APPENDIX A: ANTENNA SPECIFICATIONS

Please refer to the following pages.

General antenna specifications

Each antenna consists of 2 windings of wire on a plastic frame. This results in a loop antenna transmitting magnetic energy (H-field). The transmit antenna acts at the same time as the receiver antenna (Full-Duplex RFID technology).

Antenna parameter	**Value**
Number of windings	2
Wire	2.5 sqmm speaker wire
Inductance	18uH +- 10%
Frame size	95cm X 95cm
Cable length	1.5m +- 10%
Nominal voltage	100Vpp +- 25%
Distance between 2 adjacent antennas	40cm +- 10%
Gain	4.5dB

Start up and auto-tuning

The following figure 1 shows the position of 2 antennas on one side of the drive-by lane. Upon start-up, the system performs an auto-tuning of each pair of antennas in a way that the voltages are balanced and the phases are in opposite directions, as shown in figure 1. This minimizes the far field radiation of the antennas. The auto-tuning process is performed also automatically every 2 hours as part of a periodical system check. Should the mismatch of voltage and phases exceed defined values, the system aborts and shuts down itself automatically. Hence, The drive-by reader operates only when the antennas are all in place and successfully tuned.

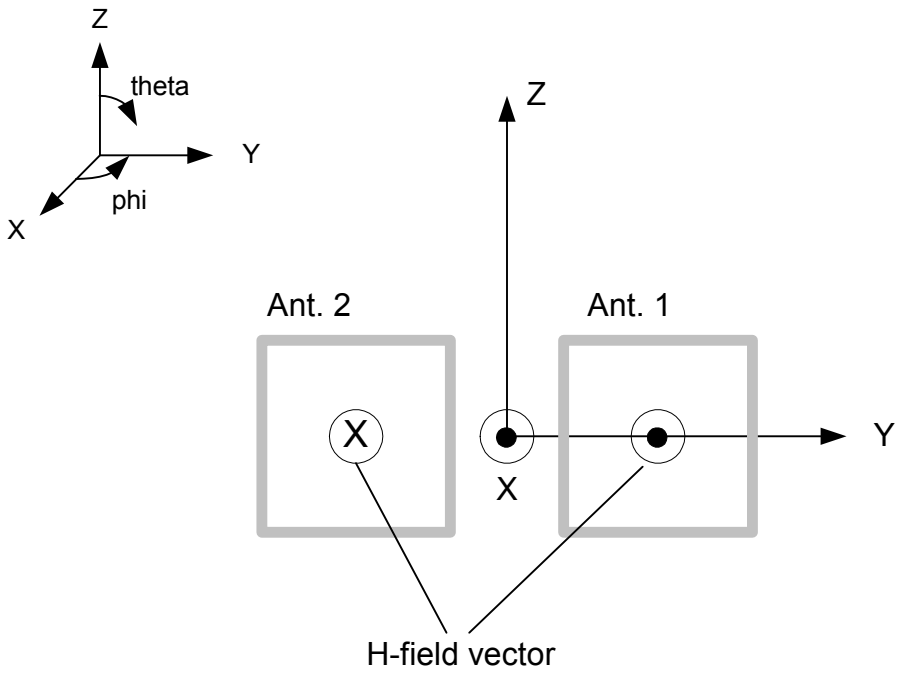

Figure 1. Position of a pair of antennas and the flux of the magnetic field

Antenna radiation patterns

The figures 2 and 3 show the radiation patterns of the antenna as functions of the Phi and Theta angles as defined in figure 1. The patterns are valid for a perfectly phase- and amplitude matched pair of antennas. In reality, slight variations may occur.

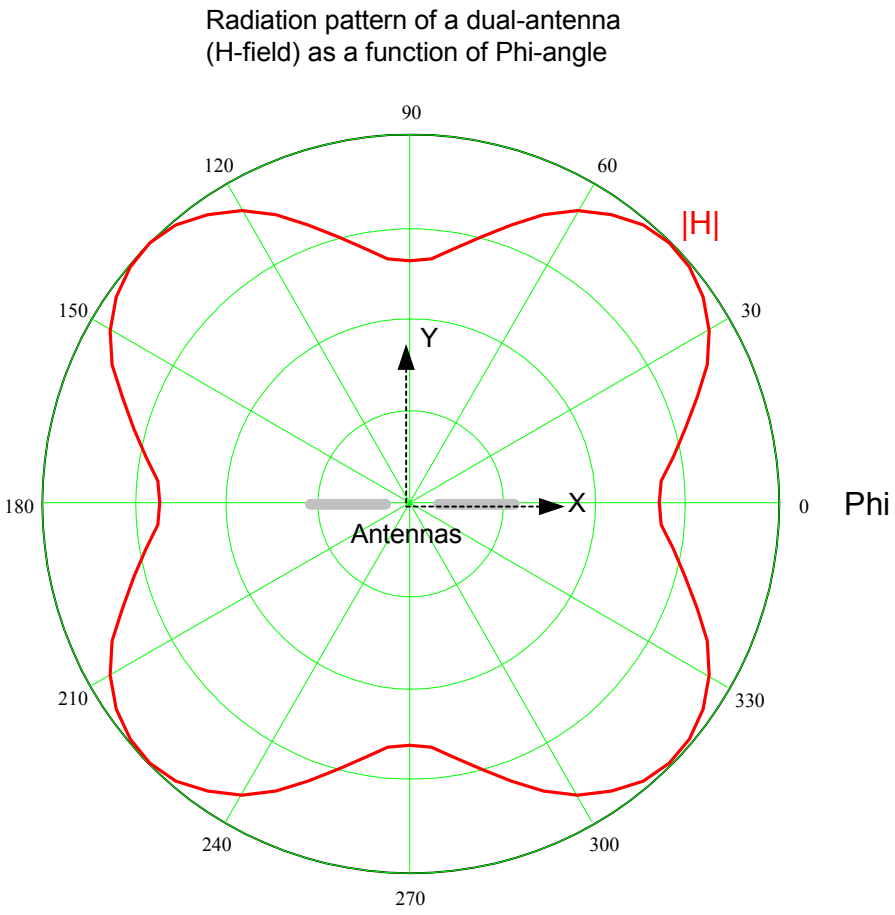

Figure 2. Radiation pattern of a perfectly matched pair of antennas in the XY plane as a function of the angle Phi

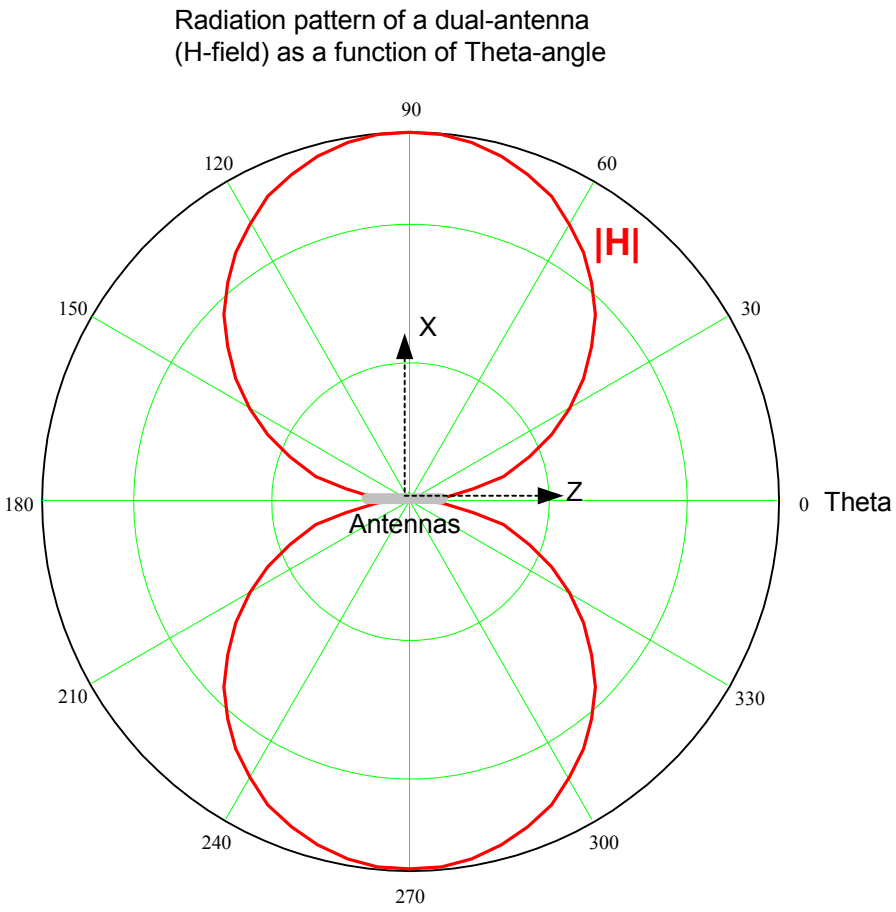

Figure 3. Radiation pattern of a perfectly matched pair of antennas in the XZ plane as a function of the angle Theta