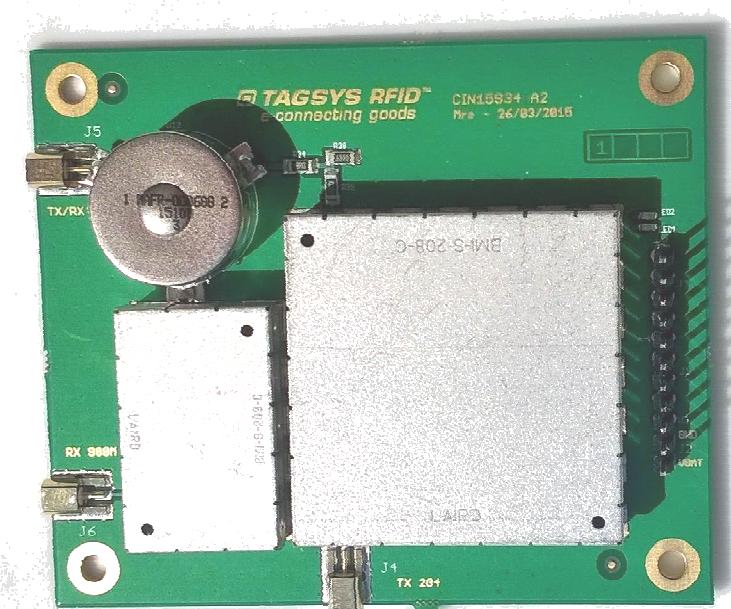


# Hot Spot Radio Module

## User's Guide

Revision 1.1



July 2015

# Publishing Information

## Disclaimer and Limitation of Liability

All information herein is either public information or is the property of and owned solely by TAGSYS who shall have and keep the sole right to file patent applications or any other kind of intellectual property protection in connection with such information.

Nothing herein shall be construed as implying or granting to you any rights, by license, grant or otherwise, under any intellectual and/or industrial property rights of or concerning any of TAGSYS' information.

This document can be used for informational, non-commercial, internal and personal use only provided that:

- The copyright notice below, the confidentiality and proprietary legend and this full warning notice appear in all copies.
- This document shall not be posted on any network computer or broadcast in any media and no modification of any part of this document shall be made.

Use for any other purpose is expressly prohibited and may result in severe civil and criminal liabilities.

The information contained in this document is provided "AS IS" without any warranty of any kind. Unless otherwise expressly agreed in writing, TAGSYS makes no warranty as to the value or accuracy of information contained herein. The document could include technical inaccuracies or typographical errors. Changes are periodically added to the information herein. Furthermore, TAGSYS reserves the right to make any change or improvement in the specifications data, information, and the like described herein, at any time.

Therefore TAGSYS assumes no liability and is not responsible for customer applications or product or software which includes TAGSYS products.

**TAGSYS HEREBY DISCLAIMS ALL WARRANTIES AND CONDITIONS WITH REGARD TO THE INFORMATION CONTAINED HEREIN, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE AND NON-INFRINGEMENT. IN NO EVENT SHALL TAGSYS BE LIABLE, WHETHER IN CONTRACT, TORT OR OTHERWISE, FOR ANY INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER INCLUDING BUT NOT LIMITED TO DAMAGES RESULTING FROM LOSS OF USE, DATA, PROFITS, REVENUES, OR CUSTOMERS, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF INFORMATION CONTAINED IN THIS DOCUMENT.**

TAGSYS does not and shall not warrant that this product/system/equipment will be resistant to all possible attacks, and shall not incur, and disclaims, any liability in this respect. Even if each product is compliant with current security standards in force on the date of their design, security mechanisms' resistance necessarily evolves according to the state-of-the-art in security and notably under the emergence of new attacks. Under no circumstances shall TAGSYS be held liable for any third party actions, and in particular in case of any successful attack against systems or equipment incorporating TAGSYS products.

TAGSYS disclaims any liability with respect to security for direct, indirect, incidental or consequential damages that result from any use of its products. It is further stressed that independent testing and verification by the person using the product is particularly encouraged, especially in any application in which defective, incorrect, or insecure functioning could result in damage to persons or property, denial of service, or loss of privacy.

All TAGSYS products are subject to careful quality control throughout the manufacturing process and are warranted to be of merchantable quality and free from manufacturing defects. Published information concerning TAGSYS products are based upon research which the Company believes to be reliable but such information do not constitute a warranty. Because of the variety of possible uses for TAGSYS products and the continuing development of new uses, the purchaser should carefully consider the fitness and performance of the product for each intended use and the purchaser assumes all risks in connection with such use. Seller shall not be liable for damages in excess of the purchase price of the product or for incidental or consequential damages. All specifications are subject to change without prior notice.

© 2000-2013 TAGSYS SAS. All rights reserved.

All trademarks and registered trademarks are the property of their respective owners.

Printed in France.

TAGSYS – 785 Voie Antiope, Athélia III, 13600 LA CIOTAT, France.

Tel: +33 (0)4.42.18.89.00 / Fax: +33 (0)4.42.18.89.01

Document Reference: DOC16129A1

# Read This First

Welcome to the TAGSYS RFID System. This User's Guide is designed to help you get up and running quickly using this high-quality Radio Frequency Identification (RFID) system. It describes all you need to know about how to install and use the TAGSYS system and its associated applications.

This guide is designed for all CIT (Certified Integrators by TAGSYS) and for TAGSYS Expert Network customers implementing a low-cost and high-performance RFID solution.

This document does not assume any previous knowledge of Radio Frequency Identification (RFID) technology.

## Conventions

Symbol	Meaning
	<b>CAUTION:</b> A note that advises users that a specific action could result in the loss of data or damage the hardware. <b>WARNING:</b> A note that advises users that a specific action may result in physical harm.
	A note that provides additional information that helps the user performing a task or obtaining the best performance from the product.

## If you need assistance

Please contact your nearest TAGSYS Sales Representative or the TAGSYS Welcome Desk at:

Telephone: +33 (0)4 42 18 89 00  
Fax: +33 (0)4 42 18 89 01  
E-Mail: [info@tagsysrfid.com](mailto:info@tagsysrfid.com)  
Website: <http://www.tagsysrfid.com>

## Contact for Comments

We welcome your feedback to help us provide high quality documentation.

For technical comments, please contact our Welcome Desk:

Telephone: +33 (0)4 42 18 89 00  
Fax: +33 (0)4 42 18 89 01  
E-Mail: [info@tagsysrfid.com](mailto:info@tagsysrfid.com)

Please remember to quote the Document Reference Number **DOC16129A1**, your job title and your company.

## Quality Issues

TAGSYS implements stringent quality controls at all stages of its manufacturing process. However, should you find a defect with this product, please notify your TAGSYS Quality Service representative using the dedicated Product Return Form.

Telephone: +33 (0)4 42 18 89 00

E-Mail: [rma@tagsysrfid.com](mailto:rma@tagsysrfid.com)

## Table of Contents

<b>PUBLISHING INFORMATION</b>	<b>2</b>
<b>DISCLAIMER AND LIMITATION OF LIABILITY</b>	<b>2</b>
<b>READ THIS FIRST</b>	<b>3</b>
<b>CONVENTIONS</b>	<b>3</b>
<b>IF YOU NEED ASSISTANCE</b>	<b>3</b>
<b>CONTACT FOR COMMENTS</b>	<b>3</b>
<b>QUALITY ISSUES</b>	<b>4</b>
<b>1 FOR YOUR SAFETY</b>	<b>6</b>
1.1 GENERAL USE	6
1.2 CARE AND MAINTENANCE	6
1.3 IMPORTANT SAFETY INFORMATION	7
1.3.1 OPERATING ENVIRONMENT	7
<b>2 CERTIFICATION</b>	<b>8</b>
2.1 REGULATORY NOTICES	8
2.2 RoHS (RESTRICTION OF THE USES OF CERTAIN HAZARDOUS SUBSTANCES)	9
2.3 WEEE (WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT)	9
<b>3 HOT SPOT RADIO DESCRIPTION</b>	<b>10</b>
<b>4 HOT SPOT RADIO INTERFACE</b>	<b>11</b>
<b>5 WARRANTY CONDITIONS</b>	<b>14</b>
5.1 WARRANTY	14
5.2 WARRANTY EXCLUSIONS	14
5.2.1 GENERAL PROVISIONS	15
5.2.2 HOW TO RETURN DEFECTIVE PRODUCTS	15

# 1 For Your Safety

---

## 1.1 General Use

The HOT SPOT RADIO MODULE is designed to be reliable and to provide years of trouble-free service. Please observe the following general tips:

- Take care not to scratch the device. Keep the device clean. When working with the device, use only TAGSYS-approved accessories.
- This device is not waterproof and should not be exposed to rain or moisture. Under extreme conditions, water may enter the circuitry.
- Protect the device from extreme temperatures. For example, do not place the device in a windowed area where the sun may cause extreme temperatures, and keep it away from heaters and other heat sources.
- Do not store or use the device in any location that is extremely dusty, damp, or wet.
- Use a soft, damp cloth to clean the device. If the surface of the device becomes soiled, clean it with a soft cloth moistened with a diluted window-cleaning solution.

## 1.2 Care and Maintenance

This device is a product of superior design and should be handled with care. The suggestions below will further increase the lifetime of this device.

- Keep the device and all parts and accessories out of the reach of small children.
- Keep the device dry. Precipitation, humidity and liquids contain minerals that will corrode electronic circuits.
- Do not use or store the device in dusty, dirty areas. Its moving parts can be damaged.
- Do not store in hot areas. High temperatures can shorten the life of electronic devices, damage batteries and warp or melt certain plastics.
- Do not store in cold areas. When the device warms up (to its normal temperature), moisture can form inside the device, which may damage electronic circuit boards.
- Do not attempt to open the device. Non-professional handling of the device may damage it.
- Handle the device with care. Shocks may break internal circuit boards.
- Do not bend the antenna part or lean on it.
- Do not clean the device with harsh chemicals, cleaning solvents or strong detergents. Gently wipe the device with a soft cloth slightly dampened in a mild soap-and-water solution.
- Do not paint the device. Paint may clog the device's moving parts and prevent proper operation. Paint with metallic contents may limit device performances.
- If the device or any accessory are not working properly, take it to your nearest qualified TAGSYS representative.

## 1.3 Important Safety Information

### 1.3.1 Operating Environment

When connecting the device or any accessory to another device, read its user guide for detailed safety instructions. Do not connect incompatible products.

As with all RF equipment, users are advised that the equipment should only be used in its normal operating position.



When placing the antennas in features do make sure that:

- General public is at least 20cm away from any transmitting antenna
- Antennas are not located at less than 20cm from each other

# 2 Certification

## 2.1 Regulatory Notices



If the Hot spot radio module is further integrated in a different product, it is the responsibility of the manufacturer of this complementary product to obtain the required approvals for this product.

An RFID system typically composed of an RF emission device such as the HOT SPOT RADIO MODULE connected to an antenna is subject to national regulations that may differ by country.



Changes or modifications not expressly approved by TAGSYS could void the user's authority to operate the equipment.

The HOT SPOT RADIO MODULE has been designed to comply with Part 15 of the FCC Rules.

### HOT SPOT RADIO MODULE

#### *WARNING TO USERS IN THE UNITED STATES*

#### FEDERAL COMMUNICATIONS COMMISSION (FCC) RADIO

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference, will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different to that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## 2.2 RoHS (Restriction of the uses of certain Hazardous Substances)

TAGSYS certifies that this product is compliant with the European Directive 2002/95/EC for the restriction in Electric and Electronic Equipment (RoHS) of the use of the following hazardous substances:

- Lead
- Mercury
- Cadmium
- Hexavalent Chromium
- Polybrominated biphenyl flame retardants
- Polybrominated diphenyl ether flame retardants

This declaration is based on information provided by our suppliers and subcontractors.

## 2.3 WEEE (Waste Electrical and Electronic Equipment)



This product bears the selective sorting symbol for waste electrical and electronic equipment (WEEE). This means that this product must be handled pursuant to European Directive 2002/96/EC in order to be recycled or dismantled to minimize its impact on the environment. Do not dispose of your old product in your general household waste bin. For further information, please contact your local or regional authorities.

## 3 Hot Spot radio description

---

The Hot Spot radio module is intended to be included in a Hot Spot equipment, which is part of a "Hot Spot Power Node" system.

The "Hot Spot Power Node" system is designed to emphasize the range of an RFID reader addressing passive tags. The system uses UHF frequency band, following the FCC 15.247 standard (including frequency hopping feature), and ISO 18000-6c protocol.

In this system, the Hot Spot, that includes a RFID reader, pilots many Power Nodes through remote links. The Power Nodes are put close to tags areas, in order to energize efficiently the tags. The Power node repeats and amplifies the RFID interrogation signal. The Hot Spot transmits the RFID interrogation and receives the backscattered signal from the passive tags.

The remote link to the Power Nodes and the interrogation signals are not transmitted in the same time intervals.

The Hot Spot radio separates Transmit and Receive signals of the RFID reader and connects the two signals on two different antennas, a Receive antenna and a Transmit antenna.

# 4 Hot Spot Radio Interface

## 4.1 Overview of the Radio module

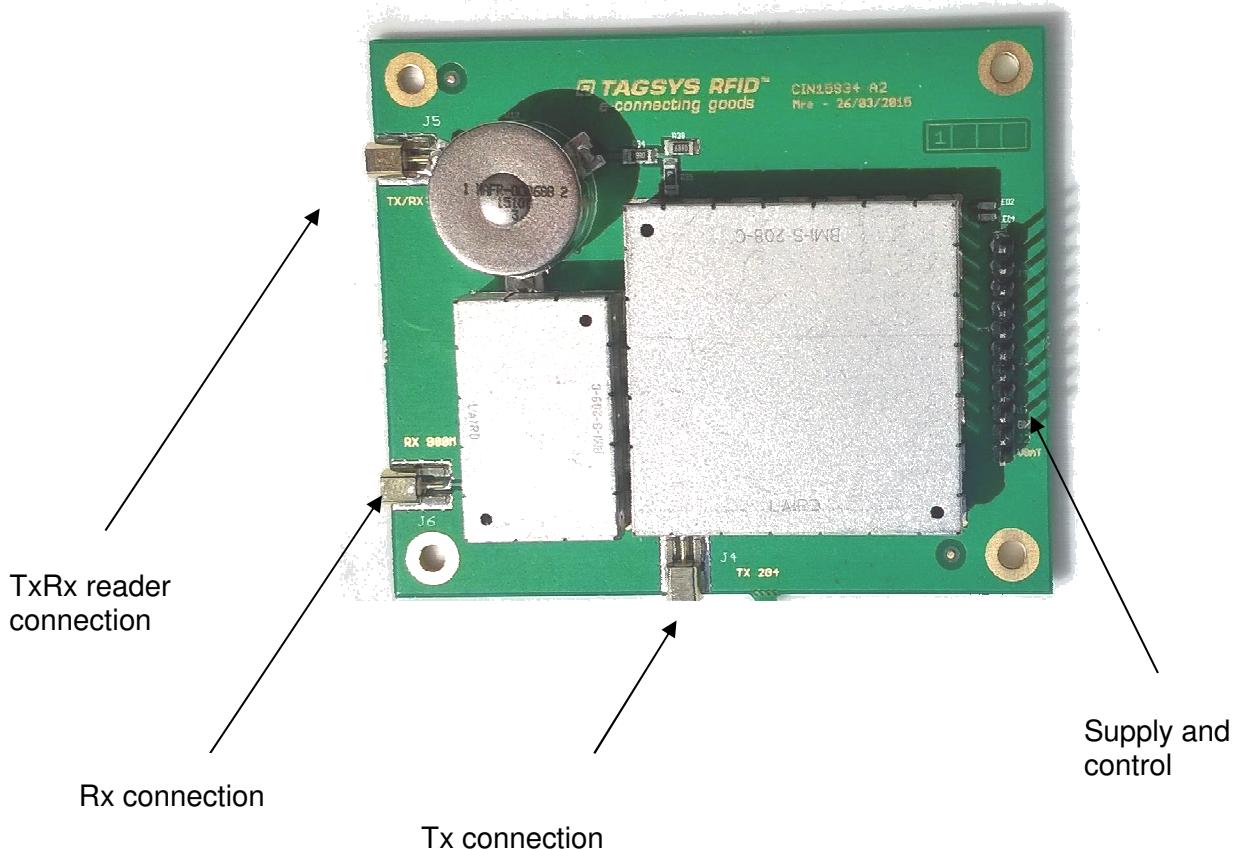
The Hot Spot radio modules has three coaxial connections, one for the RFID transmit signal, one for the receive RFID signal, and one for the connection to the monostatic port of the RFID reader. The three connectors are MMCX type, female, edge board mounted.

The Hot Spot radio module is also connected to a Hot Spot mother-board that pilots it and provides the supply. The piloting is done through an asynchronous link (UART, RS232 like, 3V3) with a Tx and a Rx connections.

The supply voltage is 5V, the maximum current is 1.5 A. The maximum power consumption is 7.5 W.

A common connector, 11 male pins, 2.54 mm pitch, groups commands and supply signal.

Pin 1	5.0 V supply
Pin2	Supply ground
Pin 3	UART Rx
Pin 4	UART Tx
Pin 10	UART Ground



## 4.2 How to connect the Antennas

In order to comply with FCC regulations and insure optimum performance, the Power node radio module must be integrated using the following recommended antennas.

Furthermore a minimum distance of 20cm should be kept between antennas and between general public for human exposure limitation.

	When placing the antennas in features do make sure that: <ul style="list-style-type: none"> <li>- General public is at least 20cm away from any transmitting antenna</li> <li>- Antennas are not located at less than 20cm from each other</li> </ul>
---	--

### 4.2.1 Transmit (Tx) Antenna

Use a 2.45GHz dipole antenna with a maximum cable length of 12cm with a MMCX type connector at one end and a Reversed polarity Front panel SMA Plug Connector.

[Figure 1](#) thereafter shows such an antenna screwed onto the SMA plug.

The following number should be used.

ANTENNA USE	TAGSYS PN	REF	DESCRIPTION / TYPE
2.45GHz Receiver only	COMP16026A0	GC-W032-015	Antenna GIGA CONCEPT (Dipole) 2.2 dBi, 2400MHz, SMA-RP male



Figure 1: 2.45GHz Antenna

## 4.2.2 Receive Only (Rx) Integral Antenna

Use a 915MHz patch antenna with a maximum gain of 6dBi.

A circularly polarized patch antenna will allow to read all tags beneath the Hot Spot Reader whatever its positioning.

The antenna should be chosen with a wide aperture angle as near as possible to 90°.

Avoid higher gain antennas with narrower aperture of 70°.

## 4.3 Product Labelling

The final product should be labelled clearly mentioning that it includes an intentional radiator stating the Hot Spot Radio Module FCC ID.

Please refer to [Figure 2](#) in order to get an example of product labelling.



Figure 2: Example of a Hot Spot Label

# 5 Warranty Conditions

## 5.1 Warranty

TAGSYS warrants that this Product shall comply with the functional specifications set forth herein for a period of one year from the date of delivery to the Buyer.

TAGSYS warrants that HOT SPOT RADIO MODULE and accessories including the batteries ("Products") are free from defects in material and workmanship under normal use and service for the period commencing upon the date of purchase by the first consumer purchaser and continuing for one (1) year.

This warranty is valid for the original Buyer of the Product and is not assignable or transferable to any other party.

TAGSYS cannot be responsible in any way for, and disclaims any liability in connection with the operation or performance of:

- any product in which the Product is incorporated;
- any equipment not supplied by TAGSYS which is attached to or used in connection with the Product; or
- the Product with any equipment

This warranty does only cover the Product to the exclusion of any such other equipment.

Optimal operation and performance of the Product are obtained by using TAGSYS' readers, by applying TAGSYS installation guidelines and by having your installation reviewed by a TAGSYS' technical consultant.

TAGSYS warranty does not cover the installation, maintenance or service of the Product and is strictly limited to the replacement of Products considered as defective by TAGSYS and returned according to the return procedure defined below; in such case, TAGSYS will, at TAGSYS' option, either replace or repair every defective Product or refund the purchase price paid by Buyer to TAGSYS for the defective Product.

## 5.2 Warranty Exclusions

- Engineering samples and early access products
- Defects or damages resulting from storage of the Product under conditions which do not comply with TAGSYS specifications or normal usage
- Defects or damages resulting from use of the Product in abnormal conditions (abnormal conditions being defined as any conditions exceeding the ones stated in the product specifications).
- Defects or damages from misuse, accident or neglect.
- Defects from improper testing, operation, maintenance or installation.
- Defects from alteration, modification except modifications or adjustments specifically described in this Product reference guide, adjustment or repair, or any attempt to do any of the foregoing, by anyone other than TAGSYS.
- Any action on Product that prevents TAGSYS from performing an inspection and test of the Product in case of a warranty claim.
- Tampering with or abuse of the Product.

- Any use or incorporation by the Buyer or a third party of TAGSYS' Product into lifesaving or life support devices or systems, or any related products; TAGSYS expressly excludes any liability for such use.

### 5.2.1 General Provisions

This warranty sets forth the full extent of TAGSYS responsibility regarding the Product.

In any event, TAGSYS warranty is strictly limited to (at TAGSYS' sole option) the replacement or repair or refund of the Products purchase price to TAGSYS, of Products considered as defective by TAGSYS.

The remedy provided above is in lieu and to the exclusion of all other remedies, obligations or liabilities on the part of TAGSYS for damages, whether in contract, tort or otherwise, and including but not limited to, damages for any defects in the Products or for any injury, damage, or loss resulting from such defects or from any work done in connection therewith or for consequential loss, whether based upon lost goodwill, lost resale profits, impairment of other goods or arising from claims by third parties or otherwise.

TAGSYS disclaims any explicit warranty not provided herein and any implied warranty, guaranty or representation as to performance, quality and absence of hidden defects, and any remedy for breach of contract, which but for this provision, might arise by implication, operation of law, custom of trade or course of dealing, including implied warranties of merchantability and fitness for a particular purpose.

### 5.2.2 How to Return Defective Products

The Buyer shall notify TAGSYS of the defects within 15 working days after the defects are discovered.

Defective Products must be returned to TAGSYS in their complete original packaging, provided such original packaging is available, after assignment by a TAGSYS Quality Department representative of an RMA (Return Material Authorization) number. If the original packaging is not available, the Buyer shall ensure that the products are returned to TAGSYS in a packaging that adequately protects said Products. No Products shall be returned without their proof of purchase and without the acceptance number relating to the return procedure.

All Products shall be returned, at Buyer's expense, with a report from the Buyer stating the complete details of the alleged defect.

Call +33 4 42 18 89 00 for return authorization and shipping address.

If returned Products prove to be non-defective, a charge will be applied to cover TAGSYS' analysis cost and shipping costs.

If the warranty does not apply for returned Products (due to age, or application of a warranty exclusion clause), a quote for replacement will be issued, and no replacement will be granted until a valid purchase order is received. If no purchase order is received within 30 days after the date of TAGSYS quote, TAGSYS will return the products and charge the analysis cost and shipping costs.

All replaced Products shall become the property of TAGSYS.

The Product Return Form is included on the following page. This form should accompany any product you need to return to TAGSYS for analysis in the event of a problem.

# Product Return Form

**Customer Profile:**

Company: .....  
 Address: .....  
 City & State: .....  
 Zip Code: .....  
 Country: .....

**RMA Number :** .....

Date : .....  
 Contact Name: .....  
 Contact e-mail: .....  
 Contact Phone: .....  
 Contact Fax: .....

**Order identification:**

Product Name: .....

Serial or Batch nr : .....  
 Return Quantity: .....

**Reason for return:**

.....  
 .....  
 .....  
 .....  
 .....

**To inform TAGSYS of this return, please email it to**

[RMA@tagsysrfid.com](mailto:RMA@tagsysrfid.com)

**Address to ship the product with this document attached:**

TAGSYS - QUALITY DEPARTMENT - 785, Voie Antiope – Z.I. Athelia III - 13600 La Ciotat - France

To inform TAGSYS of this return, please also fax it to your Customer Service Representative : +33 442-188-901

**Return Procedure:**

In order to give you a RMA number, please fulfill this document and send it by return to the above email address or to your Customer Service Representative. Please write the RMA number on the outside of the box. The product returned will go through stringent quality controls. If the product is no longer under warranty, a final analysis report will be sent to you as soon as possible as well as a quotation for repair.

Please contact the Quality Representative for further details : +33 442-188-900

**Quotation :**

In case of no product repair coverage by TAGSYS or product out of warranty period, any quotation will be charged to a fixed price of 100 € per product.

This amount will be deducted of the repair price in case of the quotation acceptance, or will be kept by TAGSYS in case of quote refusal or no answer within 2 weeks. If quote is accepted the product will be return on an Exworks basis.

After receiving quote, in case of no answer within 2 weeks, TAGSYS will be entitled to destroy the product.



This product bears the selective sorting symbol for waste electrical and electronic equipment (WEEE).

This means that this product must be handled pursuant to European Directive 2002/96/EC in order to be recycled or dismantled to minimize its impact on the environment.

For further information, please contact your local or regional authorities.