Product Selection Guide

READER ANTENNA SELECTION

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OVERVIEW

This document will help you find out which of Impinj's reader antenna offerings is right for your solution. It will cover the three categories of reader antennas offered by Impinj and compare the characteristics of the many models of antennas within those categories. All these reader antennas are packaged, connectorized products, which can be attached to an Impinj Speedway RAIN RFID reader to communicate with tags. This document will not discuss the antennas that are built into Impinj's gateway products such as xArray and xSpan, the embedded antennas built into the handhelds offered by Impinj, or the tag antennas that are built into RAIN RFID tags.

ANTENNA OFFERINGS

Antenna Category Overview

Impinj offers reader antennas in three categories: Specialized, Proximity, and Distance. The Specialized antennas are designed for specific use cases and offer performance and form factors that are very targeted at those use cases. The Proximity and Distance antennas are designed for general purpose use cases at different read ranges. Technical distinctions may vary, but in practice, solutions which are only designed for the antenna to read items 8 cm away or less require a Proximity antenna, while greater read range will require a Distance antenna. These three categories of antennas are compared in the table below and explained in detail in the sections that follow.

Table 1: Antenna Category Descriptions

CATEGORY	READ ZONE
SPECIALIZED	USE CASE OPTIMIZED
PROXIMITY	TIGHTLY CONSTRAINED (UP TO 8 CM)
DISTANCE	EXTENDED RANGE (UP TO 9 M)

- **Specialized:** Antennas specially designed for very specific use cases to maximize and intensify read zones.

- **Proximity:** Antennas designed for embedded use cases with a short-read range.

- **Distance:** Antennas for use in a wide range of solutions needing rugged and extended range readability.

To further narrow down your selection, this document provides antenna comparisons per category including antenna features, benefits, and use cases.

Specialized Antennas

These reader antennas are highly specialized and designed for a limited range of use cases. If your use case is similar to the specialty of one of these antennas, you should include the antenna for consideration.

Table 2: Specialized Antenna Optimized Use Cases

ANTENNA	OPTIMIZED USE CASE
BRICKYARD	TABLETOP (UP TO 1M)
GUARDWALL	CONVEYOR SYSTEM (UP TO 2M BETWEEN ANTENNAS)
THRESHOLD	BOUNDARY CROSSING (UP TO 4M)

- **Brickyard Antenna:** Custom built for unobtrusive tabletop use cases such as point-of-sale.
- **Guardwall Antenna:** Custom built for the high-capacity monitoring of items, packages, and cases on conveyor systems with a highly controlled read zone.
- **Threshold Antenna:** Designed for boundary/threshold crossing use cases, especially race-timing solutions.

Proximity Antennas

Our proximity antennas are designed for use cases that require a short-read range, with an emphasis on easy embedding and small size.

Table 3: Proximity Antenna Comparison Matrix

ANTENNA	APPLIED CHARACTERISTIC			
	ENVIRONMENTAL RUGGEDNESS	COVERAGE VOLUME	EASE OF INSTALLATION	SYSTEM FLEXIBILITY
MATCHBOX (UP TO 5CM)	●	○	●	○
MINI-GUARDRAIL (UP TO 8CM)	○	●	○	●

Antenna Comparison Matrix: Applied Performance Comparison (○=good; ●=best)

- **MatchBox Antenna:** Suited for embedded systems that require unobtrusive RAIN RFID capability and a highly-localized read zone. Capable of reading tags up to 5 cm away.
- **Mini-Guardrail Antenna:** Offers localized and concentrated coverage zone for a wide variety of item-level use cases. Capable of reading tags up to 8 cm away.

Distance Antennas

Finally, if the solution neither matches the specialty uses cases, nor satisfies the distance restrictions of proximity antennas, then it should consider the distance antennas designed for general use. All these antennas are built with exceptional read range and a rugged enclosure design, allowing for greater durability in industrial environments.

Table 4: Distance Antenna Comparison Matrix

ANTENNA	APPLIED CHARACTERISTIC				
	ENVIRONMENTAL RUGGEDNESS	COVERAGE VOLUME	TAG MULTI-ORIENTATION	EASE OF INSTALLATION	SYSTEM FLEXIBILITY
FAR-FIELD BY LAIRD (UP TO 6M)	◐	◐	◐	○	◐
COMPACT OUTDOOR BY TIMES-7 (UP TO 6M)	●	◐	●	●	●
SLIM OUTDOOR BY TIMES-7 (UP TO 9M)	●	●	●	◐	◐

Antenna Comparison Matrix: Applied Performance Ratings (○=good; ◐=better; ●=best)

- **Far-Field Antenna:** Provides high-efficiency coverage in a heavy-duty enclosure for accurate reading at multiple angles. Read tags at a distance up to 6 m.

- **Compact Outdoor Antenna:** For solutions that require a long-read range and compact size; rated for outdoor and industrial use. Read tags at a distance up to 6 m.

- **Slim Outdoor Antenna:** Thin, powerful, long-read range antenna rated for permanent outdoor and industrial use. Read tags at a distance up to 9 m.

ORDERING INFORMATION

This section describes ordering information for Impinj's reader antennas and reader antenna accessories. The accessories include cabling and the antenna hub, which help connect antennas to a Speedway reader. Some solutions will also require mounting equipment, which is not offered by Impinj.

Antennas should be ordered for the regulatory region in which they will be operated. If the incorrect region is used, antenna performance will be degraded. Some of the antennas are not region-specific and are "broadband".

Some of the antennas also offer different polarizations, either left-hand circularly polarized (LHCP) or right-hand circularly polarized (RHCP). Right-hand antenna beams rotate counter-clock wise, and left-hand antenna beams rotate clockwise. The choice between LHCP and RHCP is only important if there are two systems with two separate RAIN RFID readers in a small area. Antennas should be selected for the environment and how the tagged items will pass by a specific antenna.

Impinj's antenna ordering part numbers are listed in the table below.

Table 5: Impinj's Antenna Offerings and Ordering Part Numbers

ANTENNA CATEGORY	ANTENNA DESCRIPTION	ANTENNA REGION	ORDERING PART NUMBER
SPECIALIZED	THRESHOLD	ETSI	IPJ-A0311-EU1
SPECIALIZED	THRESHOLD	FCC	IPJ-A0311-USA
SPECIALIZED	BRICKYARD	ETSI	IPJ-A0400-EU1
SPECIALIZED	BRICKYARD	FCC	IPJ-A0400-USA
SPECIALIZED	GUARDWALL	ETSI	IPJ-A0402-EU1
SPECIALIZED	GUARDWALL	FCC	IPJ-A0402-USA
PROXIMITY	MINI-GUARDRAIL	BROADBAND	IPJ-A0303-000
PROXIMITY	MATCHBOX	BROADBAND	IPJ-A0404-000
DISTANCE	FAR FIELD LEFT HAND POLARIZED	ETSI	IPJ-A1000-EU1
DISTANCE	FAR FIELD LEFT HAND POLARIZED	FCC	IPJ-A1000-USA
DISTANCE	FAR FIELD RIGHT HAND POLARIZED	ETSI	IPJ-A1001-EU1
DISTANCE	FAR FIELD RIGHT HAND POLARIZED	FCC	IPJ-A1001-USA
DISTANCE	SLIM OUTDOOR	ETSI	IPJ-A1100-EU1
DISTANCE	SLIM OUTDOOR	FCC	IPJ-A1100-USA
DISTANCE	COMPACT OUTDOOR	ETSI	IPJ-A1200-EU1
DISTANCE	COMPACT OUTDOOR	FCC	IPJ-A1200-USA

Impinj's antenna accessory ordering part numbers are listed in the table below.

Table 6: Impinj's Antenna Accessory Offerings and Ordering Part Numbers

ACCESSORY CATEGORY	ACCESSORY DESCRIPTION	ORDERING PART NUMBER
HUB	ANTENNA HUB	IPJ-A6001-000
HUB	ANTENNA HUB GPIO ADAPTER	IPJ-A6051-000
CABLE	SMA-M TO R-TNC-M (2 M) ANTENNA CABLE	IPJ-A3002-000
CABLE	SMA-M TO R-TNC-M (4 M) ANTENNA CABLE	IPJ-A3004-000
CABLE	SMA-M TO R-TNC-M (8 M) ANTENNA CABLE	IPJ-A3008-000

CABLE	SMA-M TO R-TNC-M LOW LOSS (2.14 M) ANTENNA CABLE	IPJ-A3112-000
CABLE	SMA-M TO R-TNC-M LOW LOSS (4.57 M) ANTENNA CABLE	IPJ-A3114-000
CABLE	SMA-M TO SMA-M LOW LOSS (2.14 M) ANTENNA CABLE	IPJ-A3122-000
CABLE	SMA-M TO SMA-M LOW LOSS (4.57 M) ANTENNA CABLE	IPJ-A3124-000

NOTICES