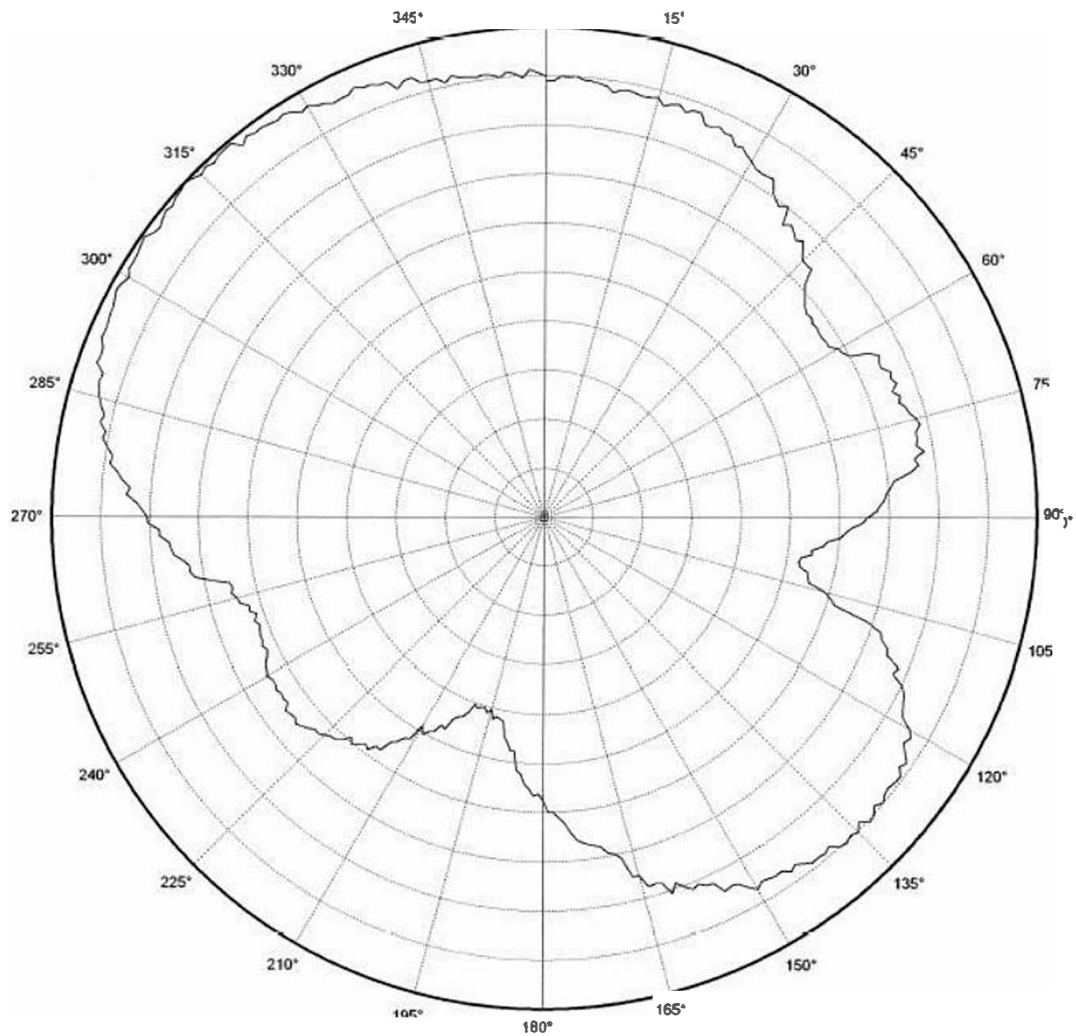
VZ

CF 2450 000 MHz

2 dB/ div

Ref Lev: +5.3 Bm

Figure 11: TPL3135 VZ Plane



Horizontal Polarization

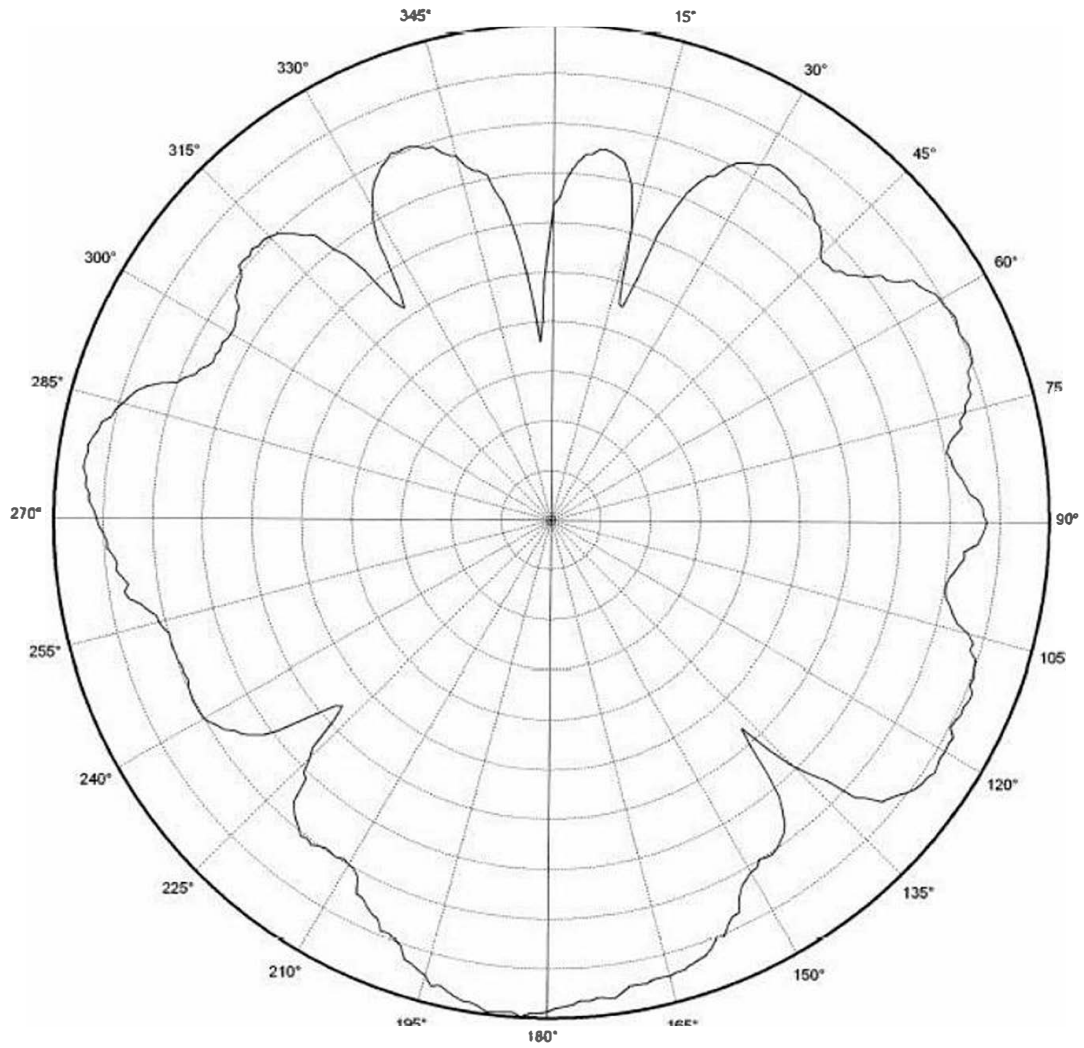
YZ

CF 2450.000 MHz

3 dB/ div

Ref Lev: -1, 2 dBm

Figure 12:TPL3135 VZ Plane



Vertical Polarization

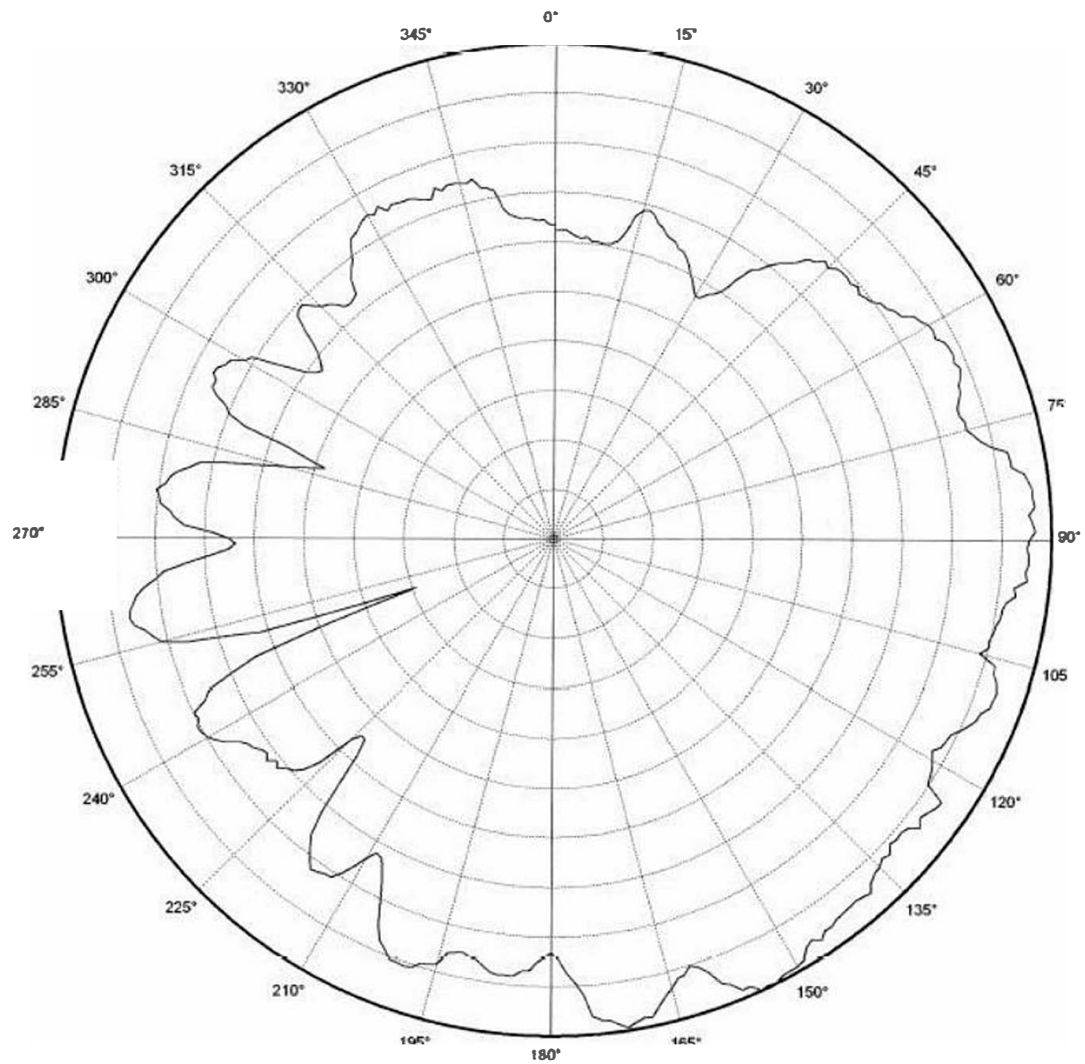
Laptop XY

CF 245 000 MHz

5 dB/ d

Ref Lev -20 dBm

Figure 13: TPL3135 XV Plane



Horizontal Polarization

Laptop XY

CF 2450.000 MHz

4 dB/ div

Ref Lev: 3.3 dBm

Figure 14: TPL3135 XV Plane

4 CONCLUSION

This application note shows that it is possible to implement a 2.4 GHz antenna on a small area and still achieve good performance. Table 6 lists the most important properties of the Inverted F Antenna, described in this document. The free line of sight (LOS) range was measured with 250 kbps and 1 % PER.

Gain in XY plane	4.5 dBi
Gain in XZ plane	4.8 dBi
Gain in YZ plane	5.3 dBi
Gain in XY plane, connected to laptop	3.3 dBi
LOS range	240 m
Antenna size	11x 2.5mm