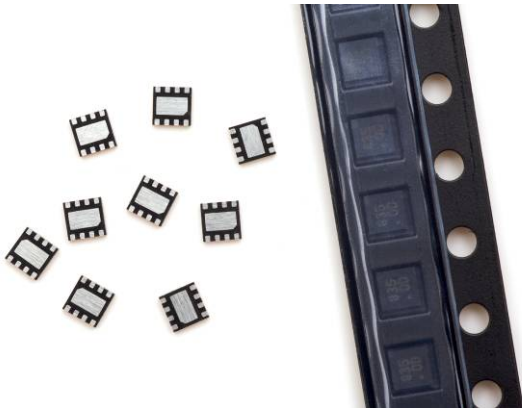


UHF Gen 2 RFID Tag Chip (IPJ-P5002-D2)

# Monza<sup>TM</sup> 3 Packaged Parts



## Overview

With availability of Monza 3 tag chips in a packaged format, Impinj extends the advantages of fully EPCglobal-compliant, high-performance, Monza-powered tags to printed circuit board (PCB) applications and enables ruggedized tag designs.

Packaged Monza 3 is supported by standard PCB surface mount assembly techniques, meaning easy integration into products designed with PCBs, as well as other electronic applications where soldered connections are preferred. Impinj encased the Monza 3 tag chips in a  $\mu$ DFN package, making it the industry's smallest and lowest profile tag chip part.

Electronics manufacturers can leverage RFID to monitor work in progress, track inventory, follow board revision history, and prevent counterfeiting. The protection the package offers enables many new opportunities to use UHF RFID in the industrial marketplace.

Monza is supported by a family of innovative antenna designs that not only optimize tag performance for wide-ranging requirements and specific market applications, but also enable whole new categories of use.

## Features

- ❖ High sensitivity coupled with superior interference rejection yields excellent tag performance—even when buried deep within a pallet of RF-absorbing material.
- ❖ Dual antenna input maximizes range and facilitates orientation indifference
- ❖ Field-rewritable NVM provides programming flexibility and 100,000-cycle/50-year retention reliability
- ❖ Write rate of >15 tags/second enables rapid programming throughput
- ❖ 8-pin  $\mu$ DFN package accommodates surface-mount assembly
- ❖ Industrial temperature range ( $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ) yields reliable performance under harsh conditions

## Applications

- ❖ PCB Tracking
- ❖ Ruggedized tag designs
- ❖ Asset inventory and management, especially those with high reliability requirements
- ❖ Item-level tracking
- ❖ Work-in-progress tracking

## Operating Conditions and Electrical Characteristics

Parameter	Min	Typ	Max	Units	Comments
Operating Frequency	860		960	MHz	
Read Sensitivity Limit		-15		dBm	
Write Sensitivity Limit		-12		dBm	
Operating Temperature	-40		85	°C	
Data Retention		50		Years	
Programming Cycles		100,000		Cycles	
Recommended Source Admittance		0.74 – j6.40mS			
Package Intrinsic Inductance		26		nH	Parallel RL model of recommended Admittance
Package Intrinsic Resistance		1350		Ω	
ESD			2000	V	Human Body Model
DC Input Voltage			± 3.5	Volts	Applied across two pins
DC Input Current			± 0.5	mA	Into any input pin

## Package Dimensions

Parameter	Min	Typ	Max	Units	Comments
Package Length (P <sub>l</sub> )	1.9	2.0	2.1	mm	
Package Width (P <sub>w</sub> )	1.9	2.0	2.1	mm	
Package Height (P <sub>h</sub> )	0.45	0.50	0.55	mm	

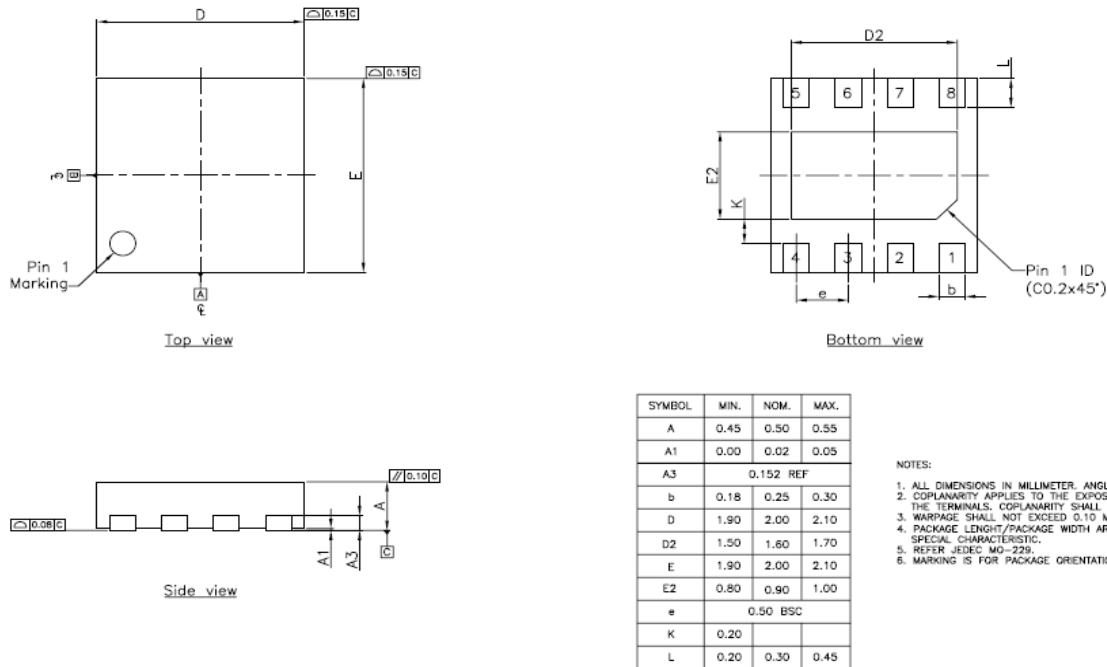
## Package Pin Out

Pin Name	Pin No.	Description
RF1	1	<b>RF antenna input/output.</b> Connects to an RF antenna for wireless communication to and from a UHF reader
GND	4,5	<b>Antenna ground.</b> Provides ground reference for antenna. Antennas may be connected to any ground reference
RF2	8	<b>RF antenna input/output.</b> Connects to an RF antenna for wireless communication to and from a UHF reader
—	2,3,6,7	No connects (NC)

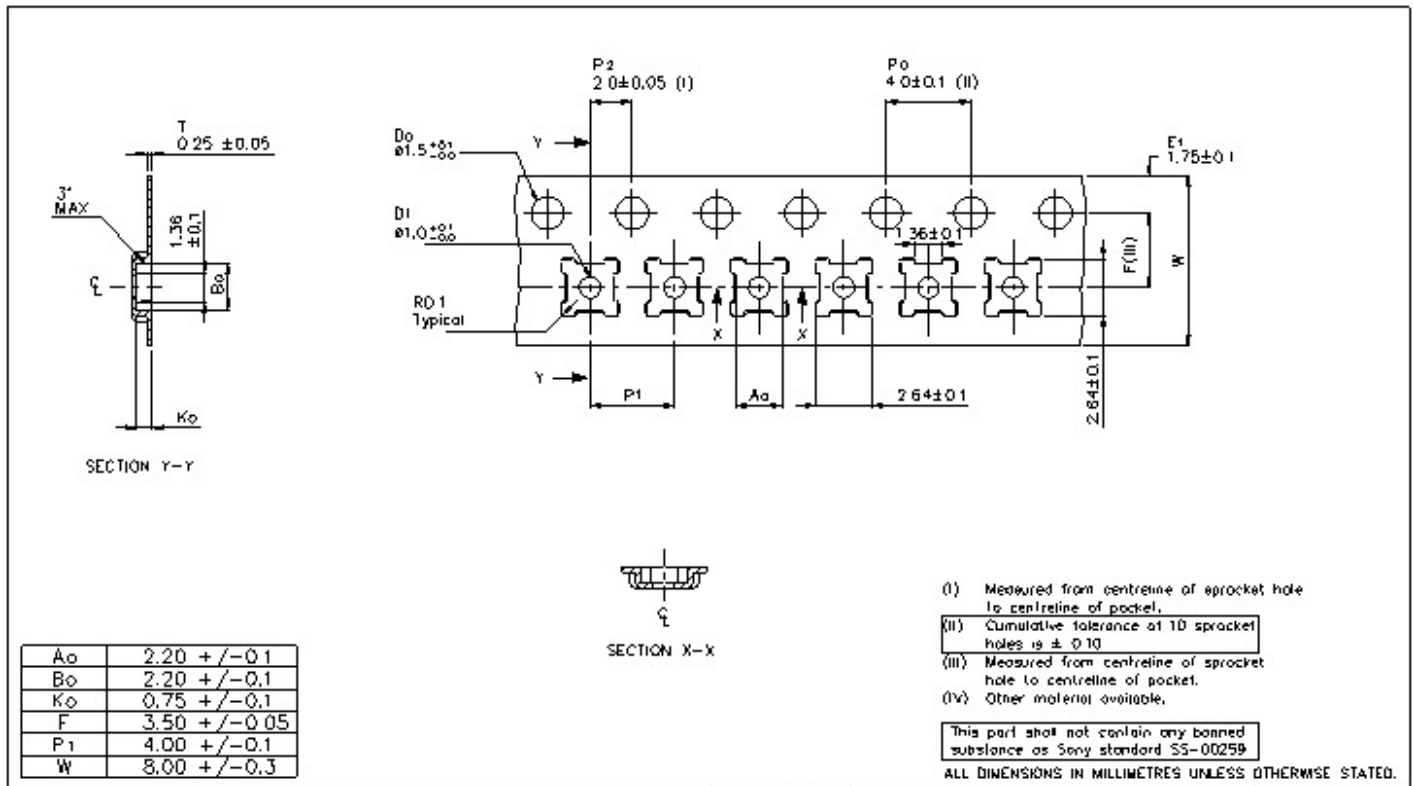
## Tape and Reel Format

Parameter	Value	Comments
Reel Size	7 in (17.8 cm)	Outside diameter
Hub Size	2.16 in (5.5 cm)	Inside hub diameter
Quantity/reel	3000	Units

## Detailed Package Drawing



## Tape And Reel Drawing

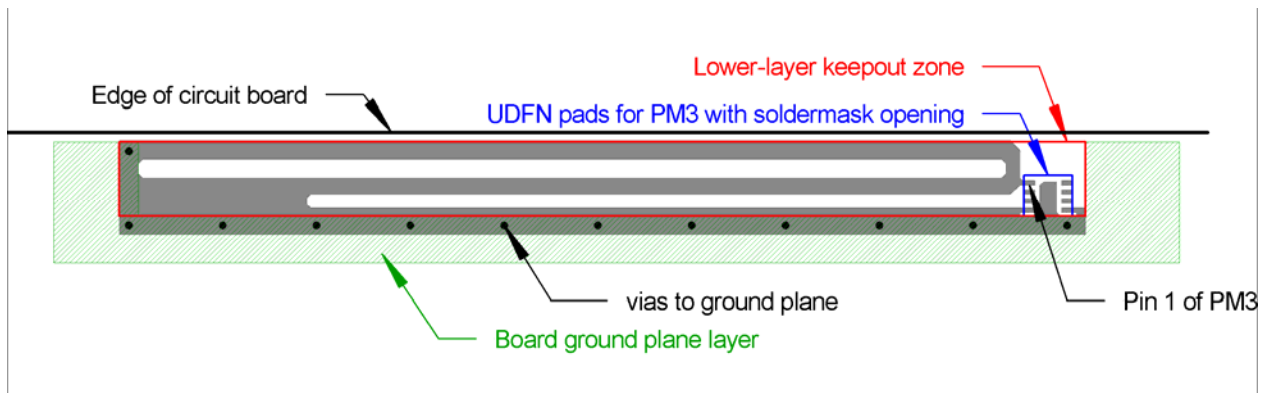


## Application Examples

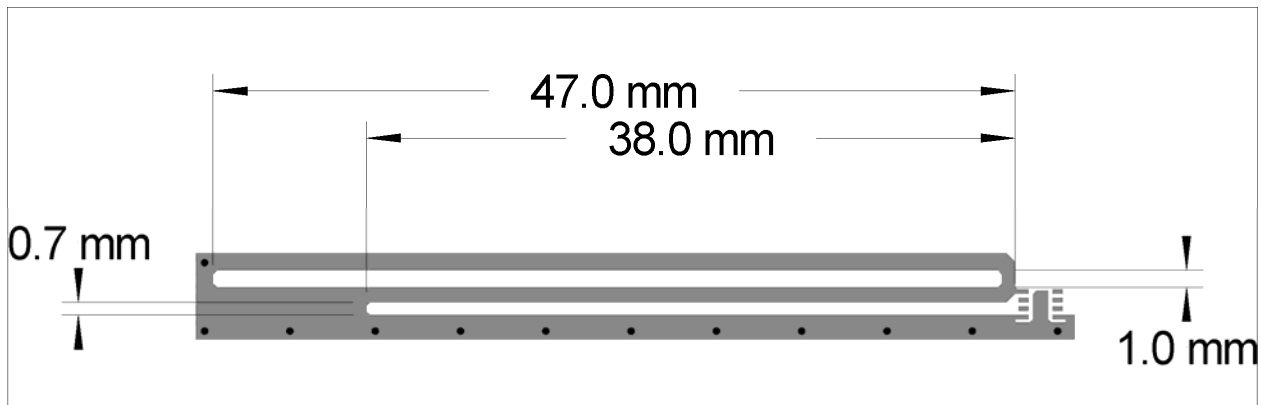
The following examples demonstrate the use of packaged Monza 3 on RFID-enabled circuit boards. The antenna for the tag is formed in the circuit traces and the dimensions strongly influence read/write performance. The following notes and guidelines apply to all of these reference designs:

- The traces shown should be on the outer circuit board layer, component side, if possible. If necessary, the antenna traces can reside on a lower layer as long as the keep-out zone is respected within all other layers.
- The keep-out zone applies to all metal layers other than the antenna layer.
- The inner edge of the antenna design should be tied to a ground plane (e.g., with vias) if one is available.
- These designs are sized for FR4 circuit board material with thickness of 1.57 mm (1/16 inch). The optimum dimensions may be different for other materials or thickness.
- The antenna must be placed on an edge of the board for proper operation.
- Artwork for these three reference designs is available in DXF format from Impinj.

Single-antenna design with annotation:

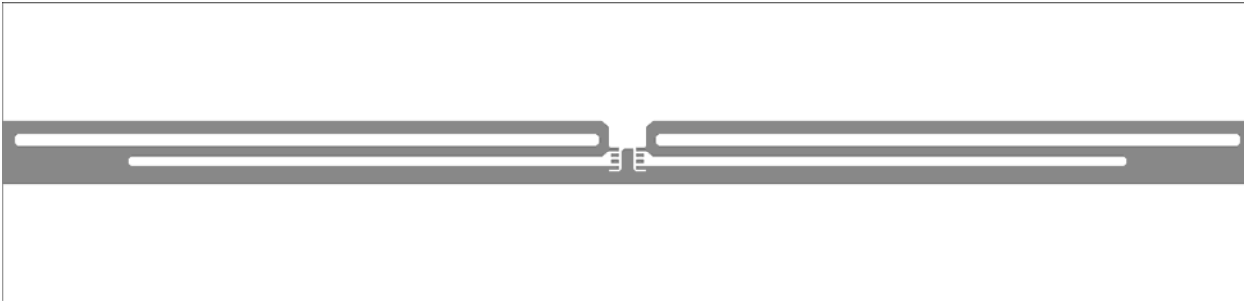


Antenna trace design showing critical dimensions:



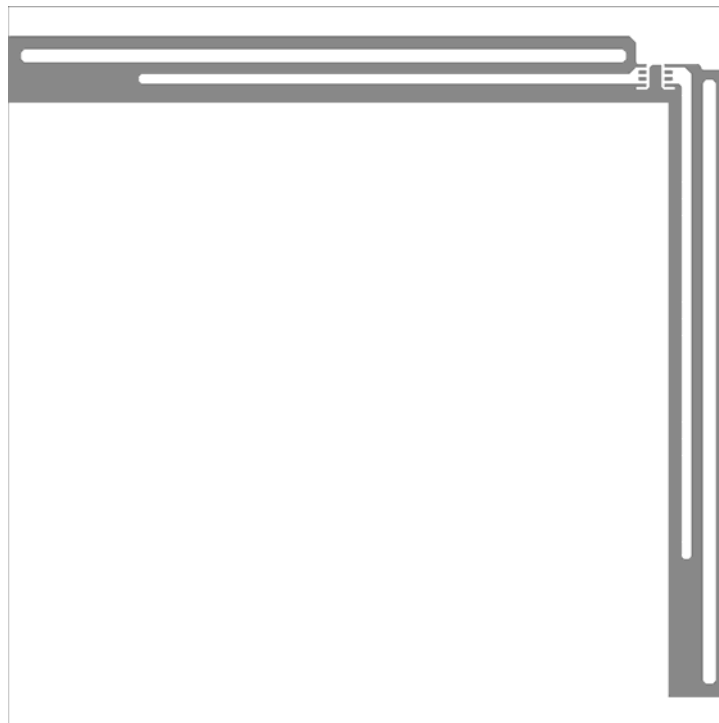
The artwork file for this design is PM3\_pcb\_ref\_ant1.DXF

Two antennas along an edge, taking advantage of Monza's dual antenna ports for greater range and sensitivity (vias and other layers omitted from figure for clarity):



The artwork file for this design is PM3\_pcb\_ref\_ant2.DXF

Two antennas, one on each adjacent edge, taking advantage of Monza's dual antenna ports for polarization diversity (vias and other layers omitted from figure for clarity):



The artwork file for this design is PM3\_pcb\_ref\_ant3.DXF

All of the layer considerations and design guidelines shown for the single-antenna example apply equally to the other two antenna types.

## Ordering Information

Part	Description
IPJ-P5002-D2	Monza 3 packaged silicon, industrial temperature range

### Notices:

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