



# ARMORED 400c



## 1 PRODUCT DESCRIPTION

The patented (US Patent # 7,928,922) **TROI Armored 400c**, provides identification and tracking capabilities never-before available in rugged or hazardous use-areas.

Not only can the tag be mounted to any metallic surface by either welding or bolting the tag, but it can withstand unprecedented temperature (consistent temperatures of 400 degrees Centigrade), pressure and environmental conditions.

### 1.1 SPECIFICATIONS

<b>Device type</b>	Class 1 Generation 2 passive UHF RFID transponder
<b>Air interface protocol</b>	EPCGlobal Class1Gen2; ISO 18000-63
<b>Operational frequency</b>	860 MHz – 960 MHz
<b>IC</b>	Impinj Monza X-8K Dura; Quanray available
<b>EPC memory</b>	128 bits
<b>User Memory</b>	Monza X-8K Dura; 8K byte
<b>TID</b>	96 bits
<b>Read range</b>	Real-world: 1 – 2 meters, depending on attachment Lab environment: 6 meters +
<b>Applicable surfaces</b>	Any material. Metal surfaces; ferrous and non-ferrous.
<b>Material</b>	Shell: Steel shell with high-temperature ceramic filler Spacer material: High temperature fiberglass
<b>Weight</b>	Steel shell RFID tag; 1 oz. Steel shell RFID tag with mounting tab; 2 oz.
<b>Standards compliancy</b>	ISO 17665 – Sterilization of Health Care Products – Moist Steam ISO 11135 - Sterilization of Health Care Products – Ethylene Oxide ATEX-compliant
<b>Product RoHS compliant?</b>	Yes

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## 1.2 DIMENSIONS

**Length:** 61 mm

**Width:** 54 mm

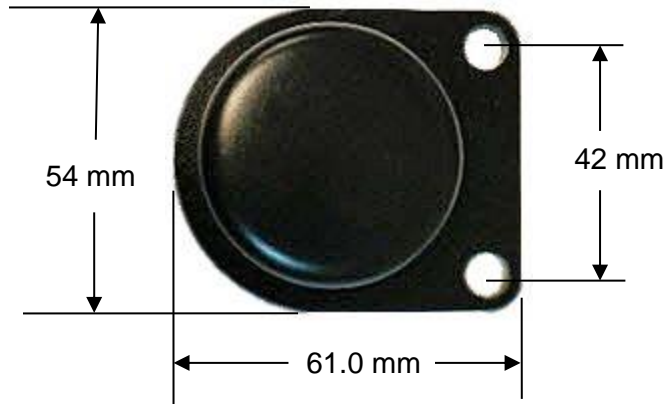
**Height:** Overall; 17 mm. Flange; 8 mm (Spacer; 2 mm).

**Hole spacing:** 42 mm.

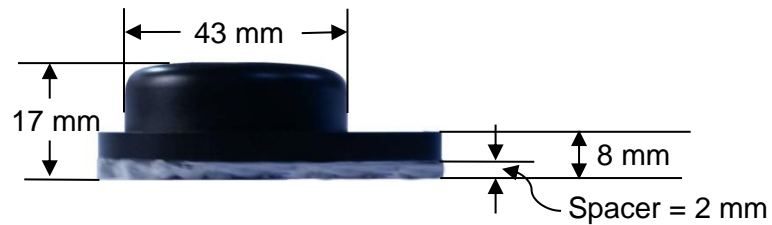
**Hole diameter:** 8 mm

NOTE: Pictures are not to size.

### PLAN VIEW



### PROFILE VIEW





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## 1.3 READ RANGE

	<b>Max read range on metal with 4W EIRP</b>
<b>Armored 400c</b> (915 MHz FCC or 868MHz ETSI )	660.4 cm / 260 inches (6.63 m / 21.75 feet)

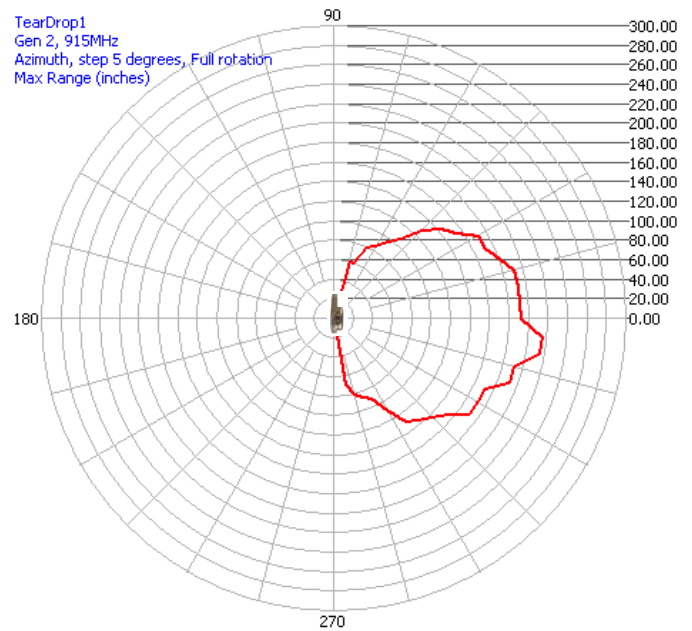
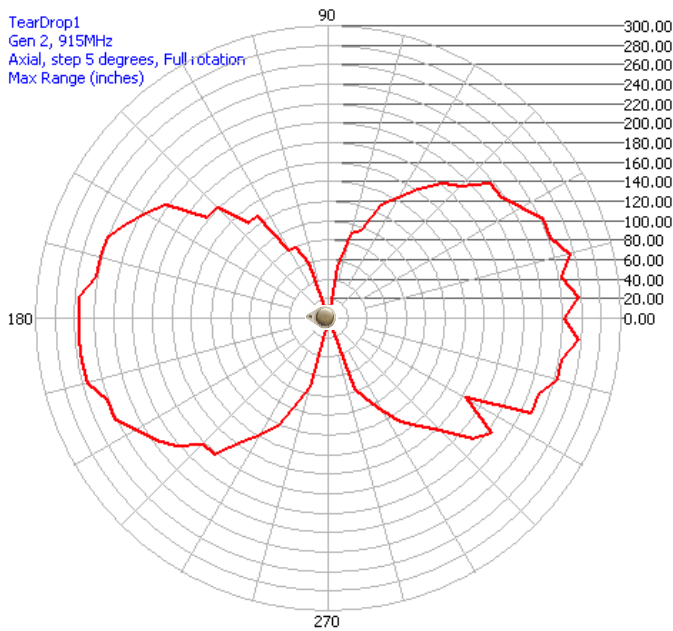
The read range listed above was obtained from a lab test environment. Actual test results may be different. Testing in actual use environments is strongly recommended.

## 1.4 RADIATION PATTERN

Axial radiation pattern; obtained in anechoic test laboratory.

Actual in-use radiation pattern may vary.

Testing in actual use environments is strongly recommended.





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## 1.5 ENVIRONMENTAL SPECIFICATIONS

Operating temperature	-50°C to +400°C / -50°F to +752 °F*
Peak temperature	+400°C / +752°F @ 1 hour duration
Temperature Cycling Test	One Hour at 400 deg C; slight cool-down; 30-day test cycle.
IP classification	IP68: <ul style="list-style-type: none"> <li>- Complete protection against dust</li> <li>- Protection against continuous immersion in water (Tested for 5 hours in 1 m [3.3 ft] depth)</li> </ul>
Weather ability	Excellent, including UV-resistance and sea water immersion
Pressure resistance	Embedded RFID tag tested to 30,000psi for 30 days
Chemical resistance	No physical or performance changes in: <ul style="list-style-type: none"> <li>- Salt water</li> <li>- NaOH)</li> <li>- Sulfuric acid</li> <li>- Motor oil (tested in 168 hour exposure)</li> </ul> Generally good against: <ul style="list-style-type: none"> <li>- Most solvents</li> <li>- Most acids and bases</li> </ul>

**\* NOTE:**

The RFID tag will not be functional if it is left at the maximum indicated temperatures such that the internal soak temperature exceeds +80 deg C. The RFID tag itself will function between -50 deg C and +80 deg C.

The Armored 400c casing reflects the heat and **WILL** protect the RFID tag at the elevated temperatures (until the RFID tags' internal temperature exceeds +80 deg C; see NOTE, above).

The Armored 400c tags cool-down time is *significantly* accelerated (to and below 80 deg C).

End result - the Armored 400c tag will **FUNCTION** at extreme temperatures.

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## 1.6 SUPPORTED SERVICES

Several options are available:

- Tag pre-encoding
- Laser engraving

For further details, please contact TROI LLC.

## 1.7 POSSIBLE APPLICATIONS

Metal surfaces	Metal returnable containers, metal canisters, metal pallets, high value metal items, aerospace applications, military applications, etc.
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## 1.8 TESTING AT ELEVATED TEMPERATURE

The following pictures show the Armored 400c undergoing temperature testing at 750 degrees F.



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## 2 INSTALLATION INSTRUCTIONS

### 2.1 TAG PLACEMENT

The Armored 400c tag must be mounted to the metal surface with the metal “cup” pointed up and with no metal covering the tag.

When selecting the mounting location, ensure the following:

- Select an even metal surface so that the entire flat plate (spacer material) of the Armored 400c is in contact with the mounting surface.
- Place the tag in the middle of the largest metal mounting surface available.
- Before welding or bolting the tag, it is recommended that the tag be taped to the metal surface to check orientation and performance.

The Armored 400c’s performance depends on the shape of the metal object and the tags placement on that surface. The above recommendations are valid for flat surfaces. Testing is recommended to verify performance in each use-case, especially when mounting to curved surfaces.

### 2.2 TAG ATTACHING METHODS

The tag can be either bolted or welded to the metal surface.

#### 2.2.1 Bolting the tag to the metal surface

Bolting achieves effective mounting and retention in various use conditions.

The Armored 400c can be mechanically attached using;

- Screws (size M4)
- Pop rivets (size 4 mm)

##### 2.2.1.1 Critical Bolting Information

The spacer permanently mounted under the Armored 400c provides the needed functional air-gap between the tag and the mounting surface. The tag must be flush with the metal surface and not “bowed”. **DO NOT REMOVE THE SPACER MATERIAL from the bottom of the tag.** Removing the spacer material will keep the tag from operating.

#### 2.2.2 Welding the tag to the metal surface

Welding achieves the most effective mounting and retention method. However, the tag must be welded according to the following guidelines, or the RFID tag may not function correctly (or at all).

##### 2.2.2.1 Procedure

The tag should be welded in two “spots” or across the entire end of the tab. See the pictures below.





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The tag must NOT be welded all the way around the tag, or in any other area besides the end of the tab - as shown in the pictures below.

Correctly welded "spot" welds



Correctly welded across the end of the tab



## 2.2.2.2 Critical Welding Information

The spacer mounted under the Armored 400c provides the needed functional air-gap between the tag and the mounting surface. The tag must be flush with the metal surface and not "bowed" in any manner. **DO NOT REMOVE THE SPACER MATERIAL from the bottom of the tag.** Removing the spacer material will keep the tag from operating.

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## 3 CONTACTING TROI LLC

For additional information and technical support contact:

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