R **EPC Gen 2 in the Real World**



Read and write faster even in challenging environments.

Gen 2 provides for faster, more reliable reads even in enviroments with multiple dock doors, dozens of readers and other environmental "noise."

Using features like "Q algorithm," "sessions," and "AB symmetry," the Gen 2 process singulates tags far more guickly and accurately, and allows for multiple readers to interrogate groups of tags at the same time without conflict.

Once a reader has inventoried the tag, it can be flagged to prevent that reader from reading it again. However, the tag can be read by other readers without interfering. This capability increases speed while reducing errors.

The reader actually evaluates the number of tags and the environment, then picks the most efficient method of identifying and reading each of the tags. Gen 2 adapts to operating conditions automatically, for example, reading cartons moving on a conveyor very quickly and reading more slowly in a noisy environment where there are multiple readers, like a dock door, for example. Frequency channelization keeps the signals of tags and readers at different frequencies and prevents reader signals from overwhelming the guieter tag signals.

With Gen 2, you can install forty to fifty readers in one building and be assured that they will all work reliably. Dense reader capabilities also make the best use of the limited spectrum available for UHF RFID, particularly in Europe. These capabilities, along with improved availability, have made large-scale international deployment practical. Gen 2 also improves reliability by eliminating "ghost reads." Ghost reads are defined as the misinterpretation of "noise" (from the environment or partial data from other tags) as a real tag. Because the reader is controlling the communication with the selected tag directly, random signals are ignored. There is a system of checks and balances with unique signatures to prevent the reader from guessing or falsely interpreting "noise" as valid data.

Gen 2 speeds can be blazingly fast. The process of identifying individual tags in a multiple tag environment can be up to ten times faster than Gen 1 – with theoretical speeds of 1600 tags per second in regions like North America where there are wide power and bandwidth allocations. Even in restricted environments, as with Europe, speeds up to 600 tags per second can be achieved. The write speed target for Gen 2 is also fast up to 30 tags per second in theory.

Prepare for global compatibility.

In the Gen 1 environment, RFID systems were based on proprietary protocols. Hardware was not always compatible and the industry lacked an international standard. These issues were all barriers to large-scale deployment, and are among the reasons that the industry sought broad cooperation in the development of Gen 2.

Gen 2 delivers a robust system compatible with most hardware worldwide. And it is flexible enough to support new functions as they emerge.

While there are still regional differences in operating frequency and reader power, Gen 2 still has the capability to substantially improve transit and inventorv control in international operations.

For example, Europe utilizes lower reader power and a relatively narrow frequency allocation (865 868 MHz) compared with



North America's 902-928 MHz frequency band. European RFID systems therefore tolerate very little interference and require much tighter spectral control than Gen 1 could ever deliver.

Gen 2 takes this limitation into account, enabling systems that work well in North America, Europe, Japan and elsewhere with equipment from a wider variety of vendors.

Expect greater efficiency, accuracy and security.

In tag population management, the needs for security and efficiency must be balanced. Based on an 8-bit code. Gen 1 tags presented security issues because they provided only 256 unique codes.

With Gen 1, an individual could guickly guess a password and kill tags or alter tag data that was locked without being detected. Gen 2 enhances security by using a 32-bit code, extending the number of potential passwords to four billion and making a successful guess improbable.

"Future-proof" your **RFID** program.

Gen 1 protocols lacked a defined upgrade path and could not address many of the functions that the market foresaw.

The Gen 2 specification creates a framework in which functions can be added and evolve over time. For example, expanded memory options provide space for database records and other functions. Building on the Gen 2 foundation, users can add temperature sensing, encryption features, and other capabilities.

Avery Dennison's Gen 2 solutions are designed to perform in tough supply chain environments with multiple readers and dock doors.

Gen 2 tags can be permanently locked, preventing anyone from changing the data in the tag. And they can be permanently killed via a mandatory built-in kill command so that they can never be read again.

Cover coding provides additional security. It utilizes random numbers to scramble data, preventing mischiefmakers from making sense of the reader/tag conversation.



Gen 2 is a major step forward for RFID, setting the stage for continuous improvement in function, efficiency, security and ROI.

Gen 2 makes ROI possible

- Faster read and write speeds
- Reliable in tough environments
- Enhanced security
- Permanent lock and kill
- Upgradable
- Improved global functionality