Achieving Optimal Range with Wiliot V2 IoT Pixels

Overview

This document describes how to achieve the best performance possible from Wiliot V2 tags with a Wiliot Reference Bridge or Works with Wiliot Bridge. The performance will vary based on tag placement, orientation, and application surface material. For information regarding specific Wiliot V2 tags please refer to their particular datasheets:

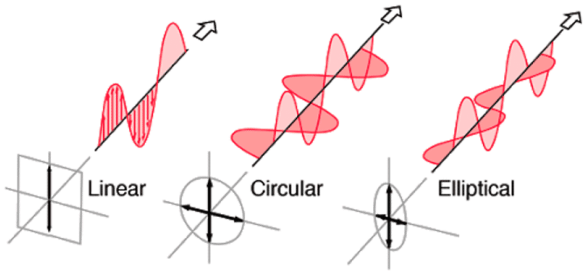
- Wiliot IoT Pixel V2 - Single-Band Data Sheet
- Wiliot IoT Pixel V2 - Dual-Band Data Sheet

Application Material

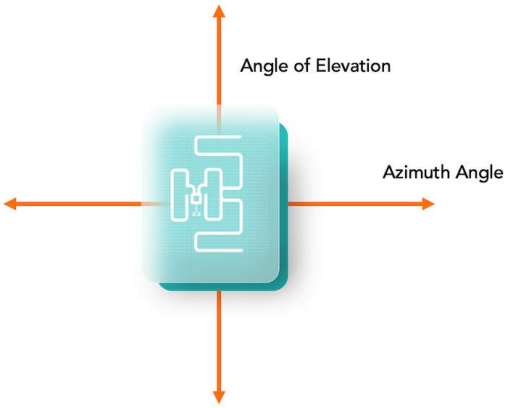
The material Wiliot tags are applied to can affect the tags' performance. For more information about which materials work best, see this article .

Tag Orientation

The orientation and positioning of Wiliot tags can have an impact on harvesting performance. There are two attributes to consider when thinking about tag orientation: **polarization** and the **angle of directionality.**

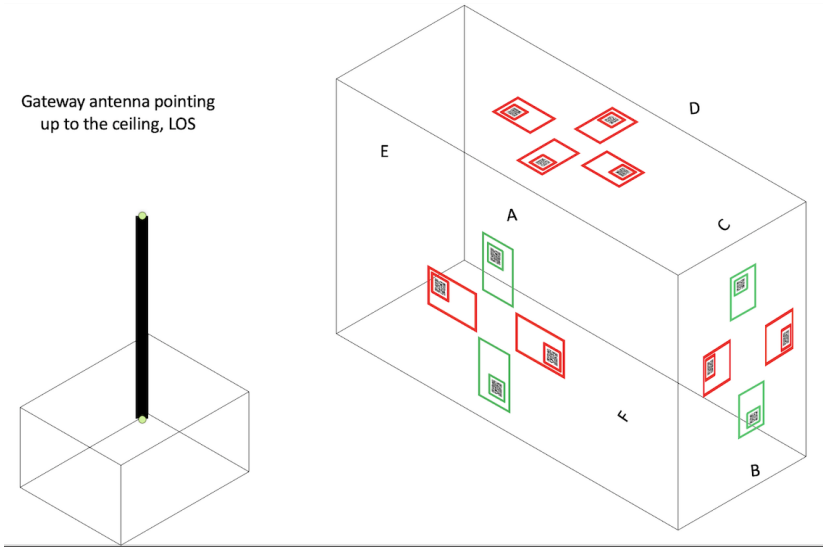


Wiliot tags are linearly polarized, making them optimized for harvesting in a single linear direction with more range (i.e., just the x-plane). For optimal tag performance, the polarization of the tag and the energizing device need to align in the same direction and optimize against the performance of the tag in the Angle of Elevation (up and down) and Azimuth Angle (left and right) planes relative to the polarization. In the case of tags, they perform best when both angles are 0° relative to the energizing device.



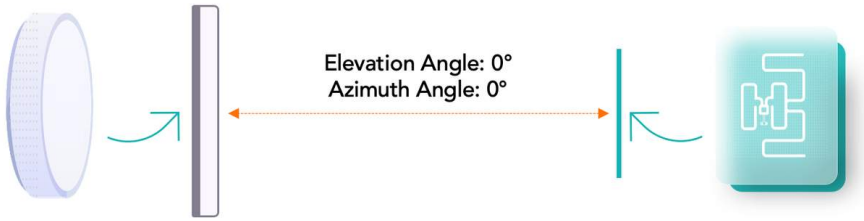
Optimal Orientation with External Whip Antenna (Dipole Antenna)

The following diagram depicts a Works With Wiliot bridge with an external whip antenna and a box with several tags applied to it. The tags highlighted in green are expected to have the best performance. The other tags in this diagram will either have worse performance or might not be energized or received by the gateway at all.



Optimal Orientation with Circular Bridges

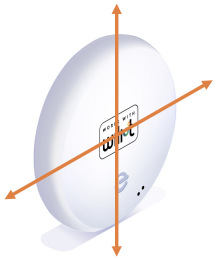
The following diagram shows the optimal relation between a Single Band Bridge and an IoT Pixel. The pixels show the best performance when they are facing the bridge.



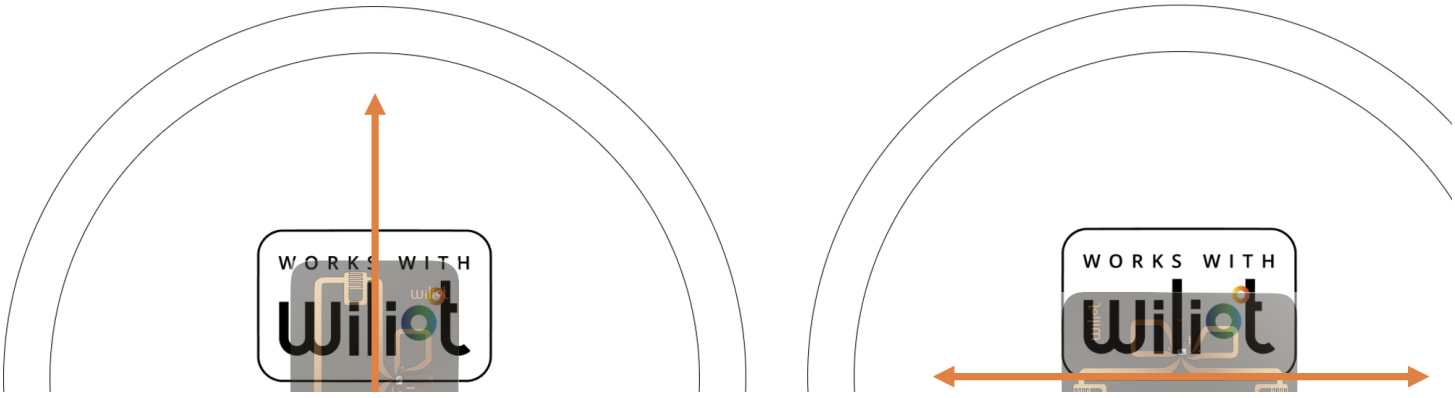
The writing on the bridge can be used to identify the optimal orientation of the bridge relative to the tag.

The Multi-Band Energous Bridge

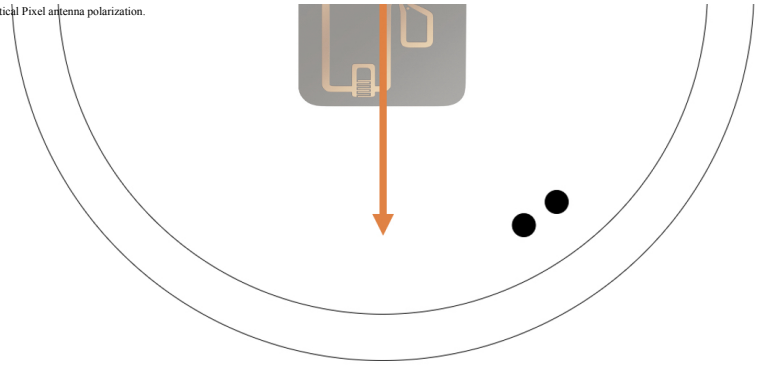
The Energous bridge has an antenna that is linearly polarized in two directions, which are shown in the image below.



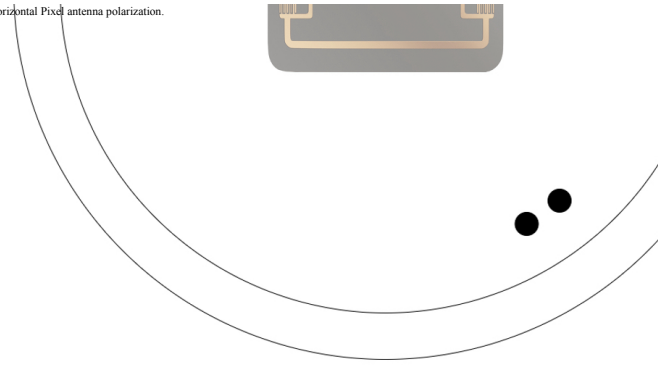
The cross-polarization of the bridge antenna provides two options when aligning a Pixel's antenna.



Vertical Pixel antenna polarization.



Horizontal Pixel antenna polarization.



The following diagram depicts an Energous bridge with a cross-polarized antenna and a box with several tags applied to it. The tags highlighted in green are expected to have the best performance. The other tags in this diagram will either have worse performance or might not be energized or received by the gateway at all.