



Solutions Guide

IMPINJ R700 SERIES RAIN RFID READERS

MIGRATION GUIDE

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OVERVIEW

This document contains key differences between the Impinj R700 series RAIN RFID readers, which includes both the R700 and R720 devices, and Impinj Speedway® R420 reader.

Reference Documents and Software

The following articles were used to compile this document.

- Impinj R700 Installation and Operations Guide
- Impinj PoE Injector Datasheet
- Impinj R700 Embedded Development Quick Start Guide
- ISO/IEC 18000-63:2015 and EPCglobal Gen2v2 Compliance Specification
- IEEE802.3af-2003 PoE Specification

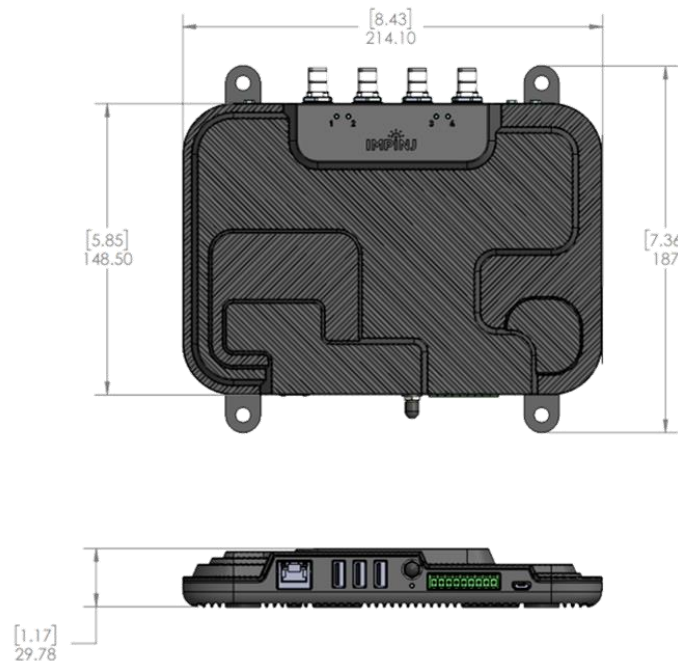
Consult these documents for sources and more information.

1. MECHANICAL

1.1 Dimensions

The Impinj R700 dimensions with R420 compatible mounting bracket are (H x W x D) 1.2 x 8.4 x 7.4 in (3.0 x 21.4 x 18.7 cm). Speedway dimensions are (H x W x D) 1.2 x 6.9 x 7.5 in (3 x 17.5 x 19 cm.)

The Impinj R700 series readers are wider and deeper than the Speedway R420. The solution designer will need to modify existing designs that do not have enough clearance for the Impinj R700 series readers. You can find additional information in the mechanical drawings below.



1.2 Mounting

For ease and flexibility of deployment, the Impinj R700 series readers have built-in VESA 100 mm x100 mm tapped holes. This feature allows existing designs to use the reader with many commercially available mounts.

The Impinj R700 and R720 also ship with mounting brackets compatible with the Speedway R420 mounting rails.

1.3 IP Rating

The Speedway R420 has a rating of IP52. The Impinj R700 series readers have a native IP Rating of IP50. Both readers are protected from dust, but the Impinj R700 series readers are not water protected, whereas the Speedway R420 is protected from water droplets. If your solution requires protection from water, you must place the Impinj R700/R720 in an appropriate enclosure or use the optional IP54 rated case, Impinj part # IPJ-A5100-000.

1.4 Connections



1.4.1 Device Power

The Impinj R700 series readers take power exclusively through the Ethernet port via power over ethernet (PoE or PoE+).

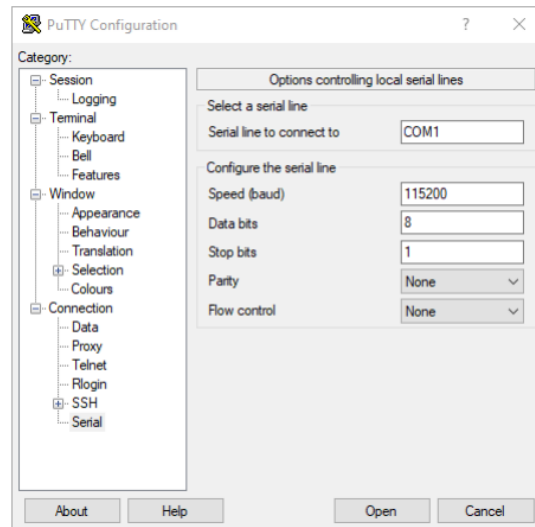
For applications using the Impinj R700, they require a PoE+ rated power source if they require the maximum transmit power of 33 dBm. Basic PoE reduces the maximum transmit power to 30 dBm.

For applications using the Impinj R720, they require a PoE+ rated power source if they require a transmit power greater the 20 dBm. Otherwise, basic PoE is acceptable.

When migrating solutions where a Speedway reader is connected to AC power, Impinj offers the PoE+ injector (IPJ-A2010-000) that can add inline power via a power brick to an ethernet connection.

1.4.2 Console

Impinj R700 series readers utilize micro-USB for console connections. For applications which utilize the console port, you will need to retrofit the serial console to a micro-USB cable. The Impinj R700 series readers do not ship with a micro-USB Cable. The following image shows how to connect to the serial console using PuTTY.



1.4.3 General Purpose I/O

The Impinj R700 series readers have two general purpose inputs and three general purpose output pins. The GPIO is exposed through a Phoenix Contact 9-position connector (PN 1803345). The GPIO on the Impinj R700/R720 have a maximum current source/sink of 1.5A per pin when external power is applied.

Sourcing high current from the GPIO Ports using the internal 5V supply will reduce the Impinj R700 and Impinj R720 maximum RF transmit power when powered via basic PoE. PoE+ will allow for maximum RF transmit power when sourcing the current.

Users will no longer need a GPIO breakout box, GPIO cable, or dedicated power supply when migrating to an Impinj R700 series-based design. Users will need to select a Phoenix Terminal Block that mates with the 9-position connector. The Impinj R700 and R720 are not compatible with the Speedway GPIO breakout box.

For applications using more than two GPI ports or three GPO ports, the solution will require external circuitry to handle the additional I/O.

1.4.4 USB

The Impinj R700 series readers have three USB device ports compared to one device port on Speedway R420. Speedway-based applications that used USB hubs to extend the number of USB devices can eliminate the hub from their solution. As of the 7.3 Firmware Release, the only USB devices that the Impinj R700 supports are USB flash drives.

1.5 Accessories and Extensions

1.5.1 Antenna Hub

The Impinj R700 antenna hub utilizes a protocol that communicates between the antenna port on the reader and the antenna hub via the cable. The Impinj R700 antenna hub does not require use of the Impinj R700 GPIO port. The Impinj R700 is not compatible with the Speedway Antenna Hub. The Impinj R700 antenna hub is compatible with both the R700 and R720 readers.

2 RFID RADIO PERFORMANCE

The Impinj R700 series readers are capable of outputting higher transmit power and has lower receive sensitivity than the Speedway R420 reader. We describe areas that may impact application behavior below.

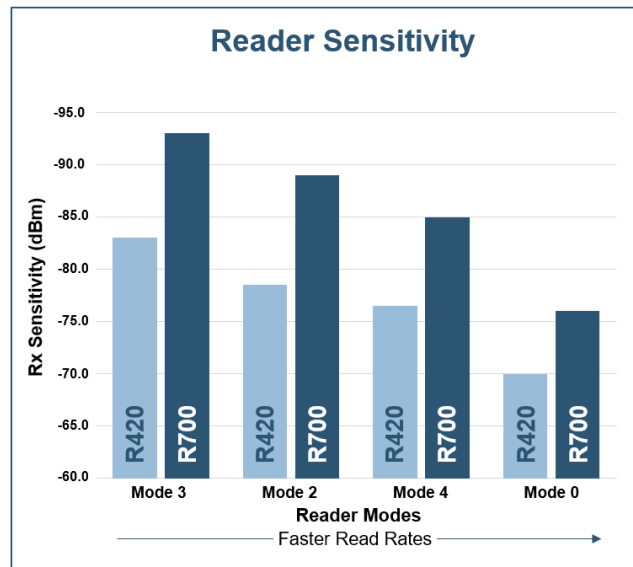
2.1 Transmit Power

The Speedway R420 has a maximum output power of 31.5 dBm (32.5 for EU2 models) when powered via PoE+. The maximum output power of the R700 and R720 is 33 dBm when powered over via PoE+. Both readers will limit maximum transmit power when operating in regions that have specific limitations on RF emissions.

This increase in power yields a larger field of view from antennas connected to the Impinj R700 series readers.

2.2 Reader Modes

The Impinj R700 series readers support the same RF Modes as the Speedway R420 except for mode 1000. For applications utilizing mode 1000, Impinj recommends using RF mode 1002 for an R700 series reader. The graph below shows the performance difference between Speedway R420 and Impinj R700 for each mode.



The improved performance across reader modes allows applications using the Impinj R700 to use a faster reader mode to read all tags of interest.

3 DEBUGGING AND DEPLOYING APPLICATIONS

3.1 Firmware

The Impinj R700 series readers support the Impinj R700 Firmware only. Impinj Octane™ firmware will not run on Impinj R700 or R720.

3.2 Development Software

3.2.1 Impinj Octane SDK

The Impinj R700 series readers are fully compatible with the Impinj Octane SDK. To add Impinj R700 support to an existing Octane SDK-based application, developers must recompile using version 4.3 or later.

3.2.2 Impinj Octane LLRP Toolkit

The Impinj R700 series readers are fully compatible with the Impinj LLRP Toolkit. To add Impinj R700 support to an existing Impinj LTK-based application, developers must recompile using version 11.4 or later.

3.2.3 Impinj Octane Embedded Toolkit

The Impinj R700 series readers are not compatible with the Octane ETK. The Impinj R700 and R720 allow users to create custom applications that run on-reader but use a separate embedded development toolkit. To migrate existing Speedway applications to Impinj R700, users must download the R700 embedded toolkit and recompile their application using the toolchain. For a step-by-step tutorial to get started developing embedded applications for Impinj R700 series readers, Impinj has provided an Impinj R700 Embedded Development Quick Start Guide available on the Support Portal.

3.3 Application Software

3.3.1 ItemTest

Impinj R700 supports Impinj ItemTest 2.0 and later. Impinj R720 supports Impinj ItemTest 2.10 and later.

3.3.2 Speedway Connect

Impinj R700 does not support Speedway Connect. The Impinj R700 series readers comes with a native web UI that enables Speedway Connect like functionality.

3.3.3 ItemSense

ItemSense does not support the Impinj R700 series readers.

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