



**ID6300**

## **User's Manual**

*Version 1.0*

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## Revision History:

The following table shows the revision history for this document.

Version	Date		By	Revision
0.1	09/25/2009		RR	Preliminary Release
0.2	10/12/2009		RR	RF Exposure Change from 25cm (~10”) to 20cm (~8”).
1.0	10/16/2009		RR	Initial Release

## Conventions:

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### **WARNING:**

**A warning is used where care must be taken or a certain procedure must be followed, in order to prevent injury or harm to your health.**

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### **Caution:**

**A caution indicates information on conditions that must be met or a procedure that must be followed, that if not heeded could cause permanent damage to the equipment or software.**

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### **Note:**

**A note indicates conditions that must be met or procedures that must be followed to ensure proper functioning of the equipment or software.**

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### **Information:**

**An informational alert indicates items that make usage of the equipment or software easier.**

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## 1 Introduction

### 1.1 Contents of this Document

This manual describes the ID6300 RFID reader.

Other documents available:

- RFID UHF Module Application Programmer's Interface (API) Addendum with C1G2 and Title 21 Commands

## 2 Product Description

The Sirit ID6300 is a *UHF* RFID reader operating in a frequency band of 902 to 928 MHz. The ID6300 is compatible with UHF EPCglobal Class 1 Generation 2 and CalTrans Title 21 (T-21) RFID tags. These cards are ideal for handheld and mobile applications due to their small form factor, low power consumption and light weight.

The ID6300 incorporates two MMCX jacks for connecting up to two external antennas. The ports are interchangeable and only one antenna can be read at a time. The transmitter output is software controlled from 15 dBm up to 27 dBm ( $\frac{1}{2}$  watt) in 1dB steps. This card can be used either in a PCMCIA slot or in TTL serial communications mode.



Figure 1: ID6300 Module with Antenna

## 3 Antennas

The ID6300 is designed to work with both integrated and external antennas, both types of which plug into the reader's MMCX jacks.

### 3.1 Integrated Antenna

The reader antenna is described in the document *ID6300 Antenna Datasheet*.

### 3.2 External Antennas

PCMCIA reader modules use an MMCX connector to connect to up to two external antennas. The ID6300 is optimized for circularly or linearly polarized antenna with linear gain not exceeding 9dBiL.



**Note:** Use of other antennas with this unit may result in harmful interference with other users and cause the unit to fail to meet regulatory requirements. Operation with different antenna types or the same type with higher antenna gain may violate FCC regulations. Current FCC regulations (Title 47, Volume 1, part 15, section 15.204) allow for any antenna to be used as long as the gain does not exceed the gain of the original certified antenna. Professional installation is recommended for the ID6300 model reader.



**Caution** should be exercised in attaching any long, relatively heavy cables to the MMCX adapters, as these adapters are not intended to tolerate large mechanical stresses. Connecting the ID6300 output port through a short length of small-diameter cabling as strain relief is recommended.



**Note:** Only use of antennas with legal gain is permitted. Using USA/Canadian modules, the output power is limited to 36dBm EIRP. Setting up the PCMCIA RFID module with an antenna containing too much gain is in direct violation of the regulatory standards certifying the product. If the user is unclear if their antenna gain is legal, they are urged to contact the RFID Applications group at Sirit.

## 4 Using the ID6300

### 4.1 Communications

The ID6300 communicates over PCMCIA and TTL serial communications lines.

### 4.2 Application Programmers Interface (API)

The ID6300 is controlled using commands issued over the PCMCIA or serial communications lines from a host. Each command is formatted to control specific elements and options. The API specification for the ID6300 follows the *RFID UHF Module Application Programmer's Interface (API)*, with the C1G2 and T-21 commands.

## 5 Compatibility

### 5.1 Host

The ID6300 is a very versatile module able to interface by a standard RS-232 port or a standard PCMCIA interface. This enables the reader to work with many systems including handhelds, PDAs, laptops and desktop computers.

## 5.2 Tags

The ID6300 RFID Reader supports EPCglobal Class1 Generation 2 and Caltrans Title 21 tags.

The ID6300 reader supports a forward data rate of 40Kb/sec and a return link of 240Kb/sec for EPCglobal Class1 Generation2 and a forward and return data link rate of 300Kb/sec for T-21.

## 6 Troubleshooting / Technical Support

### 6.1 General

The reader does not connect to the host software:

- Wrong COM port selected
  - Verify the COM port of the reader in the Device Manager.
- Card is not powered
  - Verify the green LED is lit on the MIB.
- Boot load switch is in Boot (MIB only)
  - Switch the boot loader switch to the normal

### 6.2 Performance

Reader does not read tags

- Tag is not compliant with reader protocols
  - ID6300 reads only Class 1 Gen2 and T-21 tags
- Antenna cables are not connected properly
  - Make sure the antenna connections are tight.
- Antenna is polarized perpendicular to tag polarization
  - Rotate the tag or the reader antenna 90 degrees.

Reader performance is poor

- Antenna field affected by objects nearby
  - Verify the reader's antenna is free of nearby objects that would partially cover the antenna; metal, hands, plastics: all these can effect antenna operation.
- Tag is being obscured by objects nearby
  - Tags perform poorly when in close proximity to metals and/or liquids.
- Low power level
  - Increase the transmit power setting
- Poor quality antenna

Read rate is slow

- Inventory period set too high
  - Adjust inventory period (delay time between reads)

### 6.3 Tag Programming

Programming of RFID tags is more complicated than simply reading tags: there is a substantial amount of communication between the tag and reader. Writing to the tag requires more power for a longer period of time than reading. It is most often the case that a tag can be read at a longer range than it can be programmed (assuming the same conditions.)



To improve tag write/programming reliability and success it is recommended that the tag be brought closer to the antenna so as to receive the maximum RF field strength. It is important that the tag and reader not be moving relative to each other. While individual results will vary depending on tag type, environment and other such variables, these guidelines have been shown to increase the chance of successful tag programming.

## 7 Technical Specifications

Description	Specification	Additional Info
Frequency of Operation	902-928 MHz (US ISM band)	50 channels US
Maximum Output Power	27 dBm (0.5 Watt)	
Calibrated Power Range	12 dB in 1dB steps	
Tag Protocols	Caltrans Title 21 EPCglobal Class 1 Gen2	
Regulatory Compliance	US FCC part 15	
Host Interface	Standard PC-card™ interface plus TTL serial communications	Equivalent to PCMCIA type II, 68-pin
Peak DC Current Draw	800 mA	
Operating Temperature	0 to 40° C	
Storage Temperature	-20 to 70° C	
Antenna Connection	Two (2) MMCX female	



## 8 Mechanical Configuration

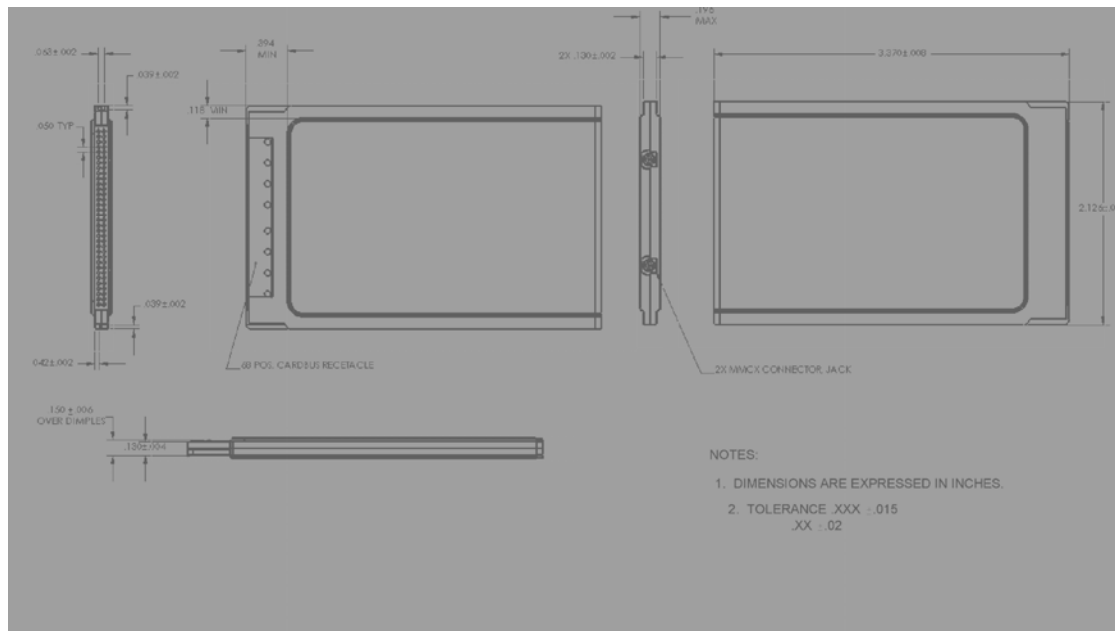


Figure 2: ID6300 Mechanical / Dimensions

## 9 Notices

### 9.1 RF Connectors and Connections



**Caution:** Care must be taken during insertion, removal and usage of the RF Connectors to prevent damage and degradation. Torques of greater than 1.7 in-lbs (0.19 newton-meters) can damage the MMCX connectors. It is best to use less torque to reduce the potential for damage. Use of a flexible RG178/196 cable (or something similar) is recommended when interfacing to the reader. Damage to the connectors may render the card unusable. The loads required to break these connectors from the PC board are moderate but easily achievable in a lab setting. It is possible to generate a large bending moment using a large diameter cable connected to the unit.



**Note:** The ID6300 product includes an automatic circuit to prevent damage due to improper or no antenna connection.

### 9.2 RFID Limitations



Communication between tags and readers is a complex phenomenon that depends on details of the environment surrounding the tags and reader. Careful installation, testing, development and appropriate

operating procedures are indispensable for successful implementation of RFID. The user can manipulate some environmental aspects, such as tag placement and orientation to increase the possibility of a successful reader-tag transaction.

### 9.3 Safety



**Caution:** Any use of this equipment with antennas or cabling installed outdoors or otherwise exposed to inclement weather must avoid proximity with power lines or other high-voltage conductors and provide for proper grounding and lightning arresting devices to protect the equipment user in the event of a lightning strike. See National Electrical Code (NEC) requirements articles 725, 800 and 810 for further information.

Do not operate the TQR series readers in any area where critical safety equipment may be sensitive to RF interference, such as medical or life support equipment.

Do not operate the TQR series readers on any aircraft in flight or at any other time when operation of radio devices, such as cellular phones, is prohibited.



**Caution:** Personnel should not be closer than 20 cm (~8 inches) from any TQR antenna for prolonged periods of time. See FCC bulletins 56 and 65 for further information on electromagnetic field exposure.

### 9.4 Patents

Portions of the products described in this manual may be covered by currently pending US and foreign patents.

### 9.5 Copyright Notice

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## 10 Regulatory Compliance

### 10.1 FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device and intentional radiator, 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 instructions, 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 from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



**Note:** Changes or modifications not expressly approved by Sirit could void the user's authority to operate the equipment described in this manual.

In the US, the ID6300 has been approved for use with external antennas of the same gain or lower. Use of any higher gain antenna(s) will void the user's authority to operate the equipment.

### 10.1.1 RF Radiation Exposure Statement

These devices comply with FCC radiation exposure limits set forth for an uncontrolled environment and users must follow specific operating instructions for satisfying RF exposure compliance.



**Warning:** To comply with RF radiation exposure requirements in FCC's regulations, the ID6300 products must be installed so there is a separation distance of at least 20 cm (~8 in) between all persons excluding hands / feet and the antenna. These devices may not be co-located with any other transmitter or transmitter antenna.

## 11 Comments and Feedback

Sirit welcomes comments, suggestions and feedback related to this manual or to the products it describes. Please submit your remarks in the "Contact Us" page of the Sirit website or submit your feedback in writing to:

Sirit Technologies at [support@sirit.com](mailto:support@sirit.com).