

## Approved antennas list

| Antenna                                    | Description    | Type      | Gain (dBI) | **Min Cable loss (dB) | Ω  |
|--|----------------|-----------|------------|-----------------------|----|
| A5010                                      | High Gain CP   | Custom    | 5.5*       | 3                     | 50 |
| A5020                                      | Slimline CP    | WideField | 2.5*       | 3                     | 50 |
| A0303                                      | Mini Guardrail | NearField | -20        | 3                     | 50 |
| A0404                                      | Matchbox       | NearField | -20        | 3                     | 50 |
| S9028PCx                                   | High Gain CP   | FarField  | 5.5*       | 3                     | 50 |
| Additional antennas approved by similarity |                |           |            |                       |    |
|  |                |           |            |                       |    |

\* Converted to linear gain from dBiC.

\*\* Assuming max TX power of 33 dBm

## Slim Outdoor RAIN RFID Antenna

### ABOUT TIMES-7

Pushing the boundaries of RFID technology worldwide Times-7 are leaders in RFID antenna design and manufacture. Our patented award winning UHF antennas meet the needs of virtually any industry application; providing customers with fast accurate tracking of products, assets & people; empowering organizations to transform processes & reduce costs.

Our SlimLine range of antennas are unique in the RFID industry; offering high levels of performance & durability in an aesthetically superior form. Proven in a diverse & growing range of markets, applications include: retail & customer interaction, conference & people tracking, race timing, baggage handling, and logistic & supply chain asset management.



Up to 9m / 29 ft. read range

Just 14mm / 0.55 in. thick

High performance & rugged design

IP67 rating for permanent outdoor use  
& industrial applications

*Slim Outdoor antenna (Slimline A5010)*

The Times-7 industry leading ultra-low profile design is now available in a compact 250 mm / approx.10 in. square footprint. IP67 rated for permanent outdoor use and built to Times-7's high standard for quality and robustness, the circularly polarized Slim Outdoor antenna (A5010) creates a new benchmark for multi-purpose UHF RFID antennas.

### Specifications:

#### Physical / Environmental Specifications

|                                  |   |
|----------------------------------|---|
| Dimensions (L x W x D):          | 250 mm x 250 mm x 14 mm<br>9.85 " x 9.85 " x 0.55 "             |
| Weight:                          | 0.75 kg / 1.6 lbs.  |
| Radome Material:                 | UV-Resistant ABS  |
| Environmental Rating:            | IP67  |
| Operating / Storage Temperature: | -20° to +55°C / -30° to +65°C<br>-4° to +131°F / -22° to +149°F |
| Mounting:                        | Flush or VESA mount (mounting info on page 4)                   |
| Connector type / position:       | SMA female side connector                                       |

#### Electrical Specifications

|                           |                                      |
|---------------------------|--------------------------------------|
| Frequency Range:          | 865-868 MHz / 902-928 MHz            |
| Polarization:             | RHCP (Right Hand Circular Polarized) |
| Far-field Gain:           | 8.5 dBiC typical                     |
| Far-field 3 dB beamwidth: | 68° in both planes                   |
| VSWR:                     | 1.3 typical                          |
| Front to back ratio:      | -20 dB                               |
| Axial ratio:              | 1 dB typical                         |
| Nominal impedance:        | 50 Ω                                 |
| Anti-static protection:   | Yes, DC grounded                     |
| Antenna detection         | 10 K Ω resistance                    |
| Maximum Input Power:      | 3 W                                  |

## Environmental Test

| Test                   | Standard     | Duration             | Temperature | Notes  |
|------------------------|--------------|----------------------|-------------|--|
| Low Temperature        | IEC 68-2-1   | 72 Hrs               | -55° C      |  |
| Thermal Shock (non op) |              | 1 Hr                 | -45 / 70° C | 3 cycles                                     |
| Humidity               |              | 72 Hrs               | 85° C RH    |  |
| Dust Resistance        | IEC 60529    | 8 Hrs                |             | with vacuum                                  |
| Solar Radiation        |              | 4 Days               |             | 340 nm                                       |
| Impact Resistance      |              |                      |             | 1 lb ball drop at 24" X 6 (top/bottom/sides) |
| Salt Fog               | Mil-Std-810G | 24 Hrs in-24 Hrs out |             | 2 cycles                                     |
| Vibration Vehicle      | Mil-Std-810G | 1 Hr X 3 axes        |             | 10-500 Hx, 1.04 Grms,                        |
| Shock-Half Sine        | Mil-Std-810G |                      |             | 10 G / 11 ms, 5 shocks x 6 directions        |
| Shock-Drop             | Mil-Std-810G |                      |             | 26 drops @ 48"                               |
| HighTemp Storage       |              | 24 Hrs each temp     |             | 60C, 65C, 70C, 80C, 85C, 90C & 95C           |

All reliability and performance measurement have been performed by certified, independent labs. Full report is available on request.

## Slim Outdoor antenna (A5010) Mounting Information

The 5010 is designed to support either flush or VESA mount. To accommodate both approaches, versions with either flush or studed backplates are supported.

With part numbers 60001 and 60002, flush mounting can be accommodated by attaching via screws or bolts through hole corner holes in the housing or by using double sided industrial tape on the backplate.

The studs on part numbers 60003 and 60004 are on 100mm spacing which will support standard VESA brackets available from a wide range of suppliers.

Built in the USA in an ISO 9001, 14001, 13485 and fully ITAR compliant/registered facility. ROHS compliant.

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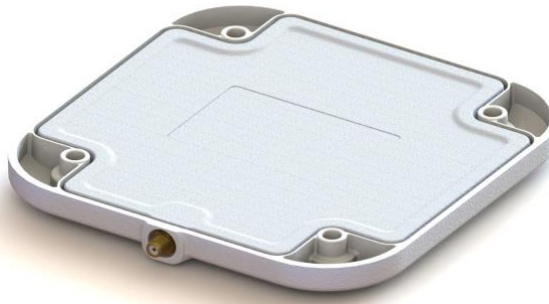
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## Compact Outdoor RAIN RFID Antenna

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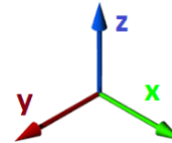
Our SlimLine range of antennas are unique in the RFID industry; offering high levels of performance & durability in an aesthetically superior form. Proven in a diverse & growing range of markets, applications include: retail & customer interaction, conference & people tracking, race timing, baggage handling, and logistic & supply chain asset management.



150 mm / 5.9 in. square footprint

IP68 rating for permanent outdoor use  
& industrial applications

Aesthetically appealing design



*Compact Outdoor antenna (Slimline A5020)*

Equipped with the familiar and industry leading Times-7 ultra-low profile, the A5020 offers a compact footprint of only 150 mm / 5.9 inch square in a very smart-looking design.

With a 1.5 ft. wider read range than most other antennas of similar size in the market, the circularly polarized Compact Outdoor antenna (Slimline A5020) creates a new benchmark for multi-purpose UHF RFID antennas.

IP68 rated and built to Times-7's high standard for quality and robustness, the Compact Outdoor antenna (Slimline A5020) can be used for permanent outdoor applications.

Its pleasing aesthetics and timeless design blends beautifully with most interiors, which makes the Compact Outdoor antenna (Slimline A5020) very suitable for customer facing environments.

## Compact Outdoor RAIN RFID Antenna

### Specifications

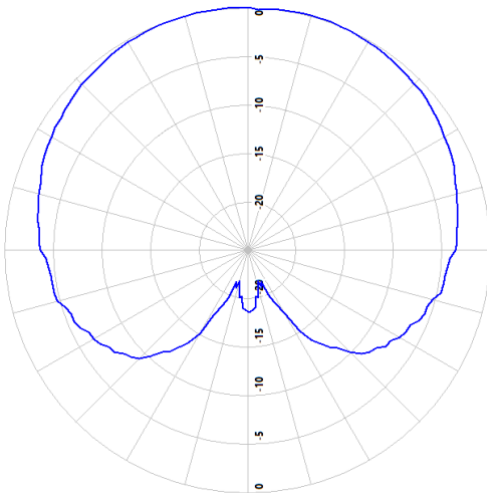
#### **Physical / Environmental Specifications**

|                                  |   |
|----------------------------------|---|
| Dimensions (L x W x D):          | 150 mm x 150 mm x 14 mm<br>5.9 " x 5.9 " x 0.55 " |
| Weight:                          | 0.25 kg / 0.55 lbs                                |
| Radome Material:                 | UV-Resistant ABS                                  |
| Environmental Rating:            | IP68  |
| Operating / Storage Temperature: | -40° to +65°C<br>-40° to +149°F                   |
| Mounting:                        | Flush or VESA mount (mounting info on page 3)     |
| Connector type / position:       | SMA female side connector                         |

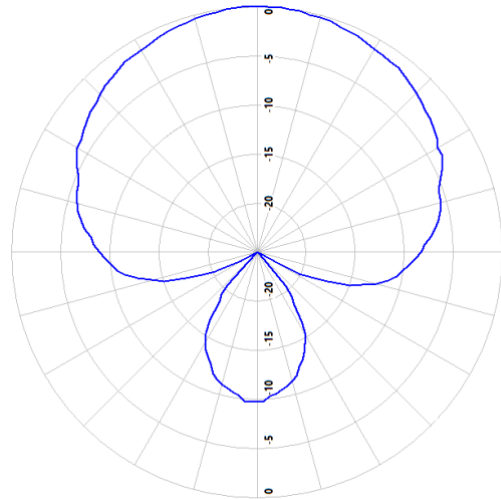
#### **Electrical Specifications**

|                          |                                      |
|--------------------------|--------------------------------------|
| Frequency Range:         | 865-868 MHz / 902-928 MHz            |
| Polarization:            | RHCP (Right Hand Circular Polarized) |
| Far-field Gain:          | 5.5 dBiC typical                     |
| Far-field 3dB beamwidth: | 115° in both planes                  |
| VSWR:                    | 1.4 typical                          |
| Front to back:           | -10 dB                               |
| Axial Ratio:             | 2 dB typical                         |
| Nominal Impedance:       | 50 $\Omega$                          |
| Anti-static protection:  | DC Grounded                          |
| Antenna Detection        | 10K $\Omega$ resistance              |
| Maximum Input Power:     | 3 W                                  |

*E-field Radiation Pattern*



XZ-plane



YZ-plane

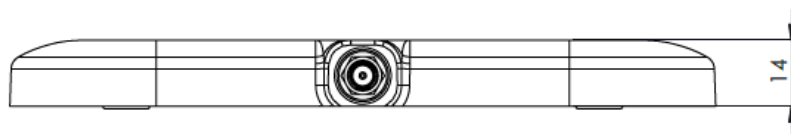
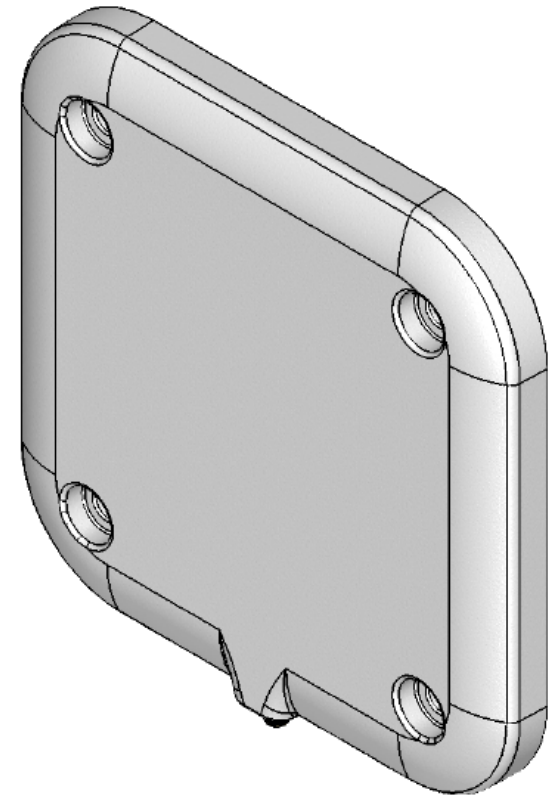
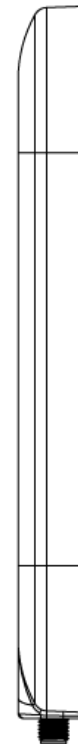
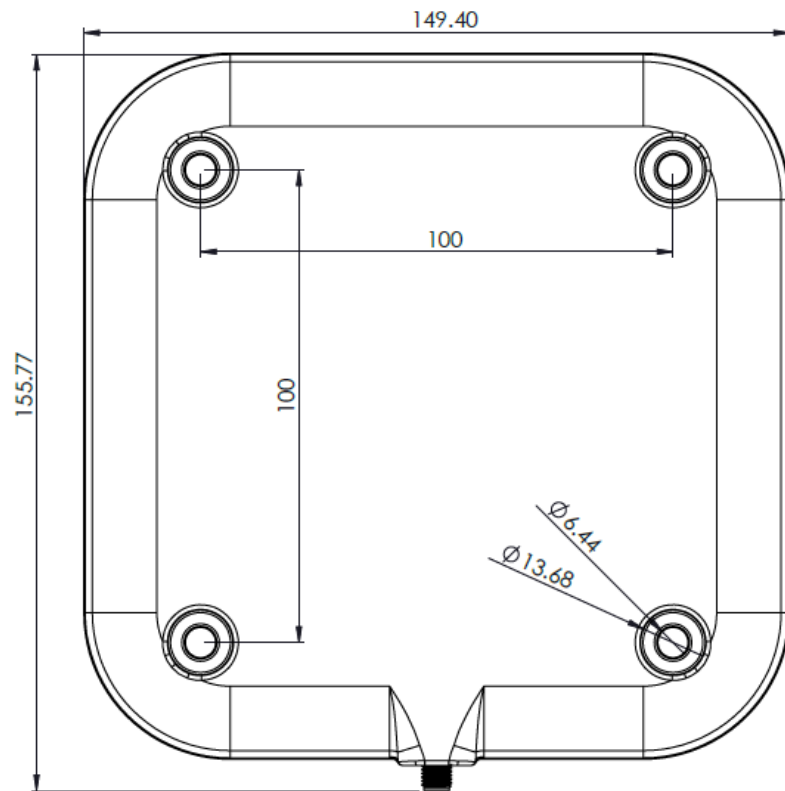
**Compact Outdoor antenna (Slimline A5020) Mounting Information**

The A5020 is designed to support either flush or VESA mount. The flush mounting holes are VESA spaced and can accommodate M6 and 1/4" type bolts and M4 screws.



The mounting holes of the A5020 support VESA spaced mounting brackets as shown in the picture. For more information on the Mounting Bracket in the picture, please click [here](#).





UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN mm  
TOLERANCES:  
FRACTIONAL  $\pm$   
ANGULAR: MACH  $\pm$  BEND  $\pm$   
TWO PLACE DECIMAL  $\pm$   
THREE PLACE DECIMAL  $\pm$

INTERPRET GEOMETRIC  
TOLERANCING PER:

MATERIAL:

FINISH:

DO NOT SCALE DRAWING

A5020

SIZE DWG. NO.

A3

REV

B

SCALE: 1:1 Robby Lopez

WEIGHT:

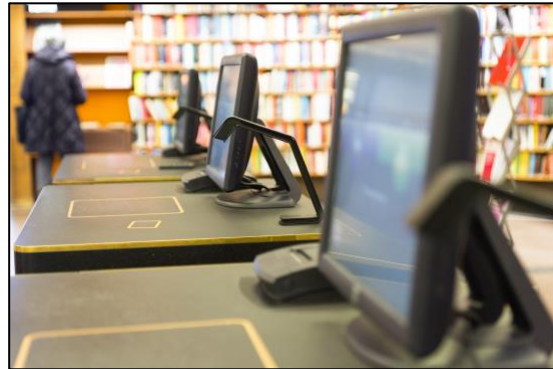
SHEET 1 OF 1



## Applications

### Kiosks and Point of Sale

The A5020 antenna's RF radiation can be confined in a zone while operating at low power. This is practically achievable due to its low gain nature. The antenna is best suited for kiosks and POS applications where a confined read zone is a key requirement. The antenna is aesthetically appealing and fits into every POS environment.



### Waste Management

The A5020 is IP68 rated, meaning it is suitable for permanent outdoor installations. The 'all-plastic'-housing prevents the antenna from corroding. The antenna is moderately impact resistant and can be water blasted. The  $\sim 100^\circ$  beam-width of the A5020 antenna makes wheelie bin detection easy and straight-forward. The antenna can be cleaned with cleaning agents and it would not be adversely affected. The physical size of the antenna is small and thus installation in waste management trucks is hassle free.



### Retail

The A5020 can easily be deployed in space constrained environments such as retail. With its superb aesthetics and compact design, the A5020 antenna blends well into the retail back drop.





## Medical & Pharmaceutical

The A5020 can operate at low-temperature extremes. High-value pharmaceutical assets can be tracked in fridges and freezers using the A5020 antenna. The slim design maximizes the usable space inside of a refrigerator. The antenna can handle general purpose cleaning agents and is water resistant. The white colored A5020 antenna is suitable for hospitals, medical laboratories, research industries and pharma labs.



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Datasheet

# MINI-GUARDRAIL ANTENNA

## READER ANTENNA DATASHEET

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# 1 OVERVIEW

The Impinj Mini-Guardrail antenna has a short-read zone and fits easily into small enclosures. The Mini-Guardrail reader antenna operates effectively at read distances of 7.5 cm or less. This antenna is the ideal choice for access control, ticketing, document control, high-speed encoding stations, packaging lines, or any application requiring high reliability and a constrained read zone. Because of its optimized short-range performance, the Mini-Guardrail antenna is virtually immune to the RF-transmission limiting effects of items such as liquids, powders, and metallic packaging.

**Figure 1: Mini-Guardrail Antenna Picture**



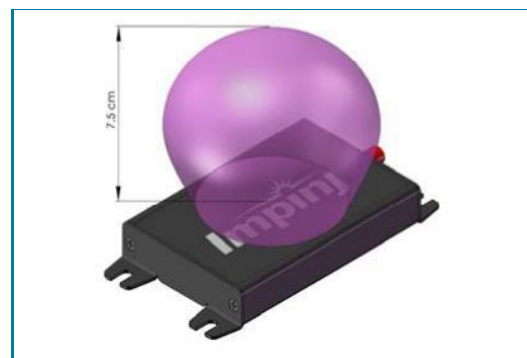
## 1.1 Features

- Strong near-field performance for reading tags at a distance up to 7.5cm
- Small form factor
- Weak far-field gain to minimize stray reads
- Broadband design to enable world-wide operation

# 2 READ ZONE CHARACTERISTICS

The Mini-Guardrail antenna's short-range (0-7.5 centimeters) read zone makes it the ideal choice for a wide variety of item-level applications.

**Figure 2: Mini-Guardrail Antenna Read Zone Diagram**



## 3 SPECIFICATIONS

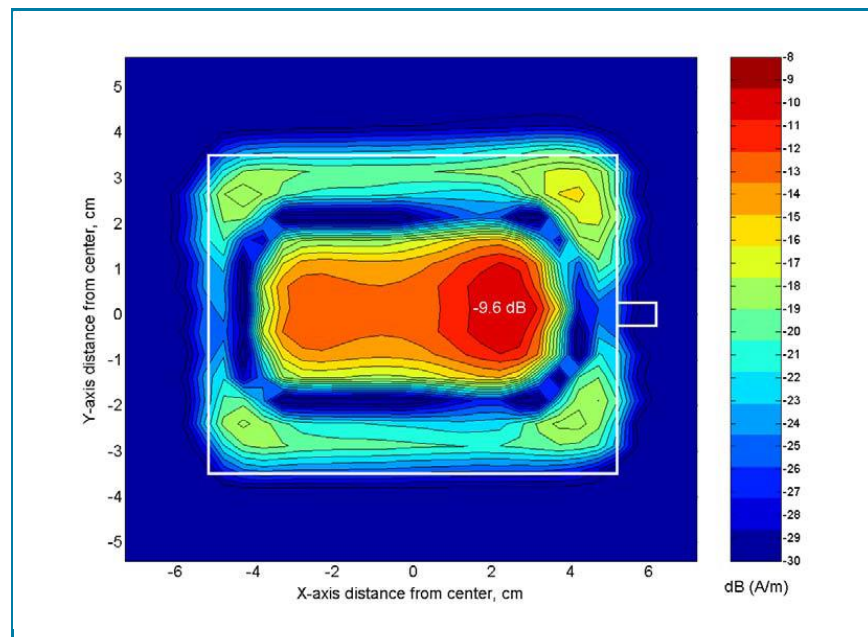
### 3.1 Electrical Specifications

**Table 1: Electrical Specifications**

| PARAMETER                   | VALUE  |
|-----------------------------|--|
| Frequency Range             | 860 to 960 MHz; Broadband for use in all regions |
| Polarization                | Linear (Parallel to Short Axis)                  |
| Input Power                 | 30 dBm (33 dBm absolute maximum)                 |
| Near-Field Intensity        | -13 dBA/m  |
| Far-Field Gain              | -20 dBi  |
| VSWR Across Frequency Range | 1.25:1   |
| Nominal Impedance           | 50 $\Omega$                                      |
| Electrostatic Discharge     | 2 kV (Human Body Model)                          |

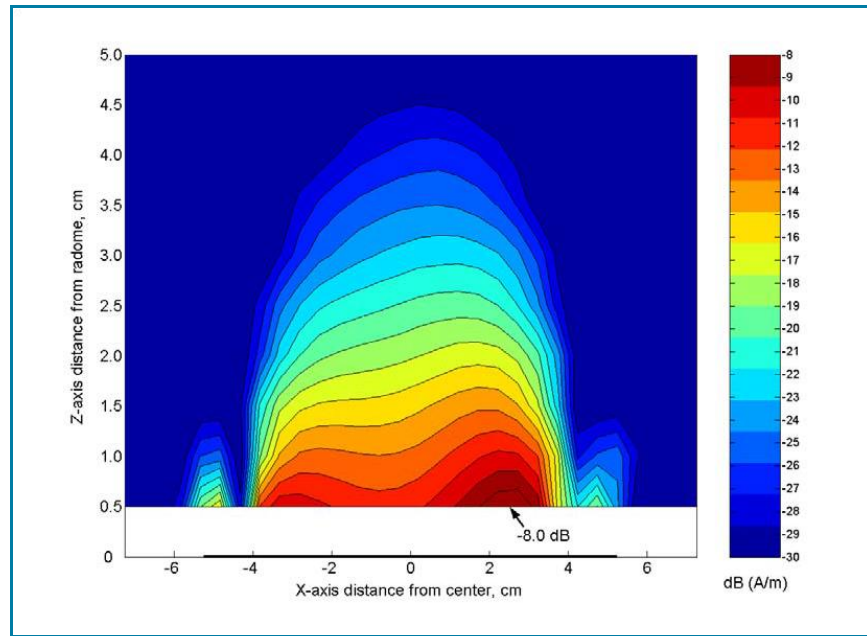
#### 3.1.1 Gain Plots

**Figure 3: Mini-Guardrail Magnetic Field Intensity Plot, X-Y Plane**

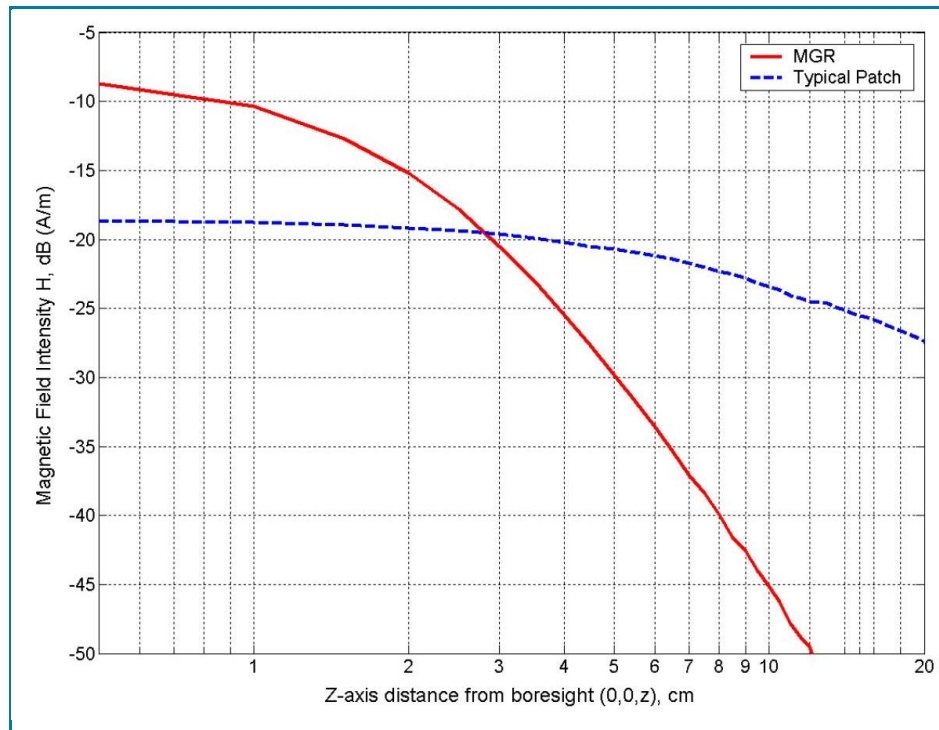


dB (Amperes/meter) with +30 dBm input power at  $z = 1$  cm from radome

**Figure 4: Magnetic Field Intensity Plot, X-Z Plane**



**Figure 5: Mini-Guardrail Magnetic Field Intensity vs. Typical Patch Antenna**



## 3.2 Environmental Specifications

**Table 2: Environmental Specifications**

| PARAMETER                       | VALUE                                |
|---------------------------------|--------------------------------------|
| Environmental Rating            | IP41 (Indoor Use Only)               |
| Operating & Storage Temperature | 0 °C to 40 °C (32 °F to 104 °F)      |
| Humidity                        | 5% to 95% (Relative, Non-Condensing) |

## 3.3 Mechanical Specifications

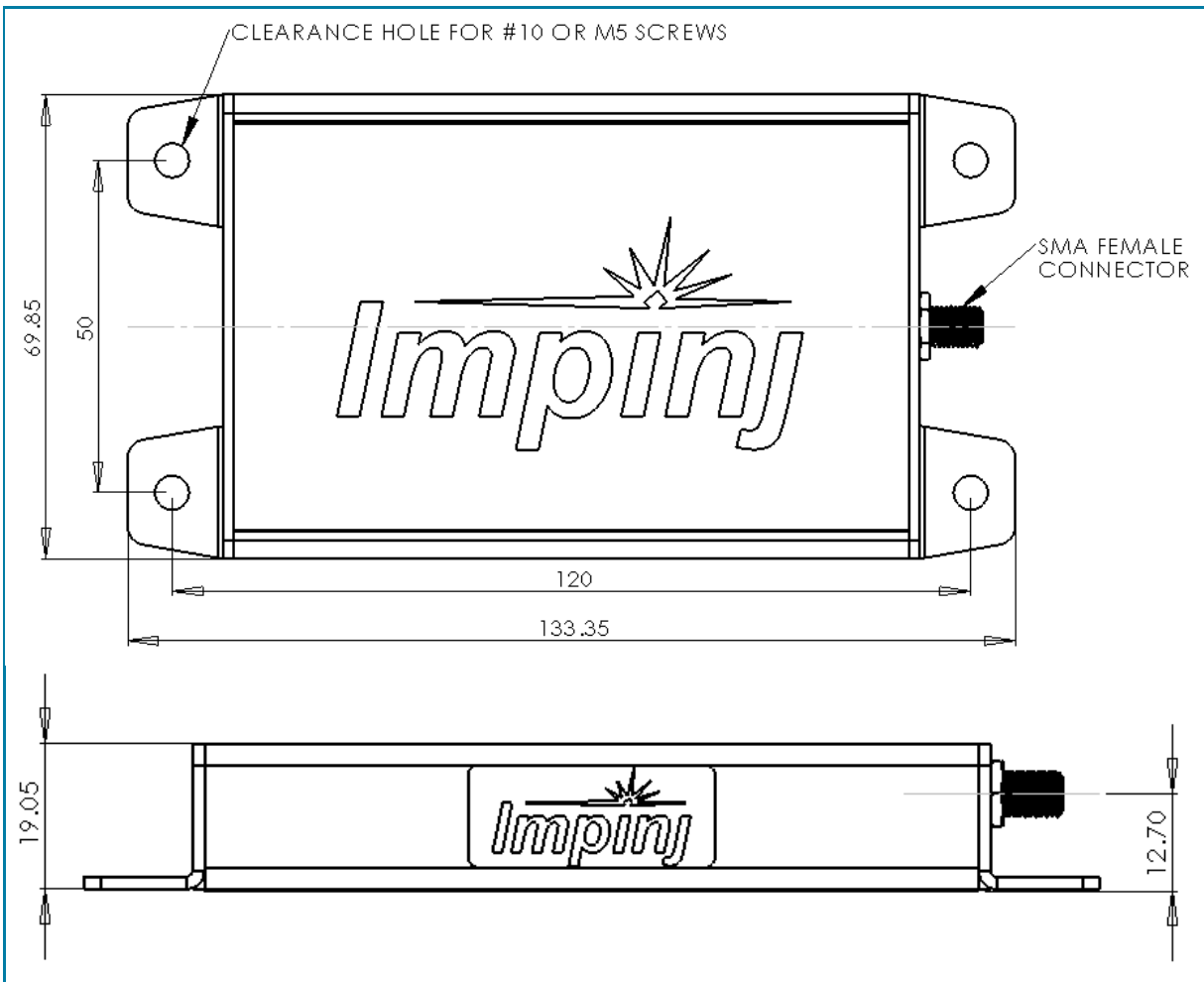
**Table 3: Mechanical Specifications**

| PARAMETER              | VALUE   |
|------------------------|---|
| Dimensions (L x W x D) | 5.2 x 2.75 x 0.75 in  |
|                        | 13.3 x 7 x 1.9 cm   |
| Weight                 | 0.114 kg (0.25 lbs)   |
| Mounting               | 4 holes for #10, or M5 screws spaced 120.0 mm length by 50.0 mm width |
| RoHS                   | RoHS Compliant  |
| Radome                 | Acrylic   |
| Enclosure              | Aluminum  |
| Mounting               | 4 holes for #10 or M5 screws spaced 12.0 cm length x 50.0 cm width    |
| Connector Type         | SMA female  |



### 3.3.1 Mechanical Drawings

**Figure 6: Mini-Guardrail Mechanical Enclosure Drawing**



Measurements in millimeters (mm).

## 4 ORDERING INFORMATION

**Table 4: Ordering Information**

| PART NUMBER   | DESCRIPTION            |
|---------------|------------------------|
| IPJ-A0303-000 | Mini-Guardrail Antenna |

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Datasheet

# **MATCHBOX ANTENNA**

## **READER ANTENNA DATASHEET**

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# 1 OVERVIEW

The Impinj Matchbox antenna is a very small RAIN RFID antenna suited for embedded applications needing strong performance in a tight read zone. The MatchBox reader antenna is the ideal antenna for item level applications that require reading tags at distances up to 5 cm. Typical applications include loss prevention, portable readers, RAIN RFID printers, access control, ticketing, document control, high-speed encoding stations, packaging lines, and any situation that requires high reliability in a constrained read zone.

The MatchBox antenna, with its optimized near-field performance, is virtually immune to the effects of liquids, powders, packaging, etc. The MatchBox antenna works for applications where standard antennas may fail, such as membership cards, blister packs, pill bottles, liquid-filled containers, and even tags floating in water.

**Figure 1: MatchBox Antenna Picture**



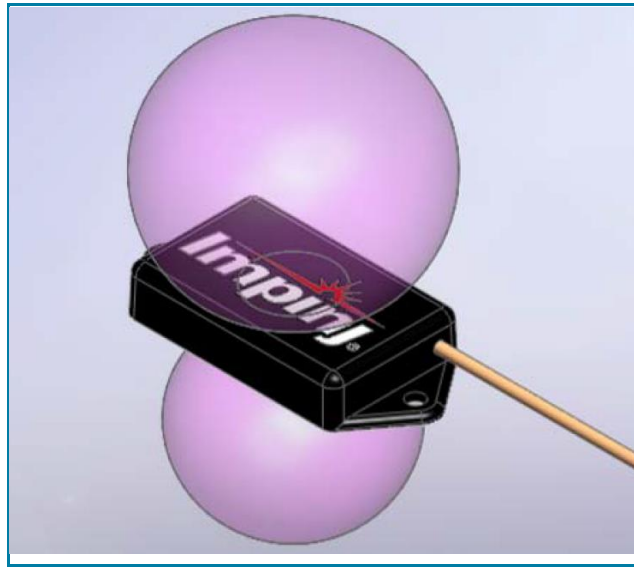
## 1.1 Features

- Adaptable to situations that require high reliability with a constrained read zone from 0-5
- Compact installation for space-constrained areas, mounts easily into confined spaces
- Performs over a wide range of frequencies that can be used in multiple regions
- Small size: 7.3 x 3.3 x 1.1 cm

# 2 READ ZONE CHARACTERISTICS

The MatchBox antenna emits RF energy from both the top and bottom surfaces. Tags are essentially unreadable beyond 5 cm from the antenna surface

**Figure 2: Read Zone Diagram**



## 3 SPECIFICATIONS

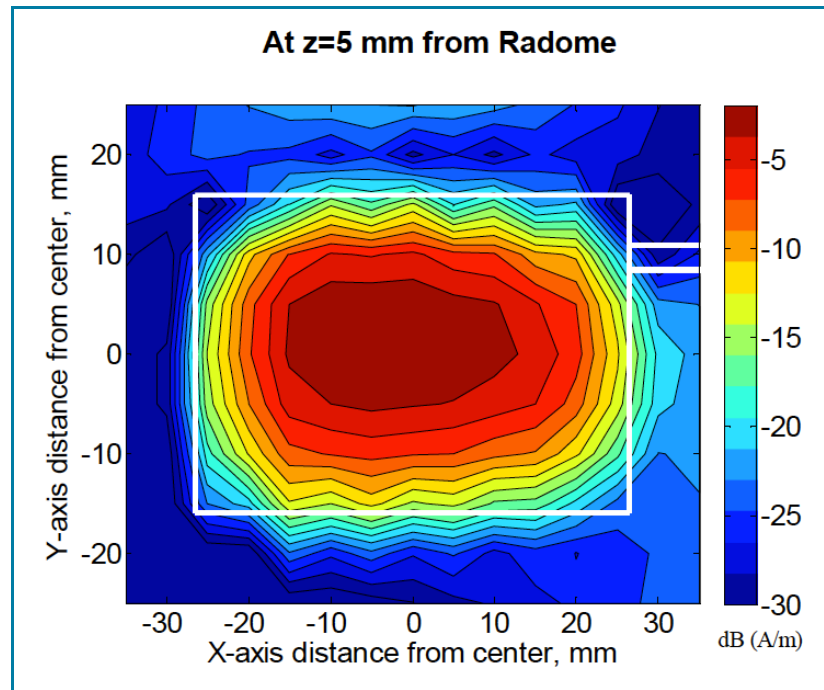
### 3.1 Electrical Specifications

**Table 1: Electrical Specifications**

| PARAMETER                   | VALUE  |
|-----------------------------|--|
| Frequency Range             | 865 to 956 MHz; broadband for use in all regions |
| Polarization                | Linear (Parallel to Short Axis)                  |
| Far-Field Gain              | -20 dBi  |
| Near-Field Intensity        | -4.2 dBA/m                                       |
| VSWR Across Frequency Range | 1.25:1 typical                                   |
| Nominal Impedance           | 50 $\Omega$                                      |
| Input Power                 | 30 dBm   |
| Electrostatic Discharge     | 2 KV (Human Body Model)                          |

### 3.1.1 Magnetic Field Intensity Plots

**Figure 3: Magnetic Field Intensity Plot, X-Y Plane**



**Figure 4: Magnetic Field Intensity Plot, X-Z Plane**

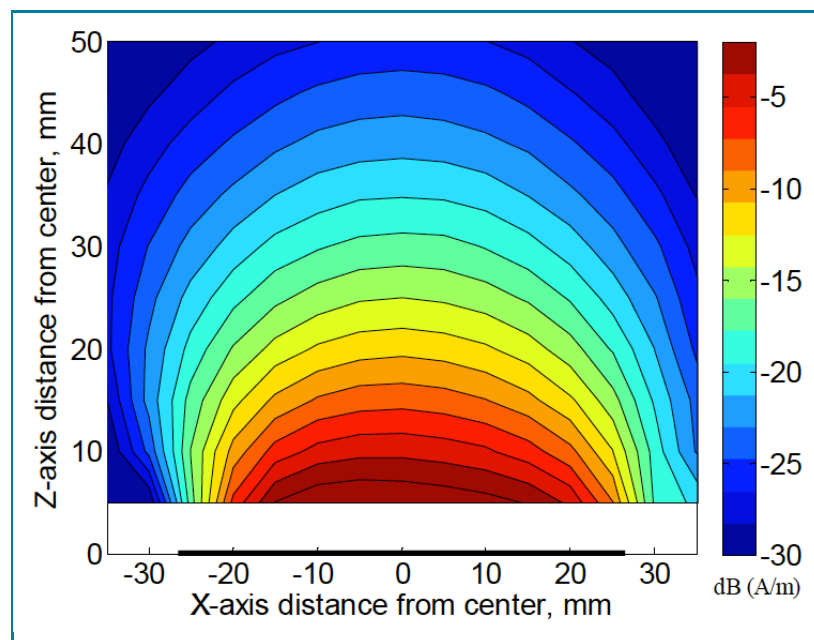
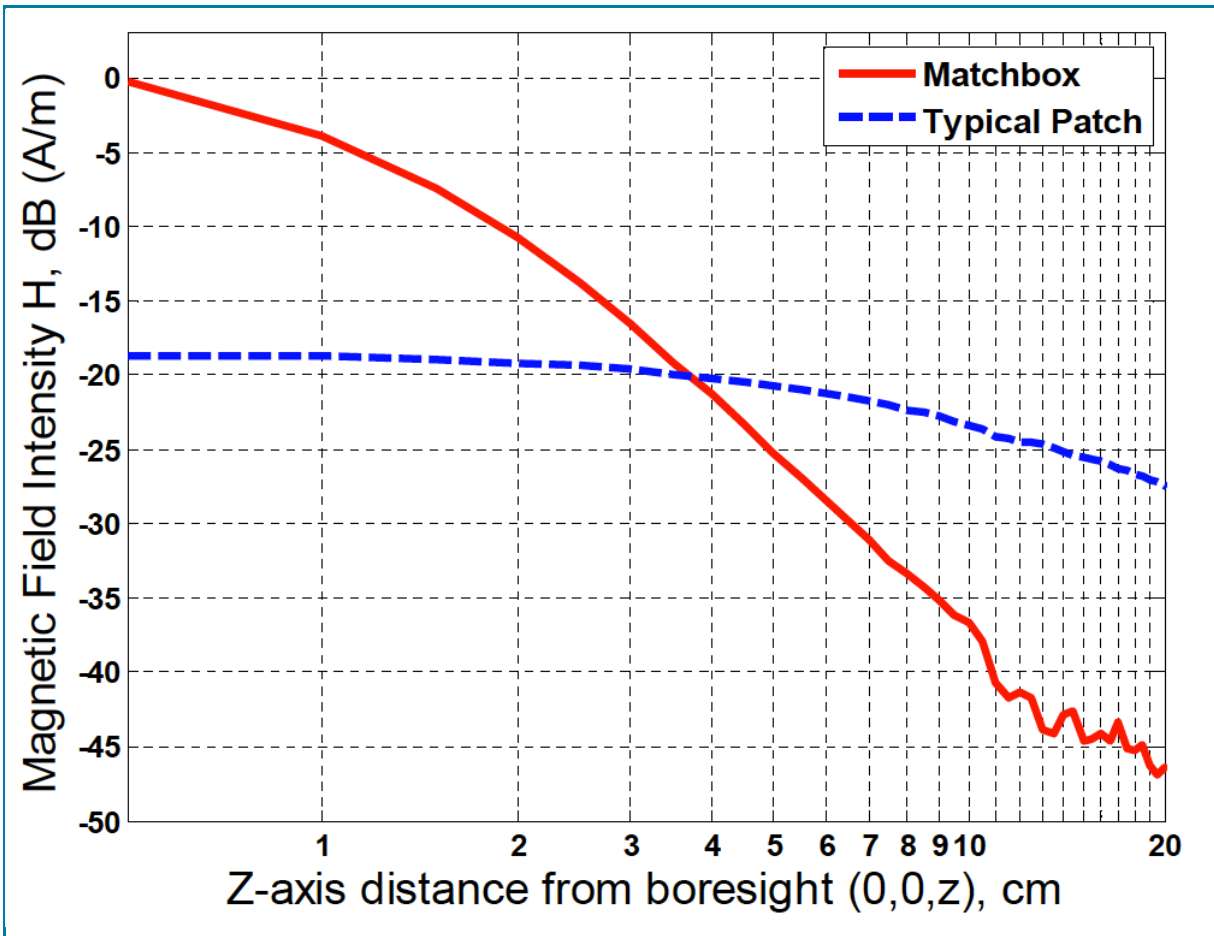




Figure 5: Magnetic Field Intensity vs. Typical Patch Antenna



Intensity measured in dB (Amperes/meter) with +30 dBm input power

## 3.2 Environmental Specifications

Table 2: Environmental Specifications

| PARAMETER                       | VALUE                             |
|---------------------------------|-----------------------------------|
| Environmental Rating            | IP54 (Indoor Use Only)            |
| Operating & Storage Temperature | 0 °C – 40 °C (32 °F – 104 °F)     |
| Humidity                        | 5%-95% (Relative, Non-Condensing) |

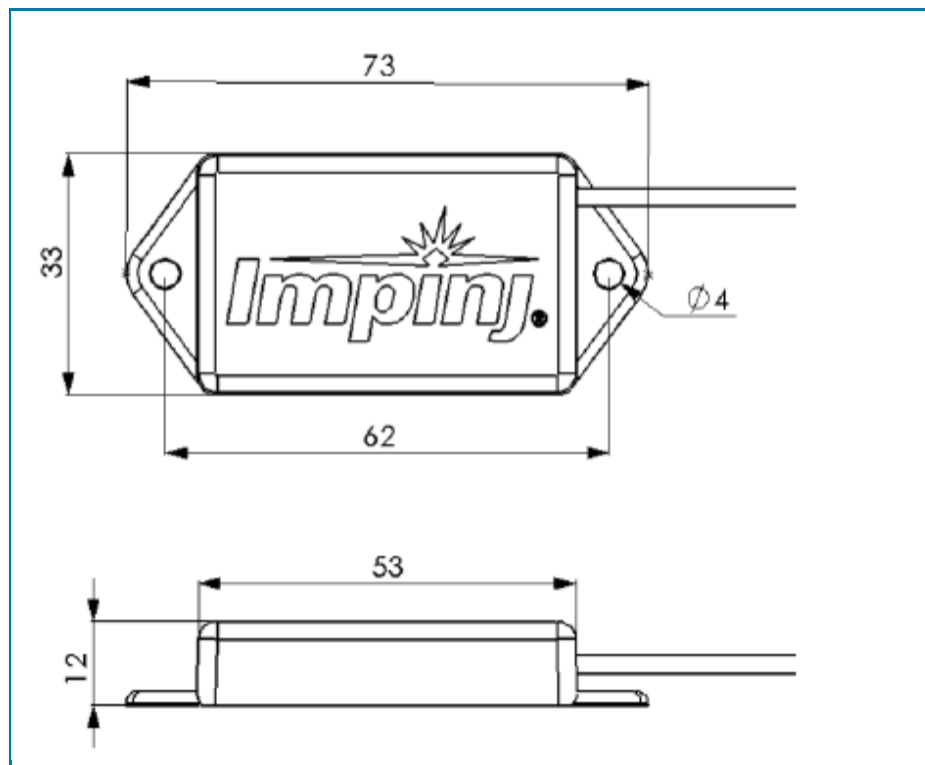
### 3.3 Mechanical Specifications

**Table 3: Mechanical Specifications**

| PARAMETER              | VALUE                                   |
|------------------------|---|
| Dimensions (L x W x D) | 2.9 x 1.3 x 0.47 in (with 8 in pigtail) |
|                        | 7.3 x 3.3 x 1.1 cm (with 20 cm pigtail) |
| Weight                 | .04 lbs/.02 kgs                         |
| Mounting               | 2 holes, 4mm diameter spaced 62mm       |
| RoHS                   | RoHS Compliant                          |
| Enclosure Material     | BlackABS                                |
| Cable Length           | 20 cm                                   |
| Connector Type         | SMA female                              |

#### 3.3.1 Mechanical Drawings

**Figure 6: MatchBox Antenna Enclosure**



## 4 ORDERING INFORMATION

**Table 4: Ordering Information**

| PART NUMBER   | DESCRIPTION             |
|---------------|-------------------------|
| IPJ-A0404-000 | Impinj MatchBox Antenna |

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# Circular Polarity RFID Panel Antenna

## S9028PCLJ S9028PCRJ (with 2 mounting studs)



### 902-928 MHz 9 dBiC CIRCULAR POLARITY PANEL

The RFMAX S9028 antenna is a circularly polarized panel that provides reception and transmission of signals in the 902-928 MHz frequency band. The antenna achieves maximum efficiency and performance across the entire frequency band.

Both VSWR and axial ratios are excellent and allow the user to achieve the maximum performance for an antenna of this type. The antenna is housed in a heavy duty radome enclosure that can be directly wall mounted, An optional articulating mount allows either wall or mast mounting.

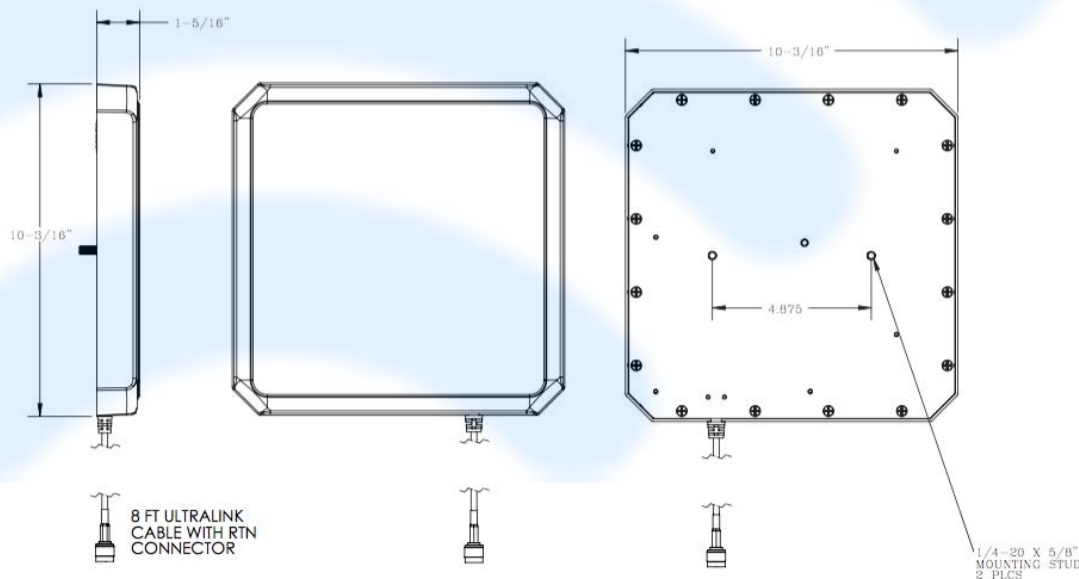
The antenna is offered with an integrated coax pigtail and a variety of connector types are available.

### FEATURES

- Low profile
- Extremely low VSWR and axial ratio
- Weather and UV resistant radome
- Wide range of connector and cable options
- Left hand and right hand CP versions
- Radome is UL 94-V2 rated for flammability
- White ABS plastic

### APPLICATIONS

- Warehouse
- Distribution center
- Airports and hospitals
- Transit terminals
- Conveyor belt



**RFMAX**  
[www.rfmax.us](http://www.rfmax.us)

Distributed internationally by:  
**Arcadian, Inc.**  
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Little Falls, New Jersey, 07424 USA

888.925.5967 toll-free  
973.890.2324 international  
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| Part #         | Polarity | Cable Length       | Connector Style |
|----------------|----------|--------------------|-----------------|
| S9028PCLJ96RTN | LHCP     | 96 inches / 8 Feet | RPTNC-Male      |
| S9028PCRJ96RTN | RHCP     | 96 inches / 8 Feet | RPTNC-Male      |



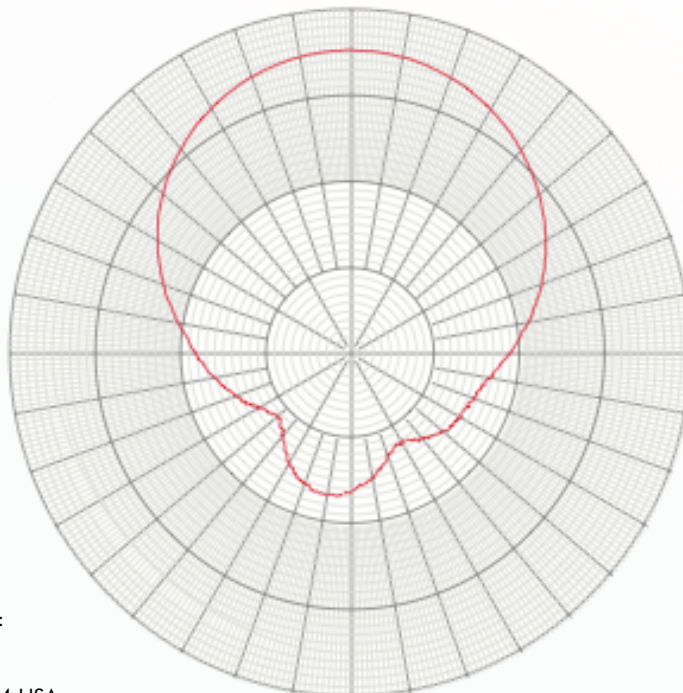


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## S9028PCLJ S9028PCRJ (with 2 mounting studs)

### SPECIFICATIONS

|                          |                                |
|--------------------------|--------------------------------|
| Antenna Part Number      | S9028PCL / S9028PCR            |
| Frequency Range          | 902 - 928 MHz                  |
| Gain                     | 8.5 dBic                       |
| Maxium VSWR              | 1.3:1                          |
| 3 dB Beamwidth - Azimuth | 70°                            |
| Front to Back Ratio      | 20 dB                          |
| Polarization             | Circular Right or Left         |
| Maxium Input Power       | 10 Watts                       |
| Input Impedence          | 50 Ohms                        |
| Axial Ratio              | 1dB Typical                    |
| Weight (Kg)              | 2.3 lbs (1.04)                 |
| Mechanical Size          | 10.2" x 10.2" x 1.32"          |
| Antenna Connection       | 96" Coax Pigtail, Rev TNC Male |
| Radome                   | High Strength PC               |
| Mount Style              | Threaded Stud                  |
| Temperature Operational  | -25°C to +70°C                 |
| Lightning Protection     | DC Grounded                    |
| Environmental Rating     | IP 54<br>UL94V                 |



915 MHz

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