# Speedway® Reader

RELIABLE DATA COMES STANDARD

# Impinj Speedway® Reader At A Glance

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| **Air Interface Protocols** | EPCglobal UHF Class 1 Gen 2 / ISO 18000-6C |
| **Certification** | Certified for conformance and interoperability in Dense Reader Mode environments |
| **Operating Frequencies** | 865 MHz - 956 MHz |
| **Antennas** | 4 high performance mono-static antenna ports with reverse gender TNC connectors enable near-field (item level) and far-field (case and pallet) applications |
| **RF Power** | +30 dBm / +32.5 dBm with extended length cables |
| **Sensitivity** | -80 dBm |
| **Supported Regions** | US, Canada and other regions following U.S. FCC Part 15 regulations<br>Europe and other regions following ETSI EN 302 208 with & without LBT regulations<br>China<br>Japan<br>Korea<br>Malaysia<br>Taiwan |
| **Protocols** | EPCglobal Low Level Reader Protocol (LLRP) 1.0.1<br>Impinj Mach1 |
| **Discovery** | Zero Configuration Networking (Multicast DNS and DNS Service Discovery) |
| **Management** | EPCglobal Reader Management 1.0.1, SNMP v2 with MIB II<br>Impinj RShell console<br>Impinj Web interface<br>Syslog |
| **Firmware Upgrade** | Reliable firmware upgrades through the use of dual image partitions enable smooth transition to new firmware while the reader is still operating.  Firmware can manually be upgraded through the Impinj web interface or scheduled to automatically download the firmware from a HTTP, FTP, or TFTP server. |
| **Processor** | Intel IXP420 (266 MHz) |
| **Operating System** | Linux |
| **Memory** | 64 MB SDRAM / 64 MB Flash<br>Serial:  RS-232 Console (DB9) |
| **Connectivity** | Ethernet:  10/100 Base-T Ethernet (RJ45)<br>Serial:  RS-232 Console (DB9) |
| **Network Services** | DHCP, LLA, NTP, HTTP, Telnet, SSH, SNMP, mDNS, DNS-SD |
| **GPIO** | 4 input and 8 output (DB25) |
| **Dimensions** | 22.7 x 32.4 x 5.7 cm (8.95 in x 12.75 in x 2.25 in) |
| **Weight** | 2.7 kg (6 lbs) |
| **Operating Temperature** | -20°C to 55°C |
| **Storage Temperature** | -20°C to 85°C |
| **Humidity** | 5% to 95% non-condensing |
| **Sealing** | IP54 |

The Impinj Speedway reader is certified for conformance and interoperability according to worldwide UHF Gen 2 RFID standards established by EPCglobal.

# Enabling Performance, Enabling ROI

**You've got a lot riding on the success of your UHF Gen 2 RFID deployment.** In order to meet demanding ROI objectives, the system you choose must integrate seamlessly and flawlessly with your enterprise-level processes. It must deliver data you can trust—every time, even under challenging conditions. And there will be no time for downtime. In short, it's just got to work. But if you think any RFID reader will do, you might be in for a few unanticipated bumps in the road. Why? Because all UHF Gen 2 readers are *not* created equal. A reader that simply meets a standard is no guarantee that *your* standards will be met.

The good news is you can bullet-proof your RFID investment by anchoring your system with Impinj's high-performance Speedway reader. And when you do, you'll learn why thousands of them have already been deployed in mission-critical applications ranging from high-speed pharmaceutical fill lines to large-scale retail operations to apparel distribution and inventory management systems. The kinds of applications that require Six Sigma results. From the dock door to the front door. From individual items to cases and pallets. Worldwide.

A closer look at the Speedway reader's key attributes will change the way you look at this most critical of RFID components.

For starters, the UHF Gen 2 standard includes optional functions and not all readers support all the options. In particular, readers can be certified as UHF Gen 2-compliant even if they are not able to operate at high data rates or support the UHF Gen 2 dense-reader mode. Speedway was designed from the ground up to support UHF Gen 2 in its entirety. Furthermore, because tag signals have very low power levels, a reader's sensitivity is paramount, and the Speedway reader's is unmatched. Lesser readers, on the other hand, are subject to the effects of noise, impacting their ability to respond within tight windows of opportunity, which in turn lowers overall system reliability.

A high degree of receive link margin is also essential to tolerate the interference coming from other readers operating in the area, as well as the polarization and phase effects of antenna orientation, and losses caused by multi-path, or the presence of RF-absorbing material that can make some tags invisible to lesser readers. But not Speedway. Take a look at the many features that have made Speedway the best-performing reader available:

- The industry's highest sensitivity

- Enterprise-class management and monitoring

- Directional sensing capability to determine if the tagged object (pallet, case, or item) entered or exited the read portal

- Innovative features to enable read zone containment and eliminate stray reads

- Higher power availability to overcome cable losses

- Easy access to settings required to optimize performance (low-level data access and high-level control) and to facilitate maintenance

- Highest reliability, proven by the industry's lowest field return rate

- EPCglobal-certified for conformance and interoperability

# The Big Picture

The Speedway reader benefits from a systems perspective that is unique in the industry. Only Impinj has brought together reader, tag chip, and antenna expertise to solve the industry's toughest RFID challenges. These challenges include solving the liquids and metals tagging problem, the extension of UHF Gen 2 to the item level, and our pioneering of UHF near-field operations to make possible a single RFID infrastructure. Perhaps we understand UHF Gen 2 better than any other company because we wrote the standard, proving its technological elements along the way. And it shows.

Speedway's unparalleled flexibility is essential to fully exploit the power of the UHF Gen 2 protocol, which allows an unlimited number of reader transmit and receive modes, each of which might generate a different combination of commands, data rates, modulation formats, and backscatter types. That's asking quite a lot of a reader—and it must be up to the task.

**But we don't stop there:**

- Speedway's software-defined radio architecture provides best-in-class performance and maximum flexibility to support future EPCglobal standards development.

- RFID deployments and system costs are slashed by using a single (monostatic) transmit/receive antenna for each of Speedway's four ports, eliminating the need for separate transmit and receive antennas.

- Speedway's monostatic antenna arrangement provides industry-leading performance while reducing the number of deployed antennas per reader from eight to four, enabling high-performance item-level operations.

- Tag data rates of up to 640 kbps enable inventory rates that exceed 1,000 tags/second.

- Speedway's rugged, industrial design is built to withstand abuse in busy warehouses.

Additionally, the Speedway reader delivers robust performance in dense-reader environments, the flexibility to read at the case, pallet, or item level, and more. Combined with an extensible architecture that supports seamless integration of field-upgradeable, third party application software, the Speedway reader is the most adaptable reader solution available.

Impinj's GrandPrix™ RFID system: Speedway reader, tag chips and reader antennas.

## UHF Near-Field Solutions

Impinj's breakthrough approach to the Speedway reader's antenna ports makes UHF near-field operations possible. Enabled by our patented INR™ technology, no other reader has it. In short, it means the Speedway reader is the *only* reader that performs equally well in conventional far-field (long-range operations in warehouses, distribution centers, etc.) and in near-field applications (short-range operations on small, individual items). A whole host of optimized reader antennas designed specifically for the Speedway reader completes the picture. The Speedway reader has in fact changed the game in RFID, extending the power of the UHF Gen 2 standard to the item level.

Speedway reader tracking a pharmaceutical bottle line.

## Redefining the Meaning of "Smart Reader"

One of the keys to a reliable, high-performance RFID deployment is effective management of RF noise in the operating area. Where lesser readers are part of the problem, the Speedway reader is actually part of the solution. For example, its low duty cycle operation means the Speedway reader transmits only when there are tags in the field, helping to clear the air of unnecessary RF noise, while also staying out of the way of other RF devices operating in the area.

The Speedway reader is also operationally aware; it senses the levels of RF noise, interference, and the size of the tag population within its read zone, and automatically selects the most appropriate data rate, modulation scheme, and other settings for the best, most reliable performance under its particular operating conditions. The Speedway reader also uses the operating environment information it gathers to dynamically optimize its inventory operations.

## On the Forefront of LLRP Development

On the applications side of the equation, the deployment of Speedway readers becomes even easier with the availability of LLRP (low-level reader protocol)—the standardized reader network interface created by EPCglobal. LLRP defines a standard interface to common reader functionality, including reader configuration, tag inventory, and tag access operations including the full functionality of the EPCglobal Gen 2 Air Protocol. LLRP simplifies basic operation while also allowing control over advanced settings on the reader. A well-defined vendor extension mechanism means you'll have access to all of Speedway reader's advanced, high-performance features via simple extension. And it should come as no surprise that Impinj is a leading participant in the development of the LLRP standard. In fact, Impinj is the first to market with a first class implementation of the LLRP standard.
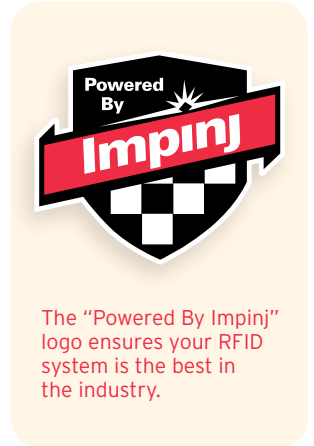
# A Healthy RFID Support System

Finally, Impinj's Speedway reader is at the heart of a powerful partner network, providing a solid platform for seamless integration with third-party application software, and supporting a wide range of end-user requirements. It's also why every major middleware and system solution provider has made Speedway support an essential part of their product strategy. The Speedway reader simply enables enterprise-class capability, performance, and manageability like no other.

Impinj's Speedway reader is available through our many distributors, value-added resellers (VARs), and original equipment manufacturers (OEMs), who license the Speedway reader under the "Powered by Impinj" label.

Whether you're initiating a pilot program, transitioning your pilot to full deployment, or expanding your RFID capability, your specification of Impinj's Speedway reader will ensure a rewarding deployment experience. We know that you want greater visibility into your supply chain operations; the Speedway reader will give your RFID system far greater visibility where you need it most—at the edge.

The "Powered By Impinj" logo ensures your RFID system is the best in the industry.

About Impinj, Inc.

Impinj, Inc. is the world's leading technical innovator in developing UHF Gen 2 RFID solutions for both item-level and supply-chain tagging. Impinj draws on its technical expertise and industry partnerships to deliver a wide range of products and solutions comprising high-performance tag chips, readers, reader chips, software, antennas, and systems integration. Impinj products provide unprecedented performance, integration and cost effectiveness to a global customer base, in applications across numerous vertical markets, including inventory management, asset tracking, authentication and serialization. For more information, visit www.impinj.com.