AMIC A9245-E-001

UHF RFID Reader

User Manual

Rev 1.4

AMIC Technology Corporation.
No.2, Li-Hsin 6th Road, SBIP, 300 Hsinchu, Taiwan, R.O.C
TEL: 886-3-5679966
FAX: 886-3-5679977

Trademarks:
All trademarks mentioned herein are properties of their respective companies

1. Introduction

Thank you for purchasing AMIC A9245-E-001 series UHF RFID readers. A9245-E-001 series UHF RFID reader family consist of two reader models, A9245-E-001-232 and A9245-E-001-485. Both A9245-E-001-232 and A9245-E-001-485 UHF RFID readers are designed to compliant with EPC Global Gen2 specifications. They are easy to use and require only simple installations. These readers are equipped with either RS-232 or RS-485 host interface, and come standard with Wiegand 26/34 and GPIO for external device controls.

2. Product Contents

Before starting using the a9245-E-001 RFID reader, first please check that the package contains the following items:

- One A9245-E-001 UHF RFID reader.
- One CD-ROM containing Demo Utility Software.
- One CD-ROM containing SDK library.
- One 110/240 VAC to +5VDC power supply. Different types of power supplied might be used for different countries / regions.
- One RS-232 cable (for A9245-E-001-232 model only)
- Two cables with circular 10-pin connector at one end and flying leads at other end for RS-485 and GPIO ports.
- DC Power cable

Note: A9245-E-001 UHF reader series has integrated antenna. User should not attempt to disassemble the antenna from the reader unit as that might cause damage to the reader unit, void product warranty, and violate local government regulation.

2.1. Installation Requirements

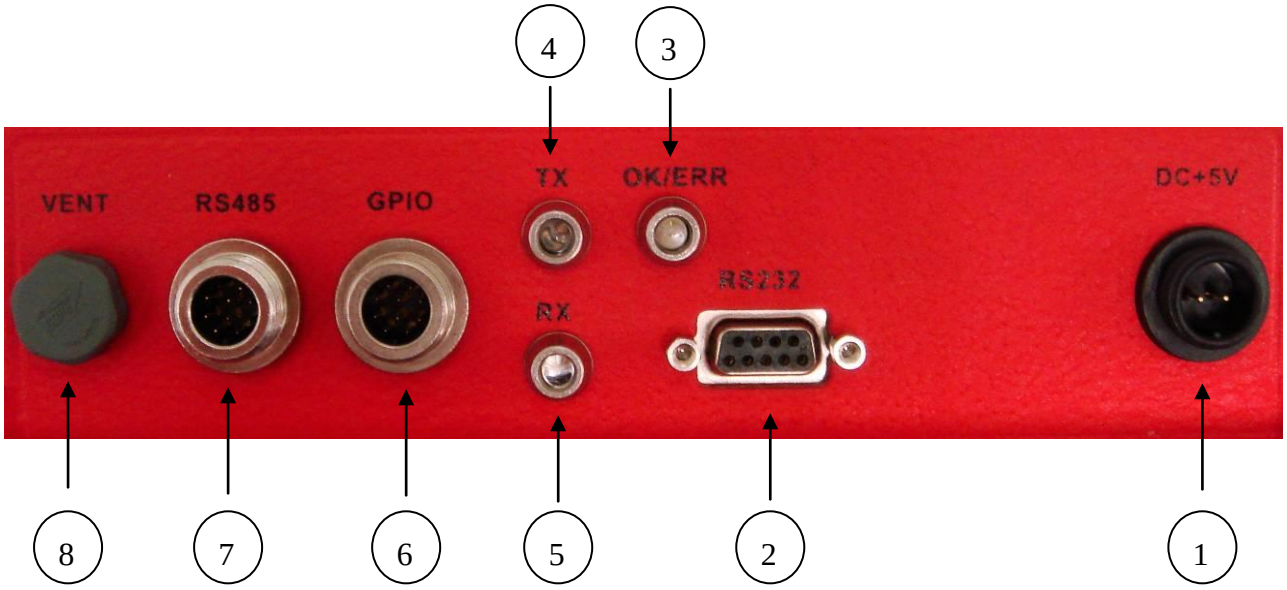
AMIC A9245-E-001 UHF readers require the following minimum system environment for proper operation:

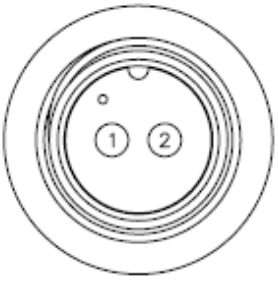
Minimum System Requirement:

PC

- Processor: Pentium 1.7GMHz or faster
- Memory: 256MB RAM
- Interface: One RS-232 compliant port for A9245-E-001-232 or one RS-485 compliant port for A9245-E-001-485
- Hard Disk Space: 10MB of free disk space
- Operation system:
  Windows 2000
  Windows XP
  Windows Vista

3. Nomenclature



Item	Name	Description	
1	DC Power Jack	The DC power input is +5V. An UL approved 110 / 240VAC to +5VDC power adapter capable of supplying at least 6A current should be used. Pin 1: +5V DC Pin 2: GND	
2	RS-232 Connector	Standard RS-232 host interface	
		PIN	**Signal**
		2	TX data
		3	RX data
		5	Ground signal

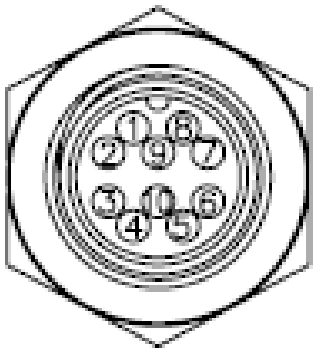
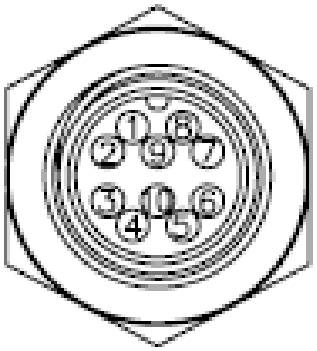
<table>
<tr><th>Item</th><th>Name</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">3</td><td rowspan="3">OK / Err LED</td><td>LED Condition</td><td>Color</td><td colspan="2">LED Illumination Mode</td></tr>
<tr><td>System OK</td><td>Green</td><td colspan="2">Flashing</td></tr>
<tr><td>System Error</td><td>Amber</td><td colspan="2">Steady on</td></tr>
<tr><td>4</td><td>TX LED</td><td colspan="4">RS-232 transmit data activity LED. When the reader is transmitting data to its host controller, TX LED will be flashing in YELLOW. When the reader is not transmitting data to its host controller, the TX LED should remain off.</td></tr>
<tr><td>5</td><td>RX LED</td><td colspan="4">RS-232 receive data activity LED. When the reader is receiving data from its host controller, RX LED will be flashing in GREEN. When reader is not receiving data from its host controller, the RX LED should remain off.</td></tr>
<tr><td>6</td><td>GPIO Connector</td><td colspan="4"><table>
<tr><th>Pin</th><th>Color</th><th>Signal Description</th><th></th></tr>
<tr><td>1</td><td>Brown</td><td>GPIO output 1-1</td><td rowspan="10">  </td></tr>
<tr><td>2</td><td>Blue</td><td>GPIO output 1-2</td></tr>
<tr><td>3</td><td>White</td><td>GPIO output 2-1</td></tr>
<tr><td>4</td><td>Green</td><td>GPIO output 2-2</td></tr>
<tr><td>5</td><td>Yellow</td><td>GPIO output 3-1</td></tr>
<tr><td>6</td><td>Gray</td><td>GPIO output 3-2</td></tr>
<tr><td>7</td><td>Pink</td><td>GPIO output 4-1</td></tr>
<tr><td>8</td><td>Red</td><td>GPIO output 4-2</td></tr>
<tr><td>9</td><td>Black</td><td>Ground</td></tr>
<tr><td>10</td><td>Orange</td><td>Reserved</td></tr>
</table></td></tr>
<tr><td>7</td><td>RS-485 Connector</td><td colspan="4"><table>
<tr><th>Pin</th><th>Color</th><th>Signal Description</th><th></th></tr>
<tr><td>1</td><td>Brown</td><td>RS-485 D+</td><td rowspan="10">  </td></tr>
<tr><td>2</td><td>Blue</td><td>RS-485 D-</td></tr>
<tr><td>3</td><td>White</td><td>Reserved</td></tr>
<tr><td>4</td><td>Green</td><td>Reserved</td></tr>
<tr><td>5</td><td>Yellow</td><td>Ground</td></tr>
<tr><td>6</td><td>Gray</td><td>Reserved</td></tr>
<tr><td>7</td><td>Pink</td><td>Reserved</td></tr>
<tr><td>8</td><td>Red</td><td>Ground</td></tr>
<tr><td>9</td><td>Black</td><td>Wiegand D0 (+5V level)</td></tr>
<tr><td>10</td><td>Orange</td><td>Wiegand D1 (+5V level)</td></tr>
</table></td></tr>
<tr><td>8</td><td>Ventilation Cap</td><td colspan="4">Turn ventilation cap to the desired opening position to release potential air pressure build up due to day / night temperature differences.</td></tr>
</table>

Table 1.0 Cable Signal Description

Connect to A9245-E-001 UHF RFID Readers

4.1 RS-232 Cable

Step 1: Connect RS-232 cable with to the reader. Make sure that the connector is fully inserted into the female socket to ensure a water tight hookup.

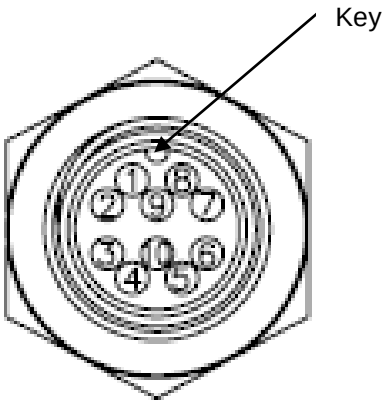
Step 2: Connect RS-232 cable to the reader and the host computer.

RS-232 Cable

4.2 RS-485 Cable

Take one of the cables with 10-pin circular connector at one end and connect it to the RS-485 connector. Please match the “key tab” inside the circular connector and that of the receptacle before making connection and tighten the circular connector. The cable should have flying leads at the other end of the cable for user to make proper connections to the hosting device. RS-485 cable should be used regardless if you have purchased either A9245-E-001-232 or A9245-E-001-485 UHF reader because the cable will also be used to hook up the Wiegand interface.

The RS-485 connector has three groups of signals running through it. RS-485 signals, and the Wiegand interface. Ground signal is supplied and should be used for proper hook up of the Wiegand interface.



RS-485 Cable

RS-485 Connection

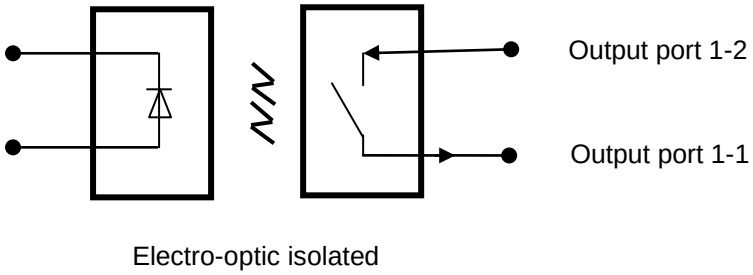
RS-485 signals are as shown in Table-1.0. A9245-E-001 reader is designed to be used as a single RS-485 device. This means that no other RS-485 device should be cascaded or be put on the same RS-485 bus. The A9245-E-001 reader's RS-485 address is always fixed at 0x01 and can not be changed by user. Please connect D+ (Brown wire) and D- (Blue wire) signals to your host's RS-485 interface.

Wiegand Interface Connection

Wiegand interface consists of 3 wires: D0, D1, and ground. A9245-E-001 is a Wigand "Slave" which means it only output data from its Wiegand interface. Any output signals from host should never be connected to A9245-E-001's Wiegand interface as that might damage A9245-E-001. A9245-E-001 reader's Wiegand interface is a standard +5VDC system. This means that all signals are at +5VDC with respect to the ground signal when logic "1" is put on the Wiegand bus. Connect D0 (Black wire) and D1 (Orange wire) to the host's wiegand interface. Please make sure that the Ground (Red wire) is also connected to the host's Wiegand interface ground to ensure proper system operation.

4.3 GPIO Cable

The GPIO cable contains four sets of GPIO Outputs. Each set of GPIO output consists of two terminals. A9245-E-001's GPIO outputs do not actually provide output signals. Instead, it routes user's I/O signal connected to output port's No.1 terminal to the No. 2 terminal upon receiving appropriate GPIO command from A9245-E-001's RS-232 or RS-485 interface as shown in the diagram below. User of A9245-E-001 needs to provide adequate signal at terminal No.1 for his own purpose.



Electro-optic isolated

GPIO Cable

Output Terminal Characteristics:

Voltage Range: 3~ 24V with respect to ground
Current Handling: 2A max
Toggle Threshold: +5VDC with respect to ground

GPIO Output Connection

Attach one of the cables with 10-pin circular connector at one end to the GPIO receptacle. Make sure the "key tab" on the connector matches before inserting the connector to the receptacle. Tighten the connector by turning the circular collar. The flying leads on the other end of the cable are for user to hook up to his GPIO device. Please see table-1.0 for wire signal definition. Please make sure that the ground signal is also connected to the GPIO device to ensure proper system operation.

4.4 Power Cable

Match up the power cable's circular connector with the power receptacle. Make sure that the key are matched before inserting the connector into the receptacle. Tighten the power connector after it is fully inserted.

Power Cable

5.0 LED Indicators

There are three LED indicators on A9245-E-001 UHF reader: OK/Err LED, TX LED, and RX LED. These LED indicators provide information about the reader's current functionality status. Please see table below for detail LED definitions.

Item	*Name*	*Description*		
3	OK / Err LED	LED Definition	LED Color	LED Illumination Mode
		System OK	Green	Flashing
		System Error	Amber	Steady on for the duration of error condition
4	TX LED	RS-232 transmit data activity LED. When the reader is transmitting data to its host controller, TX LED will be flashing in YELLOW. When the reader is not transmitting data to its host controller, the TX LED should remain off.		
5	RX LED	RS-232 receive data activity LED. When the reader is receiving data from its host controller, RX LED will be flashing in GREEN. When reader is not receiving data from its host controller, the RX LED should remain off.		

Table 2 LED Indicator

OK / ERR LED: OK/ERR LED shows reader's current health state. IF this LED is flashing in GREEN, all reader's functionalities are being carried out normally. When ever A9245-E-001 reader receives an unrecognizable command through its RS-232 or RS-485 interface or a command failed to execute, the OK/Err LED will light up in AMBER for the duration of the error condition. Possible causes of the error condition might be incorrect command, internal hardware malfunction, or bad connection of the RS-232 / RS-485 cable.

TX LED: Whenever A9245- E-001 reader is transmitting data on its RS-232 interface, the TX LED will flash in YELLOW for the duration of time that it is transmitting data. Otherwise, this LED should stay off. This LED indicator can be used to diagnose the connection between A9245-E-001 and the host device. A9245-E-001 will only transmit on its RS-232 interface upon successfully receiving a valid command. A9245-E-001 either transmit an ACK, NACK, or data packet containing the requested information (i.e., tag ID). For detail information about what A9245-E-001 will transmit on its RS-232 interface, please see A9245-E-001 SDK User's Manual.

RX LED: Whenever A9245-E-001 reader is receiving data on its RS-232 interface from the host device, the RX LED will flash in GREEN for the duration of time that is receiving data. Otherwise this LED should stay off. This LED can be used to diagnose the connection between A9245-E-001 and the host device. A9245-E-001 is a slave device this means that A9245-E-001 reader system will not transmit data on the RS-232 interface by itself. It must receive valid command before it can respond back to the host.

Product Specification

A9245-E-001	
Protocole	EPCglobal Class 1 Gen 2
Operating Frequency	902 - 928 MHz
RF Output Power	17 dBm
Built-in Antenna	10 dBi Veritcle Linear Polarization
Host Interface	RS-232 with Wiegand or RS485 with Wiegand
Anti-collision	Yes
Dense Reader Mode	Yes
Multi-tag	Yes
LED Status Indicator	TX; RX; OK / Error
Supported OS	Windows 2000 / XP / Vista
Internal CPU	8 bit
Power	+5V DC @ 6A
Operating Temperature	-10°C ~ +50°C

A9245-E-001 Part Numer	
A9245-E-001-232	UHF RFID reader system with RS-232 host interface
A9245-E-001-485	UHF RFID reader system with RS-485 host interface

Installation with FCC Approval

(1) This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

(2) Electrical connection, commissioning, measurement, maintenance, and calibration work on the unit is to be performed only by electrical specialists or persons with equivalent training.

(3) In countries or geographical regions where FCC approval is required, AMIC A9245-E RFID reader may only be operated using the built-in antenna supplied

(4) Changes or modifications not expressly authorized by the relevant approval body may result in revocation of the user's operating permission.

(5) To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.

Note: 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 communication. However, there is no grantee that interference will not occur in a particular installation. If this equipment dose 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 from that to which the receiver is connected.
--Consult the dealer or an experienced radio/TV technician for help.

7. Revision History

Revision	Date	Description	By
1.0	08/31/2009	Initial creation	R.L.
1.1	11/02/2009	GPIO modification	R.L.
1.2	03/03/2010	Antenna specification	R.L.
1.3	05/30/2010	Antenna specification	R.L.