

**ALIEN TECHNOLOGY®**

**ALR-9900**

**HARDWARE**

**SETUP GUIDE**

**September 2008**



**ALIEN®**

**ALR-9900**

## Legal Notices

Copyright ©2008 Alien Technology Corporation. All rights reserved.

Alien Technology Corporation has intellectual property rights relating to technology embodied in the products described in this document, including without limitation certain patents or patent pending applications in the U.S. or other countries.

This document and the products to which it pertains are distributed under licenses restricting their use, copying, distribution and decompilation. No part of this product documentation may be reproduced in any form or by any means without the prior written consent of Alien Technology Corporation and its licensors, if any. Third party software is copyrighted and licensed from Licensors. Alien, Alien Technology, the Alien logo, Nanoblock, FSA, Gen2Ready, Squiggle, the Squiggle logo, Nanoscanner and other graphics, logos, and service names used in this document are trademarks of Alien Technology Corporation in the U.S. and other countries. All other trademarks are the property of their respective owners. U.S. Government approval required when exporting the product described in this documentation.

Federal Acquisitions: Commercial Software -- Government Users Subject to Standard License Terms and Conditions. U.S. Government: If this Software is being acquired by or on behalf of the U.S. Government or by a U.S. Government prime contractor or subcontractor (at any tier), then the Government's rights in the Software and accompanying documentation shall be only as set forth in this license; this is in accordance with 48 C.F.R. 227.7201 through 227.7202-4 (for Department of Defense (DoD) acquisitions) and with 48 C.F.R. 2.101 and 12.212 (for non-DoD acquisitions).

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT ARE HEREBY DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

### FCC Compliance

This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any change or modification to this product voids the user's authority to operate per FCC Part 15 Subpart A. Section 15.21 regulations.

### Industry Canada Compliance

Operation is subject to the following two conditions: (1) this device may not cause interference and (2) this device must accept any interference, including interference that may cause undesired operation of the device. This device has been designed to operate with an antenna having a maximum gain of 6dBi. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

### Caution

Reader antennas should be positioned so that personnel in the area for prolonged periods may safely remain at least 23 cm (9 in) in an uncontrolled environment from the antenna's surface. See FCC OET Bulletin 56 "Hazards of radio frequency and electromagnetic fields" and Bulletin 65 "Human exposure to radio frequency electromagnetic fields."

Alien Technology®

# Hardware Setup Guide

**ALR-9900****September 2008**

## Table of Contents

<b>CHAPTER 1 INTRODUCTION .....</b>	<b>1</b>
Audience .....	1
RFID Reader Overview .....	2
EPC Class 1 UHF RFID Tags .....	2
Requirements .....	2
Specifications .....	3
RFID Reader .....	3
RFID Reader External Circular Polarized Antenna .....	4
RFID Reader High Performance Antenna .....	4
Mechanical: Reader Physical Size .....	5
I/O Port Terminal Interface .....	5
I/O Port Screw Terminal (Female) – Looking at Reader .....	6
RS-232 Port Pinouts .....	7
RS-232 Connector (Female) – Looking at Reader .....	7
System Architecture .....	7
<b>CHAPTER 2 READER HARDWARE INSTALLATION AND OPERATION .....</b>	<b>8</b>
Receiving the RFID Reader .....	8
Reader I/O Panel .....	9
Antenna Panel .....	10
System Assembly and Bench Test .....	11
Bench Test Configuration .....	11
Bench Test Procedure .....	13
Installation .....	14
Requirements .....	14
Hardware Installation Procedure .....	15
System Operation: Software Control .....	17
Reader Interface Guide .....	17
Demonstration Software Guide .....	17
Alien RFID Academy .....	17
<b>APPENDIX A CLAUSE 6.2 OF SJT/11364.....</b>	<b>19</b>

(This page intentionally left blank)

# CHAPTER 1

## Introduction

This *Hardware Setup Guide* provides instructions for installing and operating the ALR-9900 RFID Readers.

This document is designed for use by RFID system integrators and software developers - those who wish to develop software products and extended systems that take full advantage of the RFID Reader's capabilities.

Included with each reader or developer kit is the *Alien RFID Fixed Reader Software Developer's Kit and User Documentation* CD-ROM. This CD contains additional information about RFID and the ALR-9900 including the following:

- *RFID Primer (PN 8101014-000)* – an overview of RFID technology and a glossary of terms.
- *Reader Interface Guide (PN 8101938-000)* – an overview of the communication interfaces for the ALR-9900.
- *Quick Installation Guide (PN 8102003-000)* – a quick start guide for installing and running the ALR-9900 reader.
- *Quick Reference (PN 8102074-000)* – a quick reference guide summarizing the Alien Reader Protocol command set.
- *Demo Software Guide (PN 8101023-000)* – details installing and operating the Alien RFID Gateway demonstration software.
- *Quick Upgrade Guide (PN 8101051-000)* – briefly explains how to use the demonstration software to upgrade the ALR-9900.

To access these guides, please insert the CD that came with your reader and follow the on-screen prompts.

## Audience

For the purposes of this document, we assume the readers of the *Hardware Setup Guide*:

- Are competent PC users
- Have minimal previous knowledge of Radio-Frequency Identification (RFID) technology
- Are experienced in software development and/or hardware systems integration

## RFID Reader Overview

The Alien ALR-9900 RFID reader is designed to read and program any EPC Class 1 Generation 2 tag and issue event reports to a host computer system. The host computer can be locally connected to the reader via RS-232, or at a remote network location.

The RFID Reader is delivered with the following components and accessories:

- One (1) RFID Reader
- One (1) RS-232 serial cable (to connect to host computer)
- One (1) Network cross-over cable (to connect directly to host computer)
- One (1) power supply and cord
- *Alien RFID Fixed Reader Software Developer's Kit and User Documentation* CD-ROM
- *Alien RFID Gateway Application*

## EPC Class 1 UHF RFID Tags

The Alien ALR-9900 RFID reader is designed to read and program any EPC Class 1 Generation 2 tag and issue event reports to a host computer system.

Class 1 tags are “passive” devices meaning they do not have a battery or other onboard power source. They are powered solely by the RF energy transmitted by an RFID reader.

Tags communicate with the reader through backscatter modulation in which the tags do not transmit RF energy. Instead, they change their reflective characteristics in a controlled way and reflect RF energy back to the reader. An analogy to this is the way you can use a mirror to signal someone by reflecting light from the Sun.

Alien Technology manufactures user-programmable EPC Class 1 Generation 2 tags compliant with all key commercial and DoD mandates. Alien Technology offers a variety of designs capable of delivering optimal performance worldwide, including Europe and Asia.

For more information about RFID tags from Alien Technology, please visit our website at <http://www.alientechnology.com>.

## Requirements

To interface with the RFID Reader you will need the following:

- A PC running Windows 98 or higher, with CD-ROM drive, an available RS-232 serial port and/or Ethernet connectivity
- Standard 120/220 VAC 50/60 Hz
- Power supply and cord (included with reader)
- Host software (Alien Gateway demo software or your own custom software)

## Specifications

Specifications for key components of the RFID Reader system are provided in the tables below:

### RFID Reader

<b>Name</b>	Alien Multi-Port General Purpose RFID Reader
<b>Model Number</b>	ALR 9900
<b>Architecture</b>	Point-to-multipoint reader network, mono-static antenna
<b>Operating Frequency</b>	902.75 MHz – 927.25 MHz
<b>Hopping Channels</b>	50
<b>Channel Spacing</b>	500 KHz
<b>Channel Dwell Time</b>	< 0.4 seconds
<b>RF Transmitter</b>	< 30 dBm at the end of 6 m LMR-195 cable.
<b>Modulation Method</b>	Phase Reversal – Amplitude Shift Keying (PR-ASK)
<b>20 db Modulation Bandwidth</b>	< 100 KHz
<b>RF Receiver</b>	2 Channels
<b>Power Consumption</b>	30 Watts
<b>Communications Interface</b>	RS-232 (DB-9 F), TCPI/IP (RJ-45)
<b>Inputs/Outputs</b>	4 coax antenna, 4 inputs/8 outputs (optically isolated), RS-232 com port, LAN, power
<b>Dimensions</b>	8 " (20.3 cm) x 7 " (17.8 cm) x 1.6 " (4.1 cm)
<b>Weight</b>	Approximately 1 kg (2.2 lbs)
<b>Operating Temperature</b>	-20°C to +50°C (-4 °F to +122°F)
<b>LED Indicators</b>	Power, Link, Active, Ant0-3, CPU, Read, Sniff, Fault (red)
<b>Software Support</b>	APIs, sample code, executable demo app (Alien Gateway)
<b>Protocol Support</b>	Comply with EPC Class 1 Gen 2 and 18000 – 6C
<b>Compliance Certifications</b>	FCC Part 15; FCCID: P65ALR9900 IOC: 4370A-ALR9900
<b>Safety Certifications</b>	 cTUVus UL: 60950-1:2004 CAN/CSA: C22.2 No.60950-1-03

### RFID Reader External Circular Polarized Antenna

<b>Model</b>	ALR-9611-CR and ALR-9611-CL
<b>3 dB Beamwidth</b>	E-plane: 65 degrees • H-plane: 65 degrees
<b>Frequency</b>	902-928 MHz
<b>Gain (dBi)</b>	6.0 dBiL (maximum)
<b>Polarization</b>	Circular
<b>RF Connector</b>	6 m LMR-195 with Reverse-Polarity TNC
<b>VSWR</b>	1.5:1
<b>Dimensions</b>	(cm) 22 x 27 x 4 • (in) 8.5 x 10.5 x 1.65
<b>Weight</b>	.57 kg • 1.25 lb

### RFID Reader High Performance Antenna

<b>Model</b>	ALR-9614
<b>3 dB Beamwidth</b>	E-plane: 65 degrees; H-plane 65 degrees
<b>Gain</b>	6.0 dBiL (maximum)
<b>Polarization</b>	Circular
<b>RF Connector</b>	Reverse-Polarity TNC Jack
<b>VSWR</b>	1.25:1
<b>Dimensions</b>	11.1 " (28.2 cm) x 11.1 " (28.2 cm) x 1.68 " (4.3 cm)
<b>Weight</b>	1 Kg (2.2 lbs)
<b>Cable</b>	Must be used with Alien cable; Part Number 0800097-001

## Mechanical: Reader Physical Size

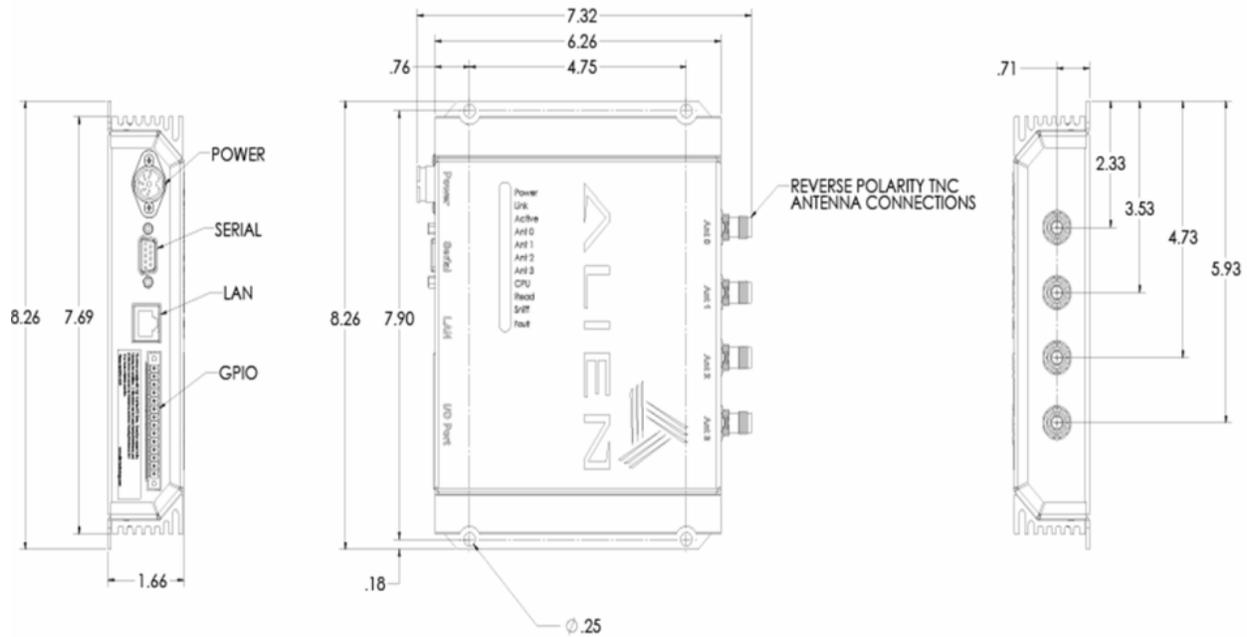


Figure 1 - Outline Drawing of the ALR-9900

## I/O Port Terminal Interface

The ALR-9900 I/O port provides four digital inputs and eight digital outputs, optically isolated from the reader circuitry. Opto-isolators have two basic elements: a light source (usually a light emitting diode) and a photo-sensitive detector. These two elements are positioned facing one another and inserted in an electrical circuit to form an opto-coupler. The key property of an opto-coupler is that there is an insulating gap between the light source and the detector. No current passes through this gap, only the desired light waves representing data. Thus the two sides of the circuit are electrically isolated from one another.

This protects the circuitry inside the reader from damaging ground loops (when the external device is at a different ground potential than the reader), and voltage spikes.

An external power supply is required for proper operation of inputs and outputs.

I/O Port Screw Terminal Connector (Phoenix 14-pin header)		
Pin 1	V+	(5-24 VDC)
Pin 2	Output 0	(1.5A max; 7.3A total)
Pin 3	Output 1	"
Pin 4	Output 2	"
Pin 5	Output 3	"
Pin 6	Output 4	"
Pin 7	Output 5	"
Pin 8	Output 6	"
Pin 9	Output 7	"
Pin 10	Input 0	(5-24 VDC)
Pin 11	Input 1	"
Pin 12	Input 2	"
Pin 13	Input 3	"
Pin 14	V-	

**I/O PORT SCREW TERMINAL (FEMALE) – LOOKING AT READER**

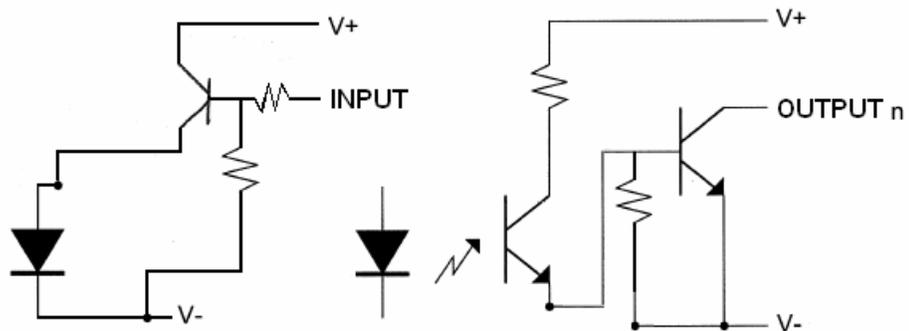
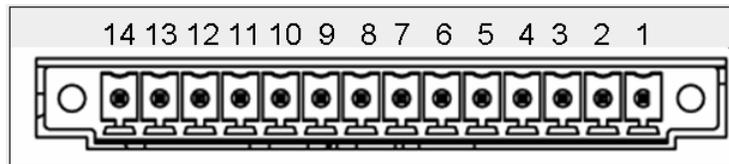
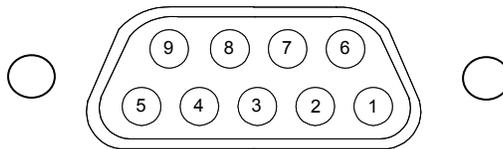


Figure 2 - Input and Output Circuits

### RS-232 Port Pinouts

RS-232 Connector (Female DB-9F)	
Pin 1	DCD Connected to Pin 6
Pin 2	TR1 Transmit Data (Output)
Pin 3	RC1 Receive Data (Input)
Pin 4	DTR Connected to Pin 6
Pin 5	Ground
Pin 6	DSR Connected to Pin 4
Pin 7	RTS Connected to Pin 8
Pin 8	CTS Connected to Pin 7
Pin 9	Not Connected

### RS-232 CONNECTOR (FEMALE) – LOOKING AT READER



### System Architecture

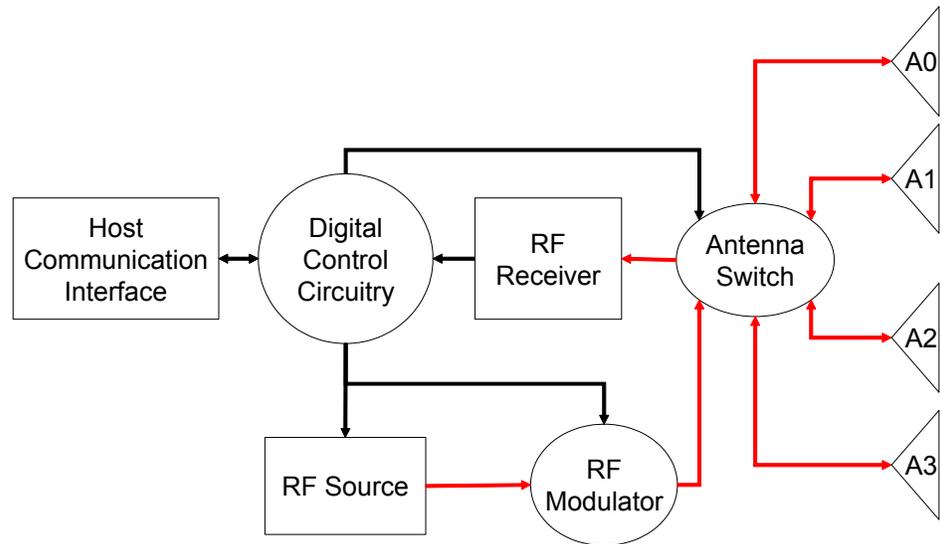


Figure 3 - System Architecture for the ALR-9900 Reader

# CHAPTER 2

## Reader Hardware Installation and Operation

This chapter describes the RFID Reader and provides installation and operation information.

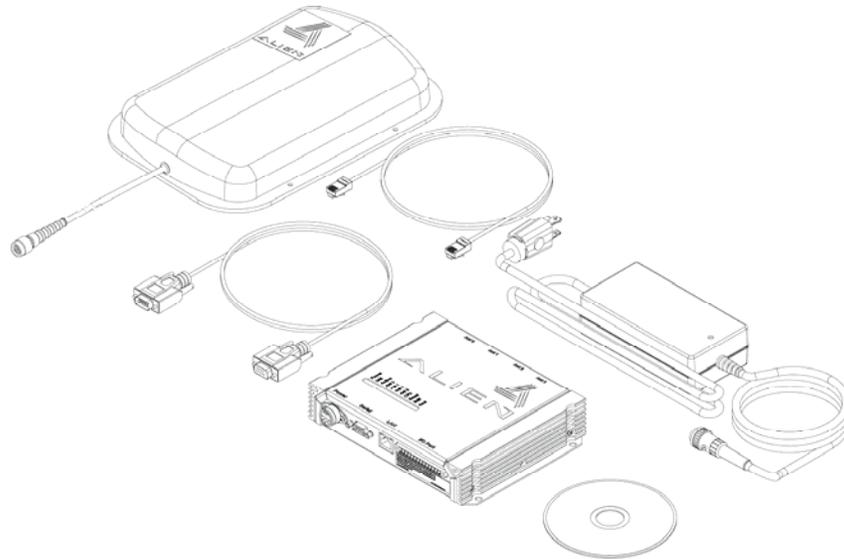
### Receiving the RFID Reader

Your RFID Reader Kit is shipped with the items listed below. Please verify the contents of your received shipment before assembling.

- RFID Reader
- Power supply and cables (two sections: one attached, one detached)
- RS-232 reader-to-PC cable
- Ethernet cross-over cable for direct connection
- CD-ROM containing demonstration software, user guides and documentation

The RFID Reader Developer's Kit includes the following additional items:

- A circular or linear antennas with 6 meter coaxial cable
- Software APIs and example code
- An assortment of Class 1 UHF tags



*Figure 4 - ALR-9900 Developer's Kit*

## Reader I/O Panel

The I/O panel (shown below) houses the following:

- 14-pin female I/O terminal block
- LAN TCP/IP port
- 9-pin D female RS-232 serial port
- Power connector

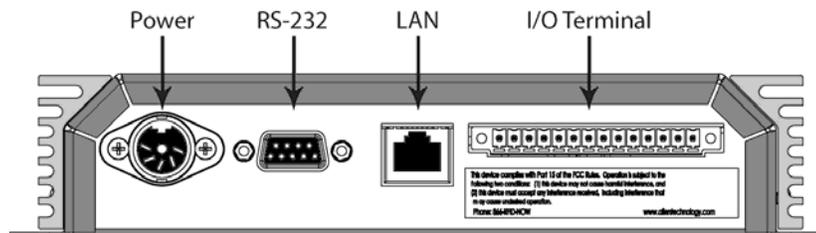


Figure 5 - ALR-9900 Reader Connections

## Diagnostic LEDs

The ALR-9900 includes diagnostic LEDs on the face of the reader to provide easy and convenient external indication for various operating conditions:

- **POWER (green)** - indicates power is applied to the reader
- **LINK (green)** – indicates that the reader is connected to the network
- **ACTIVE (green)** – indicates reader is transmitting on the network
- **ANT 0 – ANT 3 (green)** – indicates that the reader is transmitting power on the specified antenna port
- **CPU (green)** – indicates that the CPU has booted successfully and is running normally.
- **READ (green)** – indicates that the reader is receiving data from a tag
- **SNIFF (green)** – indicates a tag signal has been detected, though it may not be strong enough yet to complete a transaction.
- **FAULT (red)** – indicates a fault condition with the reader.

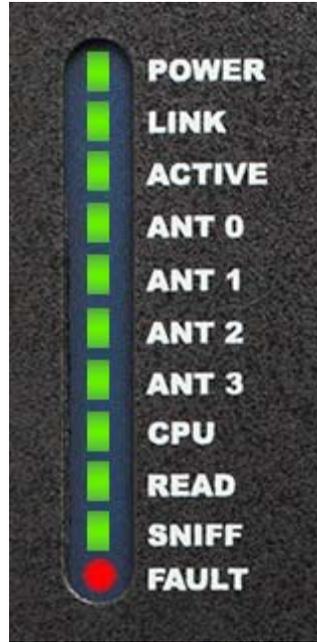


Figure 6 – ALR-9900 Reader Diagnostic LEDs

### Antenna Panel

The antenna panel (opposite the reader’s I/O panel) contains four coax antenna connector ports as shown below. These are reverse-polarity TNC connectors.

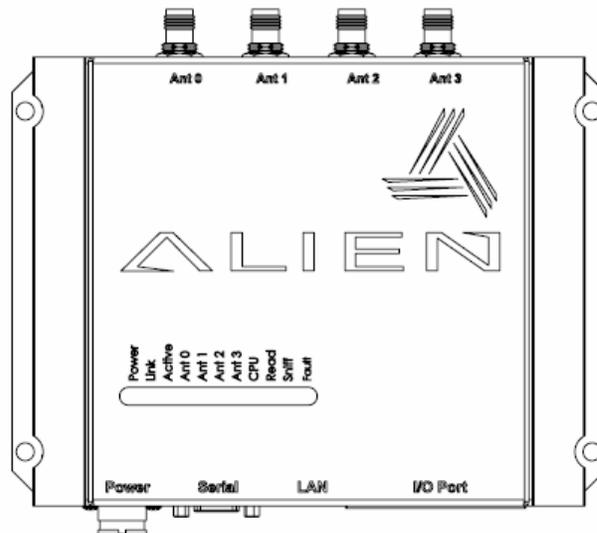


Figure 7 - Antenna Connections

## System Assembly and Bench Test

Assembling the RFID Reader system is easy. We recommend you set up the system and verify its operation in a bench test configuration before installing it in a production setting.

The ALR-9900 has been designed to provide reliable operation over its operating temperature range. This is enhanced by proper mounting of the reader during bench test and installation. When using the reader place it on a solid thermally conductive surface. Optimum thermal performance is achieved by mounting the unit to a metal mounting plate with direct contact between the reader base and the mounting plate. When mounting vertically the antenna connectors should be oriented at the top.

**CAUTION:** *This high performance RFID reader operates at full power allowed under FCC regulations. Because of its compact size the top surface will be warm to the touch. When operated continuously on a thermally non-conductive substrate the base plate can reach temperatures that are uncomfortable to the touch. Exercise appropriate caution when handling the unit. To reduce this effect, mount the reader on a hard, heat-conductive surface.*

### Bench Test Configuration

1. **Place the Reader on a tabletop.** Ensure the following conditions:
  - A standard 120 or 220 VAC outlet is nearby.

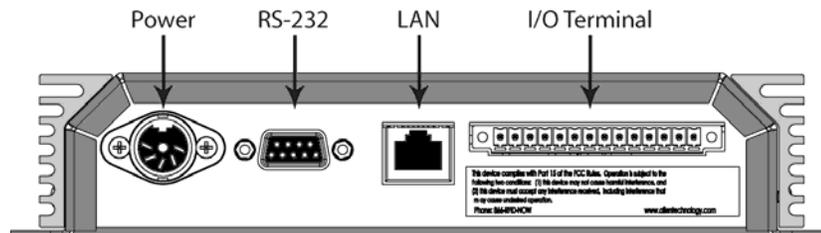


Figure 8 – Power, RS-232 and LAN Connections

- Sufficient space is available on the tabletop for the reader and antenna.
2. **Connect the RS-232 cable to the reader.**
    - Align the male cable connector so that its shape and pins match the shape and holes of the female DB-9 RS-232 port.

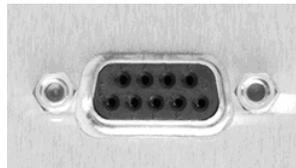


Figure 9 - RS-232 Connector

- Push the aligned connector into the port.
  - Finger-tighten the screws to secure the cable/connector to the reader.
- 3. Connect the RS-232 cable to the serial port on the PC.**
- Settings for RS-232 are 115200 Bits per second, 8 data bits, no parity, 1 stop bit, and no flow control.
  - Start up terminal software on the PC, such as HyperTerminal with these settings, and be prepared to observe the reader's messages as it boots up.
- 4. Connect the Ethernet cable to the reader and PC or LAN.**
- You must use TCP/IP to communicate with the reader, so connect a standard Ethernet cable from the reader to a nearby LAN drop or network switch.
  - You may alternatively use the cross-over Ethernet cable provided in the kit and connect the reader directly to the PC.
  - The reader comes preconfigured to look for a DHCP server to set its network parameters. In the absence of a DHCP server, the reader will use the following settings:
    - IP Address: 192.168.1.100
    - Subnet Mask: 255.255.255.0
    - Gateway: 192.168.1.1
- 5. Connect the coaxial cable(s) to antenna ports.**
- The ALR-9900 is a mono-static system. A single antenna acts as both transmit and receive. Connect all the antennas you intend to use before applying power to the reader. The unit may be operated with 1 to 4 antennas. Each antenna provides a single read point.
  - Antenna port 0 is on the top right-side, if viewing the reader from the front with the flange side down. The ALR-9900 has four (4) antenna ports. If using the Alien Gateway software, please note that ANT 0 is selected by default when first initialized.
  - At least one antenna must be connected. The ALR-9614 high performance antenna must be connected using the cable supplied by Alien Technology manufacturing.
  - Align the coax cable's center pin and push into the port
  - Screw the fitting from the cable end onto the reader connector *clockwise* until finger-tight to secure the cable to the reader.
  - Connect additional antennas to their respective ports and tighten fittings clockwise until finger-tight.
- 6. Connect the power supply to the reader.**
- Using the thin cable attached to power supply, push the connector into the port until it is securely seated. Do not plug the power supply into the wall outlet yet.

- Finger-tighten the securing ring onto the connector.
7. **Plug power cord into power supply.**
    - Use the female end of a standard 3-pronged power cord (a power cord is included with each reader kit)
  8. **Plug the power supply cable into the wall outlet and verify power.**
    - The green POWER LED will illuminate when power is on.
  9. **Observe the reader's bootup trace, and determine the network settings.**

The RS-232 port displays useful information while the reader boots, including network settings. Toward the end of the trace, the reader displays a block of text similar to the following:

```
-----  
Network Settings:  
MAC Address : 00:80:66:10:2D:12  
DHCP       : 1  
IP Address  : 10.9.8.10  
Netmask    : 255.255.255.0  
Gateway    : 10.9.8.2  
DNS        : 10.9.8.1  
TimeServer : time-a.timefreq.bldrdoc.gov  
TimeZone   : -7  
-----
```

Once the reader boots and you see the "Boot>Ready!" prompt, pressing return will bring up the "Alien>" prompt.

10. **Ensure the PC has compatible network settings.**
  - In order for you to be able to connect to the reader over TCP/IP, the host PC must be on the same subnet as the reader. If you are unfamiliar with how to do this, consult your local IT service for assistance.
  - Once the initial connection is made, you may configure your reader's network settings as you choose. Refer to the *Reader Interface Guide* for instructions on how to do this.

***You are now ready to bench test or demonstrate the RFID Reader system.***

## **Bench Test Procedure**

1. **Access an operational mode suitable for bench testing.**
  - Select Inventory mode on Gateway.
  - Refer to the applicable software application user guide for specific instructions.
2. **Position the reader so you can see the diagnostic LEDs.**
  - You may also want to position the PC so you can view the monitor simultaneously for later tests.

3. **Move a tag slowly away from the antenna's range.**
  - Begin with the tag well inside the expected read range (~2m or 6 ft) and move it toward the antenna while observing the LEDs.
4. **Verify the SNIFF LED illuminates when the tag approaches the read window.**
  - SNIFF should be illuminated green.
5. **Verify the READ LED illuminates when the tag is inside the read window.**
  - READ should be illuminated green.
6. **Verify the host receives the tag data.**
  - Refer to indications specified in applicable user guide to verify the tag was read successfully.
7. **If bench test conditions are verified, proceed to installation.**

*NOTE: To perform a hard reboot of the system, simply cycle power on the reader.*

## Installation

This section provides guidance for configuring components in your RFID system. You should consider the overall design of your specific system before permanently mounting the equipment.

Installation involves all the same connection steps required for bench test. However, instead of placing equipment on a tabletop, the reader, antenna, and their accessories are mounted in your application environment.

## Requirements

Before installing your RFID Reader system, you will need the following:

- A PC running Windows 98 or higher, with Ethernet connectivity and, optionally, one available RS-232 serial port.
- Standard 120 or 220 VAC power for the reader
- Host software (Gateway, for example)
- (Optional) extra antennas (if desired for additional coverage or configurations)
- Additional RS-232 cables or antenna coax cables needed to accommodate routing requirements
- Standard grounded, three-pronged power cord of desired length
- Mounting hardware suitable for the surface to which equipment is to be attached (e.g., wood screws, moly-bolts, brackets, etc.)

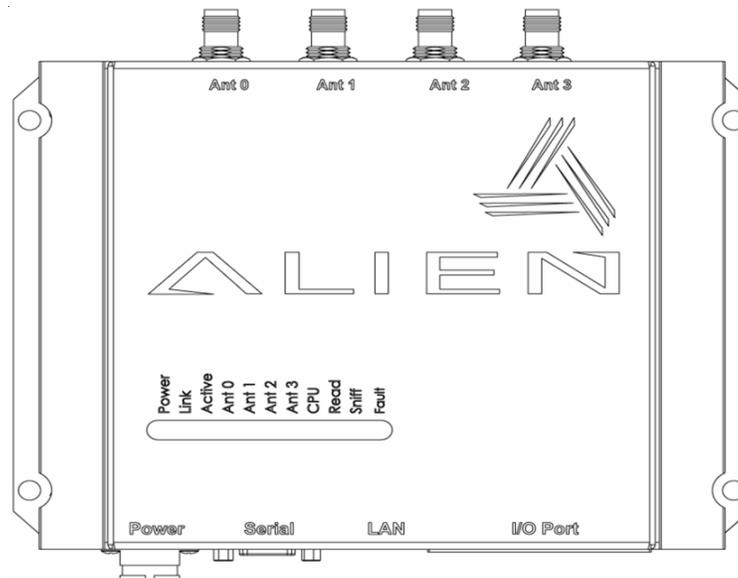


Figure 10 - View of the Reader showing mounting holes

## Hardware Installation Procedure

### 1. Select mounting position for antenna(s).

**CAUTION:** Reader antenna should be positioned so that personnel in the area for prolonged periods may safely remain at least 23 cm (9 in) in an uncontrolled environment from the antenna's surface. See FCC OET Bulletin 56 "Hazards of radio frequency and electromagnetic fields" and Bulletin 65 "Human exposure to radio frequency electromagnetic fields."

- Mount the antenna at the periphery of the desired read window (either overhead or at the side), so that the position of the most distant tag passing through the window is no farther from the antenna than the maximum range specified for your system design.
- Position the antenna at a height approximately midway between the highest and lowest expected tag position. (For example, a pallet tag may be the lowest tag position to be read, while the top-most case on a fully stacked pallet may represent your highest tag position.)
- **NOTE:** To maintain compliance with FCC regulations, use only antenna and cable supplied with the unit or approved by Alien Technology for use with the ALR-9900.

### 2. Select mounting position for reader.

The ALR-9900 has been designed to provide reliable operation over its operating temperature range. This is enhanced by proper mounting of the reader during bench test and installation. When using the reader place it on a solid thermally conductive surface. Optimum thermal performance is achieved by mounting the unit to a metal mounting plate with direct contact between the reader base and the mounting plate. When mounting vertically the antenna connectors should be oriented at the top.

**CAUTION:** *This high performance RFID reader operates at full power allowed under FCC regulations. Because of its compact size the top surface will be warm to the touch. When operated continuously on a thermally non-conductive substrate the base plate can reach temperatures that are uncomfortable to the touch. Exercise appropriate caution when handling the unit. To reduce this effect, mount the reader on a hard, heat-conductive surface.*

- Reader should be positioned close enough to the antenna to accommodate the cable length without putting strain on the connectors.
- Be sure power is available at the selected reader location.
- Mount units individually. Do not stack them.

### 3. Install reader.

- Secure the reader through the two mounting holes on either flange to its mounting location (wall, post, mounting bracket) using appropriate hardware.
- If desired, position the reader so that the LEDs are easily observed.

### 4. Install antennas.

- Secure each antenna through the mounting holes on either flange to its mounting location using appropriate hardware.

### 5. Connect antennas to reader.

- Route coax cables from the antennas to the reader according to your system design specifications and secure them properly.
- Align the connector for each cable with the reader antenna port, push into the port, and finger-tighten the screw fitting.
- Antennas must be connected prior to applying power to the reader. If power is applied to the reader before the antennas are attached you must reboot the reader after the antennas are attached.

### 6. Connect reader to the LAN or host PC.

- Align the RJ-45 connector with the corresponding TCP/IP port on the reader and push the connector in. Connect to the other end to a LAN drop or network switch. You may optionally connect the reader directly to a PC's network port, but you must use an Ethernet cross-over cable in this situation.
- If you wish to observe the reader's bootup trace, or control the reader via RS-232, align and connect a DB-9 serial cable to the reader's RS-232 port, and to the serial port on the PC. Configure your terminal software as described previously in the Bench Test Configuration topic.

### 7. Connect reader power.

- Push the power supply connector into the reader port and tighten the retaining ring finger tight.

- Plug the female end of the power cord into the power supply.
  - Plug the male end of the power cord into the 120 VAC outlet.
8. **You are now ready to use the reader. If using the Alien Gateway software, please refer to the *Demonstration Software Guide* included on your CD.**

## System Operation: Software Control

The ALR-9900 RFID Reader is controlled from software running on a host system that communicates with the reader using the ASCII-based Alien Reader Protocol. All applications use this protocol to communicate with the reader.

You may operate the reader from your own application code, using the example code provided on the Developer's Kit CD, or using the Alien RFID Gateway application which is a demonstration program also included on your CD.

For more details, refer to either the *Reader Interface Guide* or the *Demonstration Software Guide* described briefly below.

### Reader Interface Guide

The Alien Reader Protocol, mentioned previously, is described in detail in the *Reader Interface Guide*. Using this interface, the reader can be configured to read tags when queried or after one of a variety of event triggers (e.g., a rising edge on one of the I/O pins, or a timer).

Tag data acquired in response to these triggers can be transmitted to the host in a number of formats (e.g., text, XML or custom) and under a number of conditions (e.g., on a new tag being observed, or a tag disappearing from view).

If you are a software developer, the *Reader Interface Guide* provides the information you will need to connect to the reader from a host computer, communicate with it, and customize its performance.

### Demonstration Software Guide

The *Demonstration Software Guide* describes the installation and operation of the Alien RFID Gateway application.

The Alien RFID Gateway application is a useful demonstration program that allows users to explore the reader's functionality and build customizable demos with a user-friendly interface.

Using the Gateway, the various operating modes of the reader can be controlled and custom interactive demos can be constructed using sounds, images, and text.

### Alien RFID Academy

Need to absorb RFID systems fast? Enroll in the Alien RFID Academy! In two or three days we'll share our practical expertise in RFID tags, antennas, readers, frequencies, systems, and protocols.

The Alien RFID Academy is a hands-on immersion into the workings, uses, and challenges of RFID technology. Rather than a product pitch, we put products to the test in the classroom, provide students with hands-on exposure in our RFID Solutions Center, and short-cut the learning curve by sharing practical solutions to real-world challenges. You'll learn best industry practice tag placement techniques for packaging and pallets alike.

Upon completion of the training, you will learn how to implement, avoid common costly mistakes, know how to make the correct decisions for your business, how to select the right RFID options for your requirements, and where to find RFID answers.

**Alien RFID Intermediate / Advanced Academy Topics:**

- RFID Physics, Protocols & Practical Applications
- Tag Placement & Packaging Considerations
- RFID Reader/System Configuration & Optimization
- Hands-on Implementation
- RFID System Architecture and Integration
- Conducting Site-surveys & Contending with Interference

Please visit <http://www.alientechnology.com> for more information.

# Appendix A

## Clause 6.2 of SJT/11364

TUV 报告号: **30850413.001**

翻 译: 英译中

以下是根据 2006 年版 SJT/11364: 条款 6.2 之英译中:

中华人民共和国, 电子信息产品污染控制管理办法: 自我声明							
制造商:		<b>Alien Technology Corporation</b>					
制造商地址:		18220 Butterfield Blvd. Morgan Hill, CA 95037, USA (美国, 加州)					
产品名称 / 型号:		RFID Reader/Development Kit (RFID 阅读器)					
		型号: <b>ALR-9900</b> <b>ALR-9900-DEV KIT</b>					
有毒有害物质或元素列表							
部件号	部件名	有毒有害物质或元素					
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CrVI)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
第一组	外壳组件	○	○	○	X	○	○
第二组	五金件	○	○	○	X	○	○
第三组	电线电缆	X	○	○	○	X	X
第四组	线路板组件	○	○	○	○	○	○
第五组	外接电源	○	○	○	○	○	○
第六组	外接天线组件	○	○	○	○	○	○
第七组	外接天线外壳	○	○	○	○	X	X
第八组	外接天线电缆	○	○	X	○	○	○
第九组	包装材料	○	○	○	○	○	○
第十组	CD 盒	○	○	○	○	X	X
第十一组	RFID 标签	○	○	○	○	○	○
O: 表示该部件所有均质材料中的有毒有害物质含量均在 SJ/T 11363-2006 规定的限量要求以下							
X: 表示至少该部件的某一均质材料中的有毒有害物质含量超出 SJ/T 11363-2006 规定的限量要求							

注释: XRF 扫描结果和 RoHS 符合性声明是此次评估的一部分。