Monza 4 Tag Chip Family

The Monza 4 family builds upon the industry’s de facto UHF Gen 2 standard, Impinj’s Monza tag chips, by introducing new levels of RFID privacy (QT™ technology), tag orientation insensitivity (True3D™ antenna technology), read/write performance, and memory capability.

The read and write range improvements support superior performance in tags of all sizes for applications such as supply chain, retail, apparel, asset tracking, and more. True3D and QT technology further allow Impinj to achieve performance improvements by enabling smaller, smarter, and less expensive tags that extend RFID benefits to more markets.

Finally, the Monza 4 family comes with a variety of memory options, including both extended EPC and User memory.

Packaged Monza 4 Tag Chips

Extend the advantages of Monza 4-powered tags to printed environments and applications requiring low cost, small footprint, and a serialized TID. For applications where large memory is not required, Monza 4D provides the smallest and lowest µ package, making it ideal for applications where soldered connections are preferred. Impinj utilizes a through-hole assembly technique, meaning easy integration into PCB designs through the use of our packaged parts. Packaged Monza 4 tag chips are supported by Impinj’s custom tag antenna reference designs, as well as other applications where serialized IDing is required, such as RFID UHF subscriber ID packages, making it the industry’s smallest and lowest profile tag chip.

Monza 4 Tag Chip Models

<table>
<thead>
<tr>
<th>Model</th>
<th>User Memory</th>
<th>EPC Memory</th>
<th>True3D Support</th>
<th>QT Support</th>
<th>512 Serial ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monza 4D</td>
<td>32</td>
<td>128</td>
<td>√</td>
<td>√</td>
<td>√ /</td>
</tr>
<tr>
<td>Monza 4E</td>
<td>128</td>
<td>up to 496</td>
<td>√</td>
<td>√</td>
<td>√ /</td>
</tr>
<tr>
<td>Monza 4QT</td>
<td>512</td>
<td>128</td>
<td>√</td>
<td>√ /</td>
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</tr>
</tbody>
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Impinj Quality

Impinj hasn’t become the de facto industry standard based on innovation alone. Our partners and customers depend on the quality they know Impinj delivers. Our rigorous production test methodology has raised the bar for the RFID industry. Each chip undergoes state-of-the-art testing at the wafer level both prior to and after temperature cycling to ensure only working parts make it to our relay partners.

Monza 4 tag chips are widely regarded as the industry’s most consistent performer. And with the introduction of the Monza 4 family, further design improvements have eased mounting tolerances so as to significantly reduce read/write performance variations due to tag assembly. Benefits from Monza 4 tag chips in the assembly process include more consistent read/write performance, improved yield, and potentially reduced manufacturing costs.

Our custom tag antenna reference designs also have to pass in-depth characterization and benchmarking studies, including the evaluation of range, near- and far-field characteristics, interference effects, and leading conditions across the UHF spectrum and under a variety of use conditions to verify consistent tag performance for targeted applications.

The efforts Impinj undertakes to maintain quality result in the most consistent tag performance in the industry, and provide the reliability our customers have come to expect. Ask your sales representative for more information about these and other Impinj products.

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 robust performance, integration and cost effectiveness to a global customer base across numerous vertical markets with applications including inventory management, asset tracking, authentication and serialization. For more information, visit www.impinj.com.
The Monza 4 Tag Chip Family

The Monza 4 family builds upon the industry’s de facto UHF Gen 2 standard, Impinj’s Monza tag chips, by extending in new levels of RFID privacy (QT™) technology, tag orientation insensitivity (True3D™ antenna technology), read/write performance, and memory capability.

The read and write range improvements support superior performance in tags of all sizes for applications such as supply chain, retail, apparel, asset tracking, and more.

True3D™ antenna technology further enables additional performance improvements by enabling smaller, smarter, and less expensive tags that extend RFID benefits to more markets.

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<th>QT™ Technology</th>
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<tr>
<td>Monza 4D</td>
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Packaged Monza 4 Tag Chips

Packaged Monza 4 tag chips provide 150 bits of EPC memory, 510 bits of user memory, and a serialized TID. With Impinj’s DFN packages, soldered connections are preferred. Impinj utilizes a more standard memory code.

Monza 4E tag chips offer up to 16-bit, 6-bit EPC memory, 9-bit User memory, and a serialized TID to provide a true 3D antenna reference design and was chosen as a reference for Impinj’s Monza 4 Tag Chip Family. Monza 4E also provides True3D™ antenna support.

Monza 4QT tag chips offer 512 bits of user memory, 128 bits of EPC memory, and a serialized TID, and True3D™ antenna support. The extended User memory options support applications where users cannot count on a database connection. Monza 4QT can also provide database-free tags with Impinj’s QT™ technology, which protects data confidentiality and contains a serialized TID.

Monza 4D tag chips provide 128 bits of EPC memory, 22 User memory, and a serialized TID. True3D™ antenna support and a unique TID within a 128-bit EPC number provide database-free tags with Impinj’s QT™ technology, which protects data confidentiality and contains a serialized TID.

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Impinj’s Monza 4 tag chips feature:

- **True3D™ antenna technology**: Two fully independent antenna ports enable the creation of tags without blind spots
- **QT™ technology**: Enables public and private data profiles that support confidentiality of business-sensitive data and assure consumers of privacy
- **Memory**: Options to support large user-memory (512 bits with block permalock) or EPC-memory (496 bits) applications
- **Gen 2 compliant**: Custom features that facilitate inventory of hard-to-read tags and rapid access of serial numbers
- **Industry’s best read and write sensitivity combined with excellent interference rejection**: Yield outstanding read and write reliability
- **ECG/Global UHF Gen 2 and ISO 18000-6C compliant**

### True3D™ Antenna Technology

**Monza 4 tag chips** possess a unique, patent-pending architecture that provides two fully independent antenna ports enabling high performance true omni-directional tags for the first time.

For many applications, consistent orientation of a tag with respect to a reader presents a challenge. And as the read range plot below illustrates, tags based on conventional tag chips can have blind spots—angles at which they are effectively invisible to a reader, even with creative and advanced tag antenna designs.

In the previous generation Monza 3 tag chips, a dual input structure enabled tags without blind spots for shorter range applications. The True3D 4 antenna technology introduces further improvements by providing true orientation insensitivity as well as outstanding read range performance.

Compare the read range response of the Monza 4 tag (Impinj H42) below to the Monza 3 tag (Impinj H32) and conventional tag chip responses. The response pattern is circular; no angle has significantly lower sensitivity than any other. At every angle, the read range has increased significantly. And this doubling of read range performance comes in a very compact form factor tag.

With True3D antenna technology, readers see tags from any angle, resulting in higher read rates and creating less expensive tags—returning RFID benefits to more applications.

### Tag Read Range Response Performance Comparison

#### Impinj’s Monza Tag Antenna Reference Design

Just as our Monza tag chips enable solutions that lead the industry, our antenna reference designs benefit from our unique approach to RFID as well.

One of the tag antenna’s essential functions is to harvest energy from a reader to power the chip and to do so in all regulatory environments. Impinj antenna designers, both because of their knowledge of RFID systems and the flexibility of our tag chips, have created a uniquely diverse scale of tag antenna-reference designs. These reference designs address short range through long range applications, typical target form factors, adhere to volume manufacturing guidelines, and enable exceptional system performance. As Impinj Monza 4 chip antenna combinations work worldwide. Contact Impinj for specific tag antenna recommendations, or our of our outstanding plug and label conversion partners for more information.

### QT™ Technology

**Control what the world sees**

**Private/Public Profiles**

In the Private Data Profile, users have access to several data/privacy blocks: a private EPC memory, a serial number, an alternate product identifier, a serialized tag identifier (STID), and User memory.

The Public Data Profile only contains the IC model information and the alternate product identifier. When a tag is switched to the Private Data Profile, all other data appears to be non-readable.

**Short-Range Mode**

QT technology’s Short-Range Mode adds a layer of physical protection to a user’s private data by reducing the tag’s read range to less than one-tenth of its normal range. So while a reader can still trigger the tag and read its currently exposed identifier (EPC or alternate product identifier) from normal range, any attempts to access the Private Data Profile from a distance will cause the tag to lose power and drop out of its classical behavior.

Monza 4 QT tag chips feature Impinj’s patent pending QT technology—a unique ability to maintain short range through long range applications, typical target form factors, adhere to volume manufacturing guidelines, and enable exceptional system performance. As Impinj Monza 4 tag chip antenna combinations work worldwide. Contact Impinj for specific tag antenna recommendations, or our of our outstanding plug and label conversion partners for more information.
Impinj’s Monza 4 tag chips feature:

- **True3D™ antenna technology**—two fully independent antenna ports enable the creation of tags without blind spots.
- **QT™ technology**, featuring public and private data profiles that support confidentiality of business-sensitive data and assure consumers of privacy.
- Memory options to support large user memory (512 bits with block permutation in EP6 memory or 496 bits in QT memory) applications
- Gen 2 compliant custom features that facilitate inventory of hard-to-read tag chip responses. The response pattern is circular, no angle possesses a unique, interference-free blind spot. Far-range performance comes in a very compact footprint.
- Two data profiles to support protection of business-sensitive data and consumer privacy. With True3D™ antenna technology, readers see tags from any angle, resulting in higher read rates and enabling less expensive label-reads extending RFID benefits to more applications.

**Impinj Monza® 4 tag chips**

The Monza 4 family of tag chips delivers unique privacy, performance, and memory benefits that address even the most challenging of RFID applications.

**Providing superior sensitivity combined with excellent interference rejection, support for omni-directional antennas (True3D™ antenna technology), innovative privacy features (QT™ technology), and expanded memory options, Monza 4 tag chips set a new standard in RFID.**

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In the previous generation Monza 3 tag chips, a dual input structure enabled tags without blind spots for shorter range applications. The Monza 4 True3D™ antenna technology introduces further improvements by providing true orientation insensitivity. Comparing the read range responses of the Monza 4 tag (Impinj H42) below to the Monza 3 tag (Impinj H32) and conventional tag chip responses, the response pattern is circular; no angle possesses a unique, interference-free blind spot. Far-range performance comes in a very compact footprint.

**Tag Read Range Performance Comparison**

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<thead>
<tr>
<th>Monza 4 Model</th>
<th>Tag Read Range Performance Comparison</th>
</tr>
</thead>
<tbody>
<tr>
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**Monza 4 UHF Gen 2 RFID Tag Chips**

### Tag Read Range Performance Comparison

- **Monza 4**: Tag read range drops significantly when the tag is switched to the short-range profile, or both.

**Impinj Tag Antenna Reference Design**

Just as our Monza tag chips enable solutions that lead the industry in tag antenna architecture and performance improvements, these reference designs feature a unique approach to RFID as well. One of the tag antenna’s essential functions is to harvest energy from a reader to power the tag chip and to do so in all regulatory environments. Impinj antenna designers, both because of their knowledge of RFID systems and the flexibility of our tag chips, have created a uniquely diverse scale of tag antenna-reference designs. These reference designs address a range of tag antenna performance needs by using different antenna architectures. The Monza 4 reference antenna combinations work worldwide. Contact Impinj for specific tag antenna recommendations, or any of our outstanding inlay and label conversion partners for more information.

**Impinj Monza 4 Chip Design**

Monza 4 chip design continues the family tradition of innovation and quality, bringing antenna technology to market with reliability, support for true omni-directional antenna designs, unique privacy protection features and larger antenna arrays to the industry’s most flexible and best performing tag chips.

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Monza® 4 UHF RFID Tag Chips
The New Standard in Performance and Privacy

Featuring True3D™ antenna technology and QT™ technology

The Monza 4 family of tag chips delivers unique privacy, performance, and memory benefits that address even the most challenging of RFID applications. Providing superior sensitivity combined with excellent interference rejection, support for omnidirectional antennas (True3D™ antenna technology), innovative privacy features (QT™ technology), and expanded memory options, Monza 4 tag chips set a new standard in RFID.

Monza® 4 tag chips continue the family’s legacy of innovation and quality. Impinj antennas on read and write reliability, support for true omnidirectional antenna designs, unique privacy protection features and larger memories to the industry’s most flexible and best-performing tag chips.

Impinj’s Monza 4 tag chips feature:

> True3D™ antenna technology—two fully independent antenna ports enable the creation of tags without blind spots
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> Memory options to support large user memory (512 bits with block permanence) or EPC memory (496 bits) applications
> Gen 2 compliant custom features that facilitate inventory of hard-to-read tags and rapid access of serial numbers
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> EPCglobal UHF Gen 2 and ISO 18000-6C compliant

Tag Read Range Response Performance Comparison

True3D™ Antenna Technology SEE WHAT YOU’VE BEEN MISSING

Monza 4 tag chips possess a unique, patented pending architecture that provides two fully independent antenna ports enabling high performance, true omnidirectional tags for the first time. For many applications, consistent orientation of a tag with respect to a reader presents a challenge. And as the read range plot below illustrates, tags based on conventional tag chips can have blind spots—angles at which they are invisible to a reader; even with creative and advanced tag antenna designs.

In the previous generation Monza 3 tag chips, a dual input structure enabled tags without blind spots for shorter range applications. The Monza 4 True3D antenna technology introduces further improvements by providing true orientation insensitivity as well as outstanding read range performance.

Compare the read range response of the Monza 4 tag (Impinj H42) below to the Monza 3 tag (Impinj H32) and conventional tag chip responses. The response pattern is circular, no angle is significantly lower than any other. All over every angle, the read range has increased significantly. This doubling of read range performance comes in a very compact form factor tag.

With True3D antenna technology, readers see tags from any angle, resulting in higher read rates and creating less expensive label-regarding RFID benefits to more applications.

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Impinj Quality

Impinj hasn’t become the de facto industry standard based on innovation alone. Our partners and customers depend on the quality they know Impinj delivers. Our rigorous production test methodology has raised the bar for the RFID industry. Each chip undergoes state-of-the-art testing at the wafer level both prior to and after temperature cycling to ensure only working parts make it to our inlay partners.

Monza tag chips are widely regarded as the industry’s most consistent performer. And with the introduction of the Monza 4 family, further design improvements have eased mounting tolerances so as to significantly reduce read/write performance variations due to tag assembly. Benefits from Monza 4 tag chips in the assembly process include more consistent read/write tag performance, improved yield, and potentially reduced manufacturing costs.

Our custom tag antenna reference designs also have to pass in-depth characterization and benchmarking studies, including the evaluation of range, near- and far-field characteristics, interference effects, and leading conditions across the UHF spectrum and under a variety of use conditions to verify consistent tag performance for targeted applications.

The efforts Impinj undertakes to maintain quality result in the most consistent tag performance in the industry, and provide the reliability our customers have come to expect. Ask your sales representative for more information about these and other Impinj products.

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 robust performance, integration, and cost-effectiveness to a global customer base across numerous vertical markets with applications including inventory management, asset tracking, authentication, and security management.

Monza 4 Tag Chip Models

<table>
<thead>
<tr>
<th>Monza 4 Tag Chip Models</th>
<th>Memory</th>
<th>Memory</th>
<th>Technology</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monza 4D</td>
<td>32</td>
<td>128</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Monza 4E</td>
<td>128</td>
<td>up to 496</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Monza 4QT</td>
<td>512</td>
<td>128</td>
<td>√</td>
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Monza 4 Tag Chip Models

Monza 4D tag chips provide 32 bits of EPC memory, 128 bits of User memory, and a serialized TID. User memory is not required for applications where true3D antenna support is not needed. True3D antenna support is available in 8-pin µDFN packages, making it the industry’s smallest and lowest profile tag chip.

Monza 4E tag chips offer up to 128 bits of EPC memory, 128 bits of User memory, and a serialized TID to provide reliability along with true3D antenna support. For applications where true3D antenna support is not required, Monza 4D tag chips provide default antenna rejection, 512 bits of EPC memory, and a serialized TID.

Monza 4QT tag chips offer 512 bits of user memory, 128 bits of EPC memory, block permalock capability, a serialized TID, and True3D antenna support. The extended user memory options support applications where users cannot count on a database connection. Impinj utilizes a serialized TID, and a private database to provide the reliability our customers have come to expect. Our rigorous production test methodology has raised the bar for the RFID industry, and provide the reliability our customers have come to expect. Ask your sales representative for more information about these and other Impinj products.

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Monza 4 Tag Chip Models

Monza 4D tag chips offer 32 bits of EPC memory, 128 bits of User memory, and a serialized TID. 8-pin µDFN packages accommodate surface-mount assembly and enable ruggedized tag designs. For more information, visit www.impinj.com.

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