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identiCLASS®

Developer Tool Kit

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Version History

Date	Author	Description	Document Version
October 12, 2010	SH	Initial version	Rev A.0

Contents

1   Overview

1.1   Introduction

identiCLASS is a universal e-Government reader platform designed for integration into OEM equipment, providing contact or contactless reading of electronic documents. For example: Electronic Passports, Electronic National ID Cards and Electronic Driver's Licences.

The identiCLASS Developer Tool Kit contains everything a customer needs to integrate identiCLASS into their systems. Included are two types of Reader boards: a small footprint board for space-restricted or mobile devices using an external antenna, and a larger board with built-in antenna for terminals. In addition, included are all the accessories such as cables, drivers and software needed to complete the task.

1.2   About this Guide

This user guide describes:

- The components supplied in your identiCLASS Developer Tool Kit.
- How to choose the components you need for your application and example configurations.
- How to connect the components which you will be using.
- How to integrate the identiCLASS reader with your equipment, including tips on installation.
- Board dimensions and mounting dimensions.
- Using the Software Configuration Tool to configure parameters within the identiCLASS reader.

1.3   Related Documents

Source	Description
HID	identiCLASS Quick Start Guide
HID	identiCLASS Product Data Sheet
HID	identiCLASS Software Configuration Tool User Guide
HID	identiCLASS Software Developer Guide

1.4   Ordering

See the identiCLASS How to Order Guide.

1.5   RFID Standards Supported

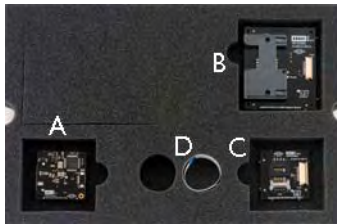identiCLASS supports ISO 14443A, ISO 14443B, ISO15693 RFID standards.

2   What's in the Box

The box is divided into four layers. Described are the components of each layer.

Layer 1
- sample e-passport (**A**)
- one sample dual-interface card (ID card) (**B**)
- one USB Flash Drive containing drivers, software, documentation and release notes **C**)

Layer 2
- identiCLASS 3300 Reader Core (**A**)
- identiCLASS smart card adapter – ID1 full card size (**B**)
- identiCLASS smart card adapter – ID0 SIM card size (**C**)
- 15cm smartcard adapter cable (**D**)

Layer 3
- identiCLASS 3500 Reader Board (**A**)
- identiCLASS ID1 antenna (**B**)
- identiCLASS ID3 antenna (**C**)
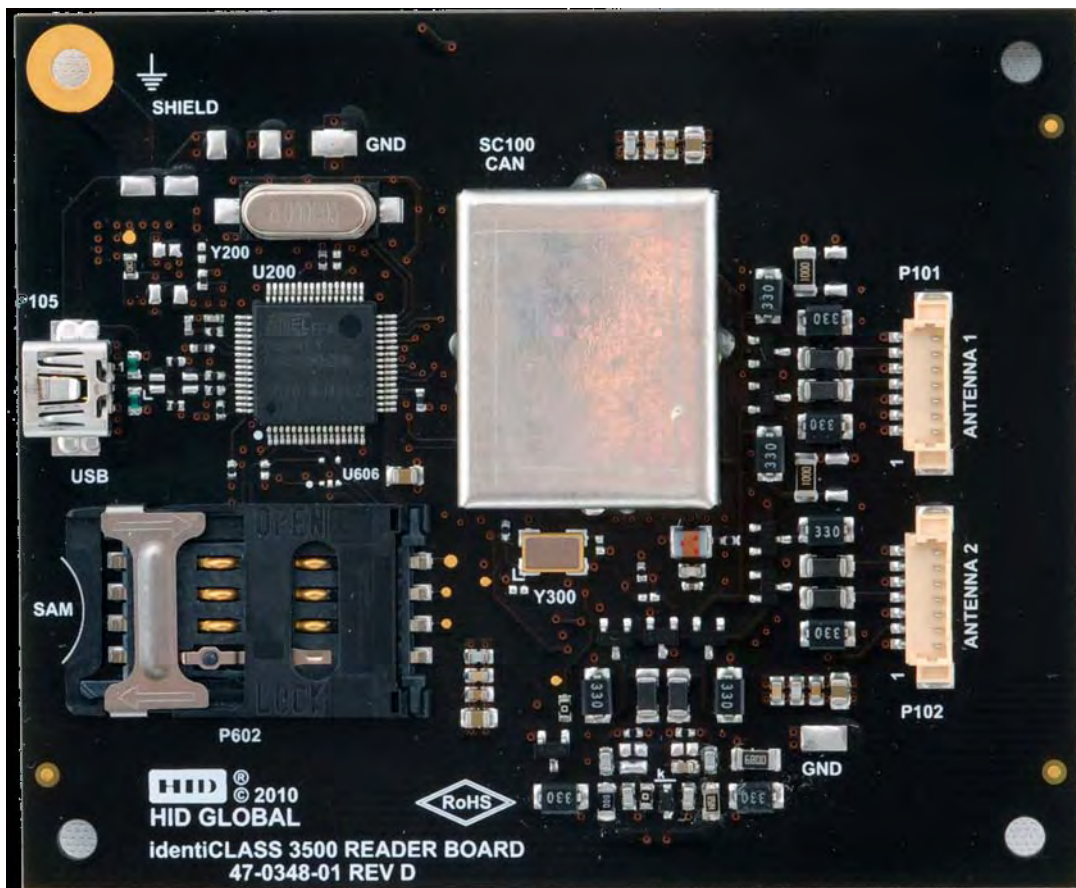- 10cm antenna cable (**D**)

Layer 4
- USB cable

3 Choose the Components

3.1 3500 Reader Board (DG 3500A00)

The identiCLASS 3500 Reader Board has:

- One internal antenna
- Connections for one or two external antennas
- Internal SAM socket
- USB connection
- FCC modular approval is planned for release in late 2010. See identiCLASS microsite at www.hidglobal.com/main/identiclass for the latest information.

The 3500 Reader Board reads contactless cards/passports using its built-in antenna. Connect the 3500 Reader Board to one or two external antennas, either large (ID3) or small (ID1), see Example Configurations. The 3500 Reader Board is capable of reading ID0 credentials through the built-in SAM socket.

3.2   3300 Reader Core (DG 3300A00)
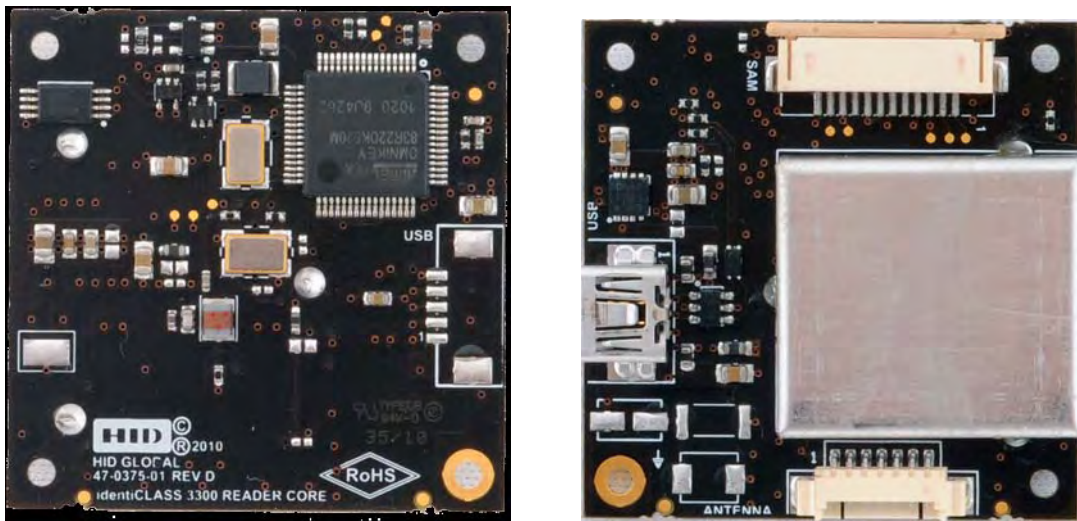
The identiCLASS 3300 reader core has:

- One connection to an external antenna
- One connection to a smart card adapter
- USB connection
- small size for use in mobile / hand-held devices

The 3300 Reader Core reads contactless cards/passports using an external antenna, either large (ID3) or small (ID1). Connect the 3300 Reader Core to an external smart card adapter which enables it to read either full-size contact cards or SIM-size contact cards, see Example Configurations. Use the 3300 Reader Core with both a contactless antenna and a contact smart card adapter at the same time.

3.3   ID1 Small Antenna (4090A01)

The identiCLASS ID1 Small Antenna provides reading of contactless passports/credentials. It can be connected to the identiCLASS 3500 Reader Board or to the identiCLASS 3300 Reader Core. Use the ID1 Small Antenna on its own, or mounted next to another antenna to enable reading of contactless cards/passports in whichever orientation they are presented, see Example Configurations.

3.4 ID3 Large Antenna (4090A02)

The identiCLASS ID3 Large Antenna provides reading of contactless passports/credentials. Connect the ID3 Large Antenna to the identiCLASS 3500 Reader Board or to the identiCLASS 3300 Reader Core. Its large window enables an optical reader to be mounted in the center. Use the ID3 Large Antenna on its own, or mounted next to another antenna to enable reading of contactless passports/credentials in whichever orientation they are presented, see Example Configurations.
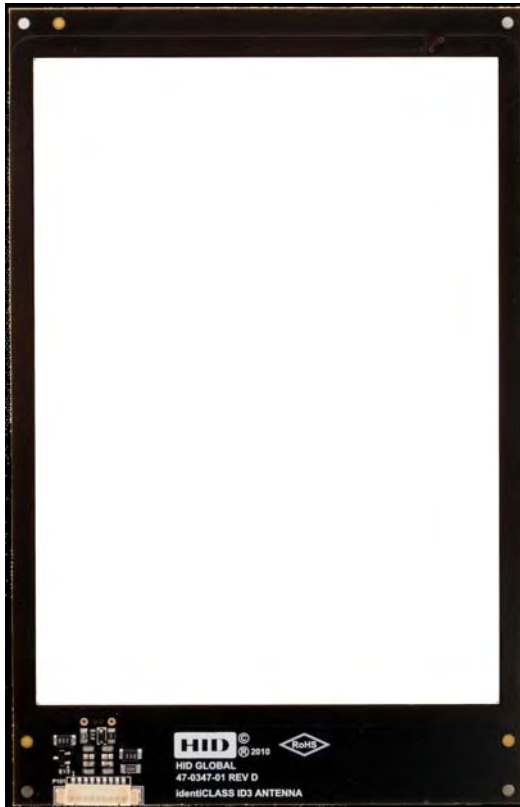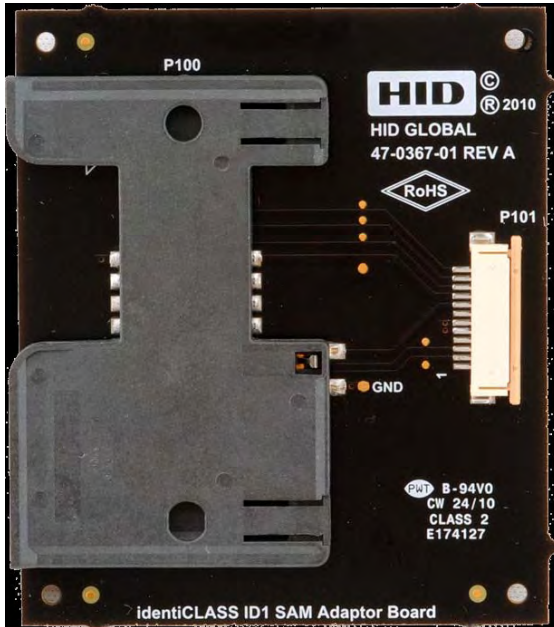
3.5   ID1 Full-Size Smart Card Adapter (4093A01)

The identiCLASS Full-Size Smart Card Adapter reads contact cards using an ISO 7816 compliant interface. Connect the ID1 Full-Size Smart Card Adapter to the identiCLASS 3300 Reader Core, see Example Configurations.

3.6   ID0 SIM Card Adapter (4093A02)

The identiCLASS SIM-size smart card adapter reads ID0 credentials through the built-in SAM socket. Connect the ID0 SIM Card Adapter to the identiCLASS 3300 Reader Core, see Example Configurations.

4   Example Configurations

4.1   Stand-alone 3500 Reader Board

The simplest layout is the 3500 Reader Board using the built-in antenna.

The USB connection is used to configure the 3500 Reader Board, and for receiving data from the Reader Board when it reads a card. Power is provided from the USB cable.
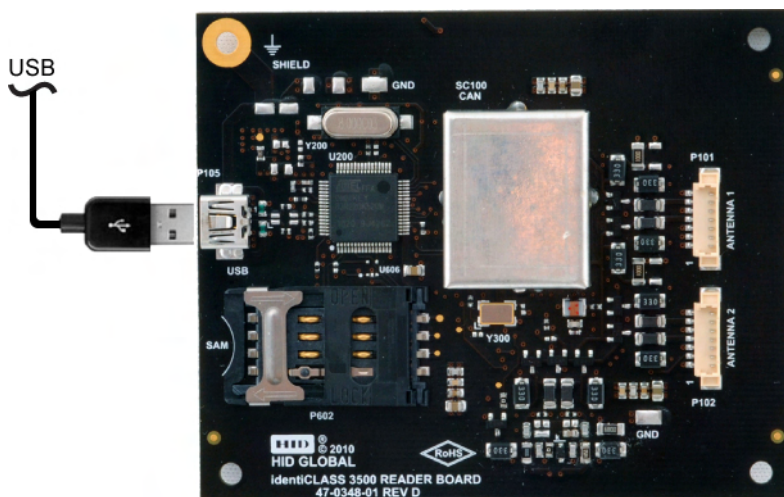
3500 Reader Board

4.2   3500 Reader Board and external small antenna

Connect the ID1 antenna to one of the external antenna connectors (P101 or P102) on the 3500 Reader Board using the supplied cable (4091A01 10cm):
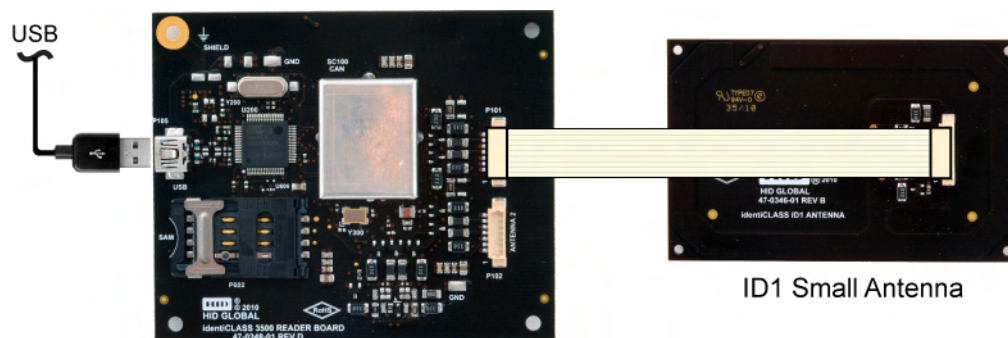
3500 Reader Board   ID1 Small Antenna

4.3 3500 Reader Board and external large antenna

Connect the ID3 antenna to the 3500 Reader Board P101 or P102 connector using the supplied cable (4091A01 10cm).

An ID3 antenna is designed to enable integration with an optical character recognition (OCR) reader.

3500 Reader Board   ID3 Large Antenna
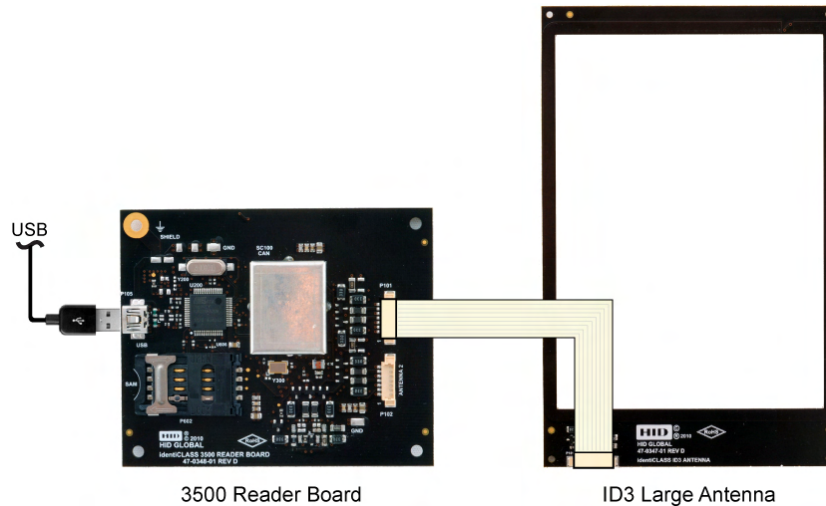
4.4 3500 Reader Board - Two ID3 Large Antennas

Connect the ID3 Large Antennas to the 3500 Reader Board connectors P101 and P102 using the supplied cables (4091A01 10cm).

This layout provides two antennas adjacent to each other, for presenting a passport in any orientation. Mount OCR readers in the center of the ID3 large antennas.

ID3 Large Antenna   ID3 Large Antenna

3500 Reader Board

USB
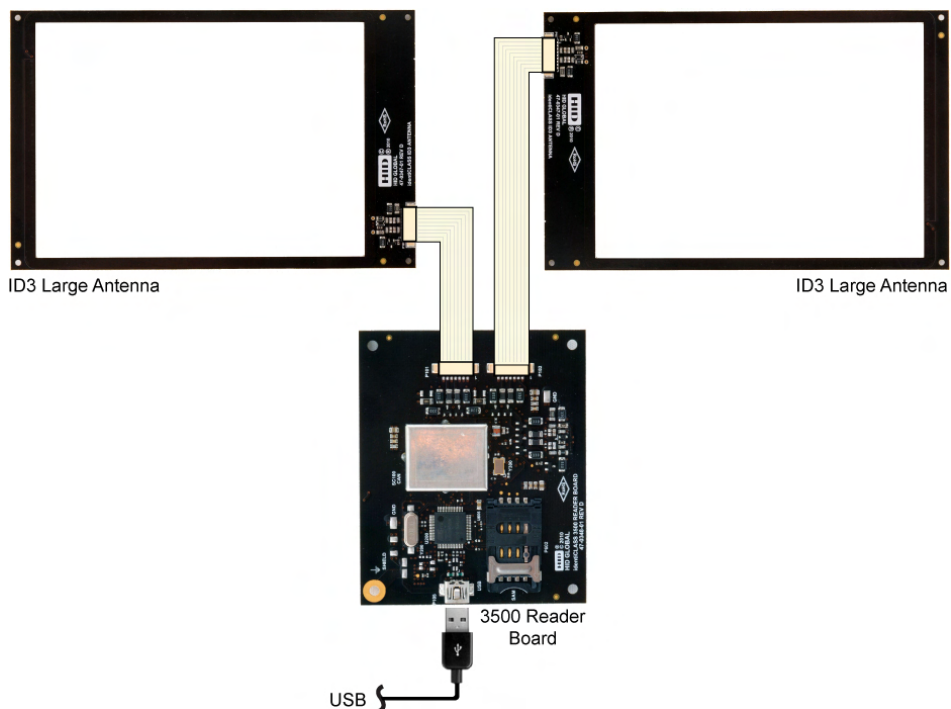
4.5   3300 Reader Core - ID1 Small Antenna Connected

Connect the ID1 antenna to the ID1 Small Antenna connector on the 3300 Reader Core using the supplied cable (4091A01 10cm).

This layout provides a small antenna connected to the reader core which is also small, making this layout ideal for space-restricted applications as well as mobile / hand-held devices.

ID1 Small Antenna
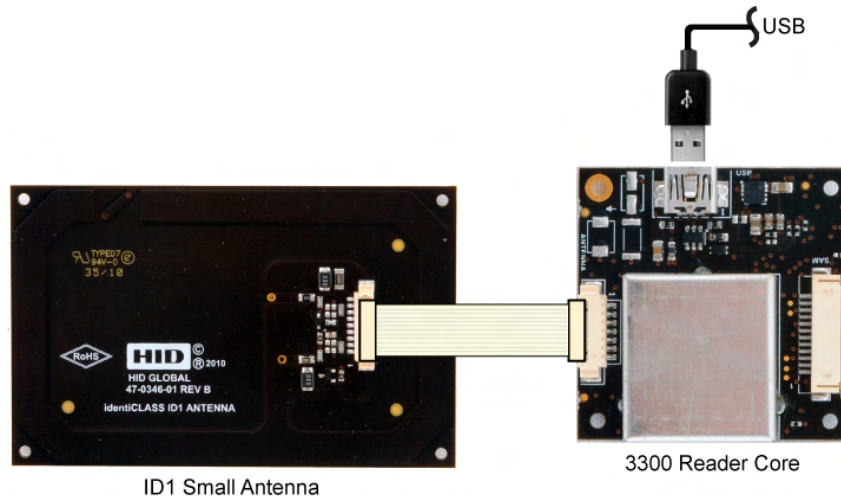
3300 Reader Core

4.6   3300 Reader Core - Smart Card Adapter - ID3 Large Antenna Connected

Connect the Smart Card Adapter to the SAM connector on the 3300 Reader Core using the supplied cable (4091A04 15cm). Connect the ID3 antenna to the external antenna connector on the 3300 Reader Core using the supplied cable (4091A01 10cm).

This layout provides a contact card reader, plus a large antenna for contactless cards, in the center of which an OCR reader can be mounted.

Smart Card Adapter

3300 Reader Core

ID3 Large Antenna
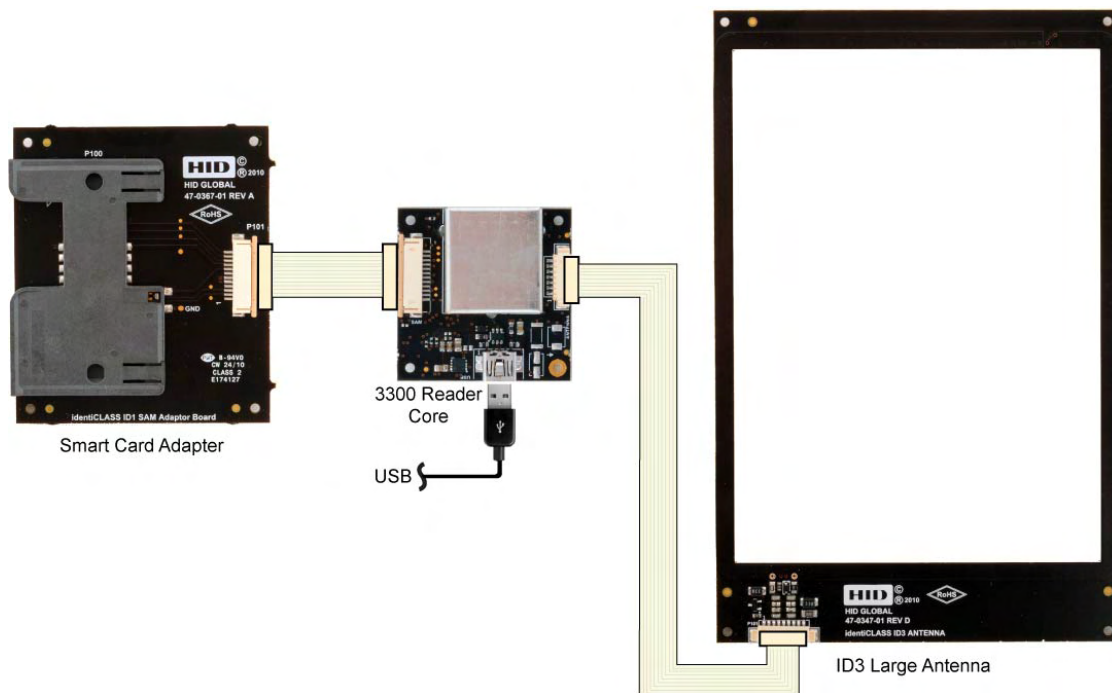
5   Configuration, Setup and Testing

Set up, configure and test the reader before installing the reader into your own enclosure. This way, you verify the reader is operating correctly without metal affecting the operation. Your metal enclosure may affect reader operation.

5.1   Installing the identiCLASS DTK

1. Take the USB Flash Memory Drive supplied with the identiCLASS Developer Tool Kit and insert it in one of the USB connectors on your computer.

   The USB Flash Memory Drive auto-runs; if you have not previously accepted the End User License Agreement (EULA), a screen are displayed showing the EULA.

2. Read the EULA. Click the check box and click **OK**.

3. Follow the instructions on the screen to install the drivers and the identiCLASS configuration tool.

4. If you select the **Typical** install option then installed are all the components of the identiCLASS DTK.

   Note: Select **Custom** for installing the drivers or any of the other components within the identiCLASS DTK separately.

5. Connect the reader board to your computer using the USB cable provided in the identiCLASS Developer Tool Kit.

5.2   Downloading the latest software

1. Take the USB Flash Memory Drive supplied with the identiCLASS Developer Tool Kit and insert it in one of the USB connectors on your computer.

   The USB Flash Memory Drive auto-runs and displayed is the End User Licence Agreement (EULA).

2. Read the EULA. Click the check box to accept the EULA and click **OK**.

3. If your computer is online and you have not registered your product then do so now – you will then be able to download the latest drivers, software and documentation for your identiCLASS Developer Tool Kit.

4. If your computer is online and you have registered your product, go to www.hidglobal.com, choose the identiCLASS product option and follow the instructions on the screen to download the latest updates onto your local computer.

5.3 Installing and running the software configuration tool

1. Double-click the **identiCLASS** desktop icon ![identiCLASS icon] to run the program.

2. If the reader board is connected to the computer through the USB port, the screen will display the **Reader Information**. An example screen is shown.
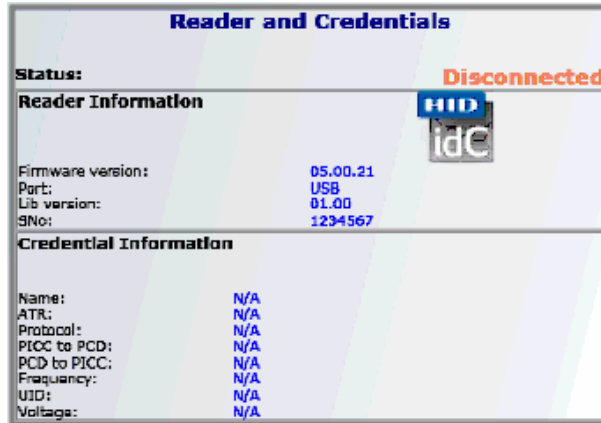
3. Present a sample card or passport to the reader. If the reader reads the credentials from the card or passport, the screen changes to say **Connected** in green as shown below and the **Credential Information** is displayed.
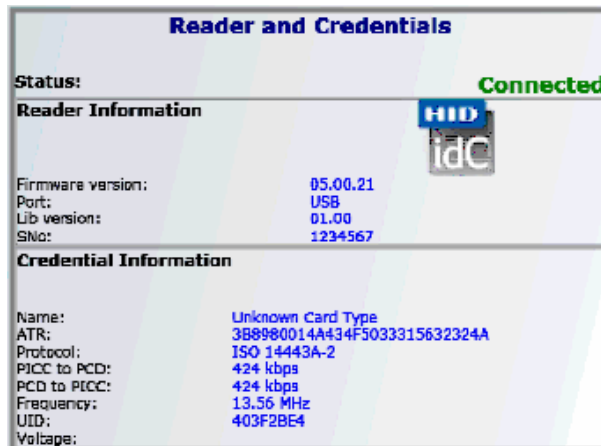
4. For details of how to configure your system using the Software Configuration Tool, refer to the identiCLASS Software Configuration Tool User Guide.

6   Integrating identiCLASS with your equipment

6.1   Tips for installing identiCLASS readers and antennas

Installing the antennas in surroundings which have metal nearby may cause the reader to suffer reduced performance, or not work. Setup and test the reader and antennas before enclosing them so you know they are working, as described in
Section 5 Configuration, Setup and Testing. The following guidelines help when you integrate the identiCLASS readers and antennas with your equipment.

1. If possible, mount the antennas in an enclosure which is not made of metal, and contains little or no metal. This is the ideal solution.

2. Keep metal as far away as possible from the antenna(s).

3. Install identiCLASS and test it in its new enclosure. If it worked when tested outside the enclosure, but now does not work, you need either

   a. Locate the antennas further away from the metal, or

   b. Use ferrite material to cancel the effect of the metal in the enclosure. Ideally, use a different enclosure without any metal.

4. Using ferrite material is a matter of trial and error. Ferrites are magnetically soft ceramic materials which consist of mixed crystals, or compounds, of ferric oxide and another bivalent metal oxide. The main characteristic of ferrites is that they are poor electrical conductors while having a high magnetic permeability. This allows ferrites to be used to shield the reader's field from nearby metal.

6.2   Cables

Cables are provided to connect antennas to readers (10cm), to connect smart card adapters to the 3300 Reader Core (15cm) and to connect the reader to the USB port.

- The ribbon cable should not be folded with a hard crease (radius defined at < 3mm) like a piece of paper more than once; for example if creased at 1mm never unfold it.

- The cable performs best if placed in free space. To avoid detuning the antenna, do not attach the cable to a metal surface. Observe capacitive couplings near metallic surfaces: within 10mm.

- If a cable is damaged it must be replaced by the exact type and length item.

7   Mechanical Specifications

The following section details mechanical specifications for the identiCLASS readers, antennas and interfaces. Full resolution files are available on the USB Flash Memory Drive and on the identiCLASS Tool Kit developer's website.

7.1   3500 Reader Board
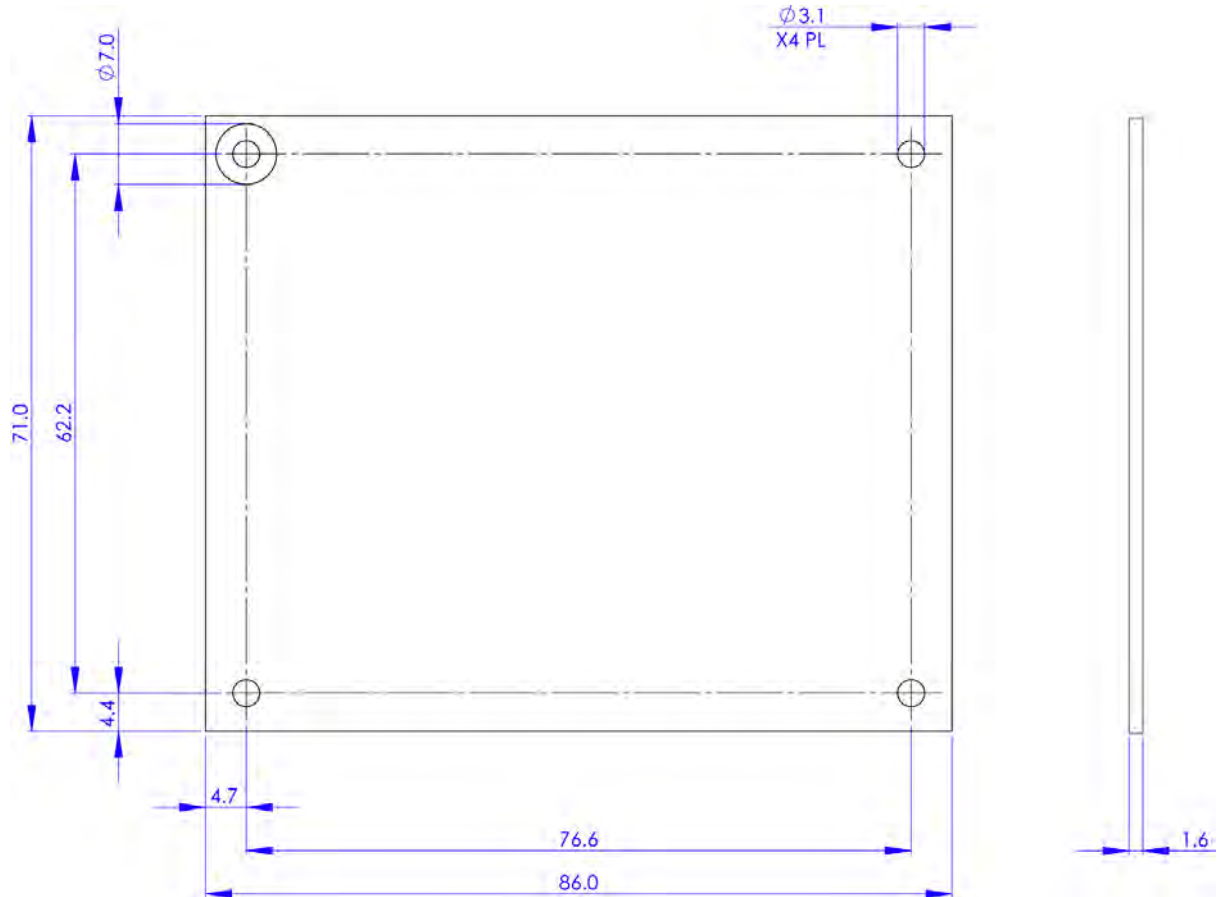
Figure 7-1 – 3500 Reader Board Dimensions

7.2   identiCLASS 3300 Reader Core
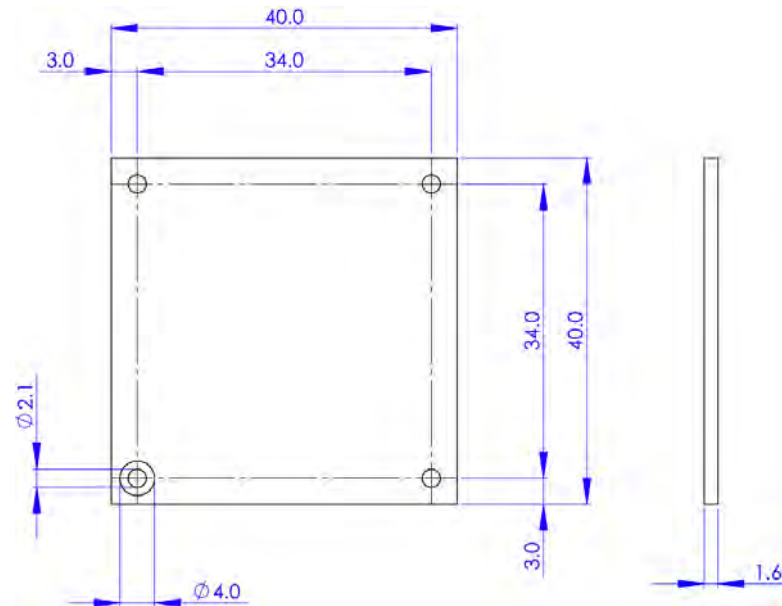
Figure 7-2 – 3300 Reader Core Dimensions

7.3   Smart Card Adapter – full-size card
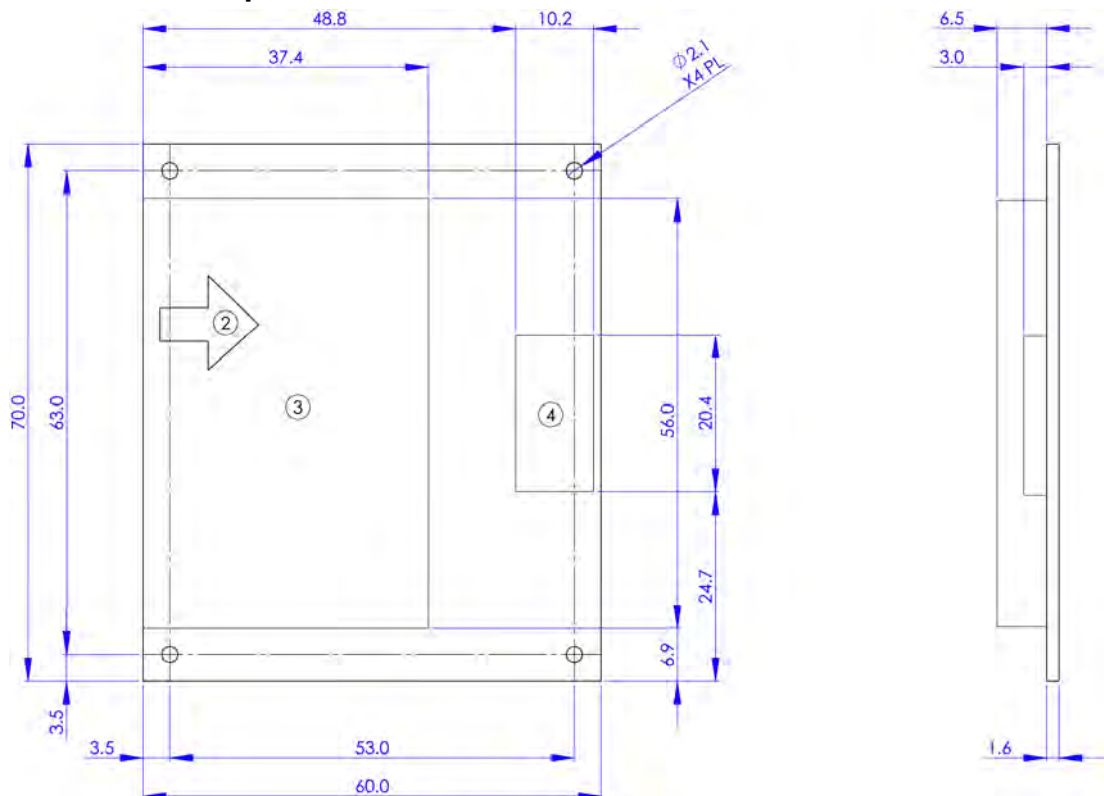
Figure 7-3 – Smart Card Adapter dimensions and mounting holes

7.4 Smart Card Adapter – SIM-size card
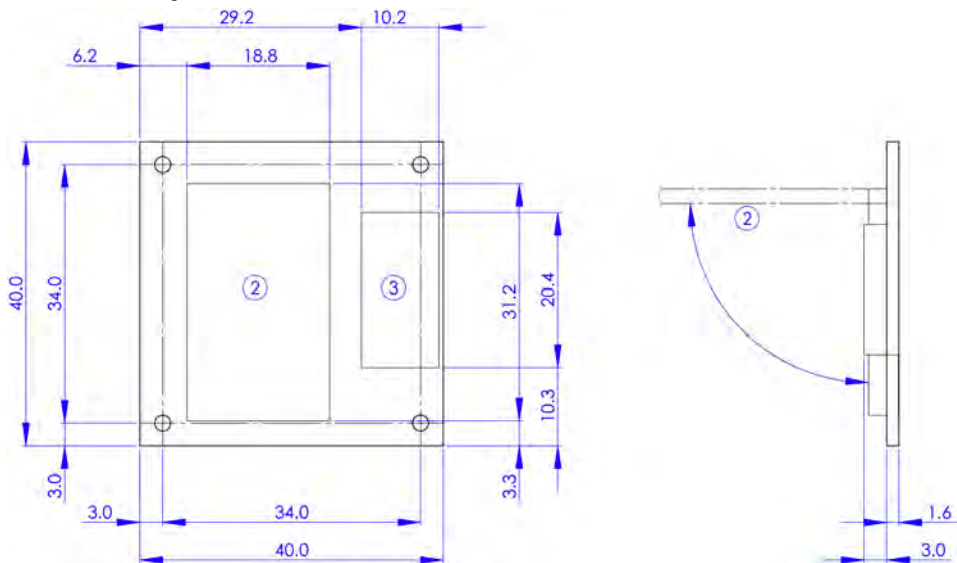
Figure 7-4 – SIM Card Adapter Dimensions

7.5 Antennas

The antennas for the identiCLASS readers are air-tuned.

This means the antenna is pre-tuned for open air conditions (for example, not near metal). When an air-tuned antenna is placed near metal, its tuning is affected (causing it to perform with a slightly smaller read range). More importantly, communication errors become more frequent when large data transfers are involved.

7.5.1 Antenna Model ID1
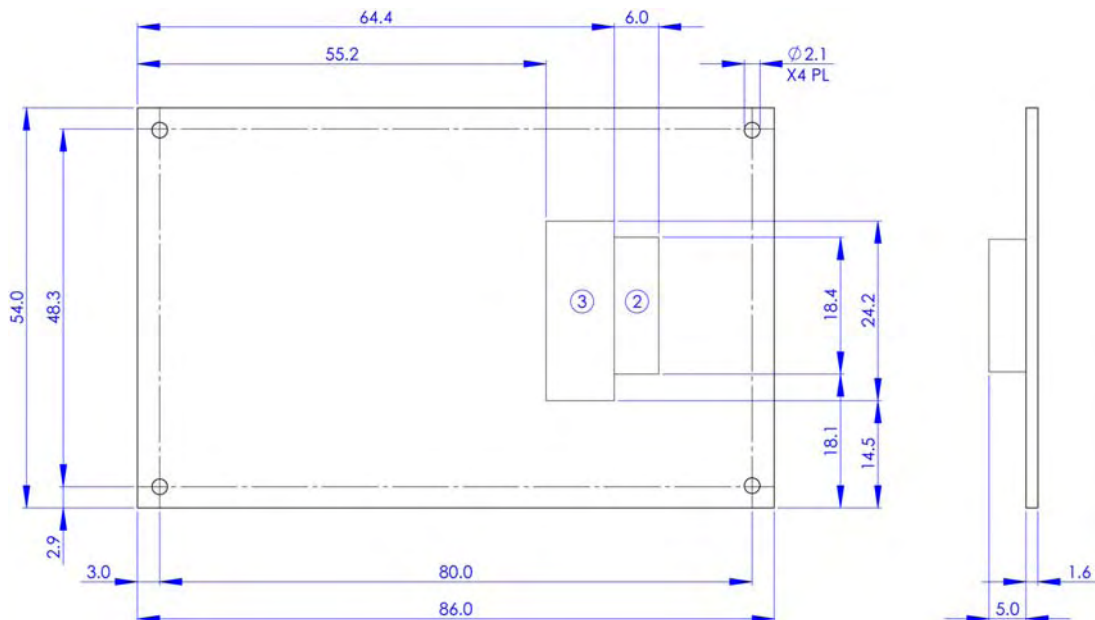
Figure 7-5 – ID1 Antenna

7.5.2   Antenna Model ID3
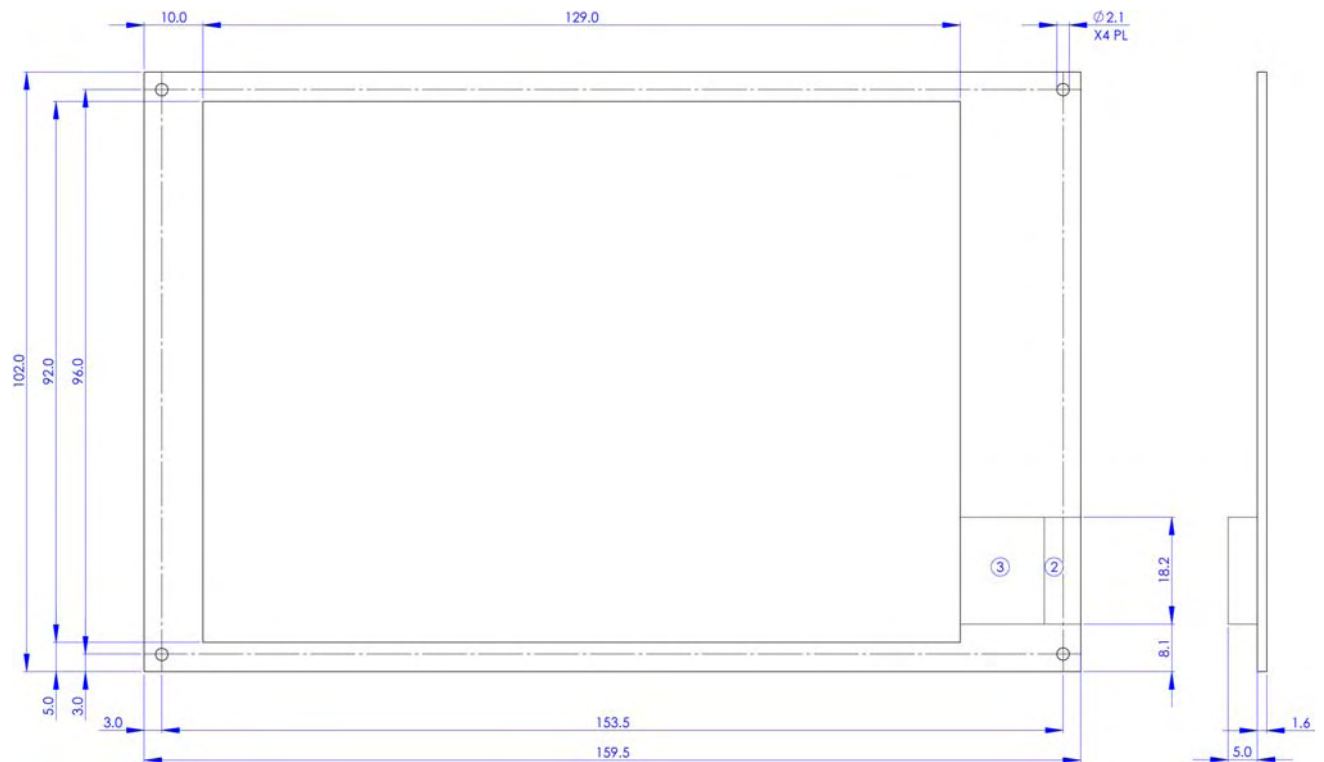
Figure 7-6 – ID3 Antenna

8   Configuration

The standard default configuration settings for identiCLASS readers are as follows:

Reader Core   (DG3300A00)   Single antenna, ID3

Reader Board   (DG3500A00)   Integrated antenna enabled, 2x External antenna's, both ID3

Note: These configuration settings can be altered using the identiCLASS software configuration tool (refer to the identiCLASS Developer Tool Kit software configuration tool user guide), or the identiCLASS production configuration tool (refer to the identiCLASS production configuration tool user guide)

8.1   Modulation Index (MI)

The Modulation Index has to be within the range defined in the standard to which your equipment must conform.

8.2   Rx Threshold

The Rx Threshold can be adjusted. In situations where there is background RF noise, the Rx Threshold can be increased so that the receiver will not be switched on by the noise.

8.3   Rx Gain

The Rx Gain can be adjusted. It may be desirable to reduce the Rx Gain when there is background RF noise.

8.4   Changing these parameters

To adjust any of these parameters, do the following:

1. Run the **Software Configuration Tool**.
2. Click the **Device Settings** tab.

3. If you have more than one reader connected to the computer, choose it in the drop-down box at the top of the screen.

4. Choose the standard for which you want to apply these settings by choosing one of the tabs on the left.

5. If you have more than one antenna connected to the reader, choose the antenna whose settings you want to configure: Antenna 0, Antenna 1, Antenna 2.

6. **Set values according to standard configuration for:** in this drop-down box choose the type of antenna you are configuring:

    ID0 -> Internal is the built-in antenna

    ID1 -> External is the small external antenna

    ID3 -> External is the large external antenna

6. Enter the new values for the parameters you want to change in the column which is headed **Register Values**.

7. For every value you change, click the box in the **Apply Settings** column.

8. When you have finished making changes, click the button at the top of the screen. The new changes are sent to the reader board.

9   Regulatory

The identiCLASS 3500 Reader Board has been FCC modular approved – refer to the identiCLASS developer website for the FCC approval number.

Submit any equipment using the identiCLASS 3300 Reader Core for FCC approval by the OEM. The following theory of operation is required in order to gain approval.

9.1   Theory of Operation

9.1.1   Block diagrams

3300 Reader Core

```
            ┌──────────────┐
            │  ISO 7816    │
            │  Interface   │
            └──────┬───────┘
                   │
        ┌──────────┴───────┐   ┌──────────┐   ┌──────────┐   ┌──────────┐
USB ────│  identiCLASS     │───│  Reader  │───│ Matching │───│  Tuning  │──⟩
        │  MicroController │   │   IC     │   │          │   │          │
        └────────┬─────────┘   └────┬─────┘   └──────────┘   └──────────┘
              8 MHz              13.56 MHz
```

3500 Reader Board

```
            ┌──────────────┐
            │   ID000      │
            │   Card       │
            │   Socket     │                                  ┌──────────┐
            └──────┬───────┘                             ┌────│ Antenna  │
                   │                                     │    │  Ext 2   │
        ┌──────────┴───────┐   ┌──────────┐   ┌───────┐  │    ├──────────┤
USB ────│  identiCLASS     │───│  Reader  │───│Antenna│──┤    │ Antenna  │
        │  MicroController │   │   IC     │   │ Switch│  │    │  Ext 1   │
        └────────┬─────────┘   └────┬─────┘   └───────┘  │    └──────────┘
              8 MHz              13.56 MHz   ┌──────────┐ │    ┌──────────┐
                                            │ Matching │ └────│  Tuning  │──⟩
                                            └──────────┘      └──────────┘
                                                               Antenna
                                                                Int 0
```
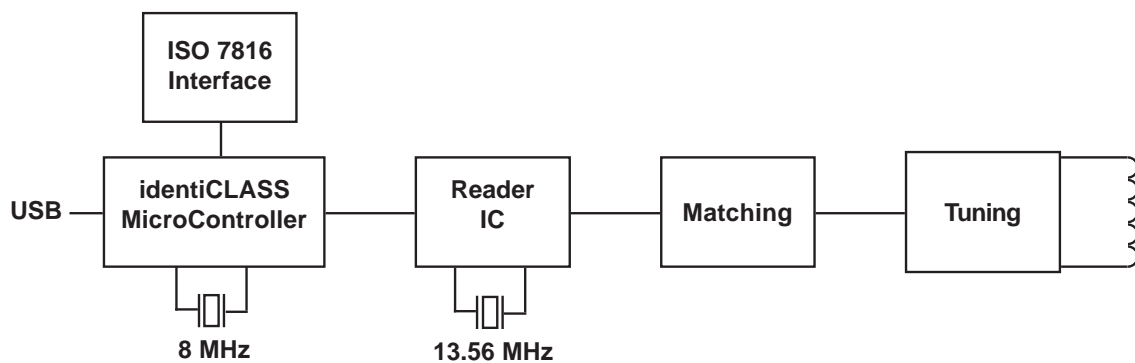
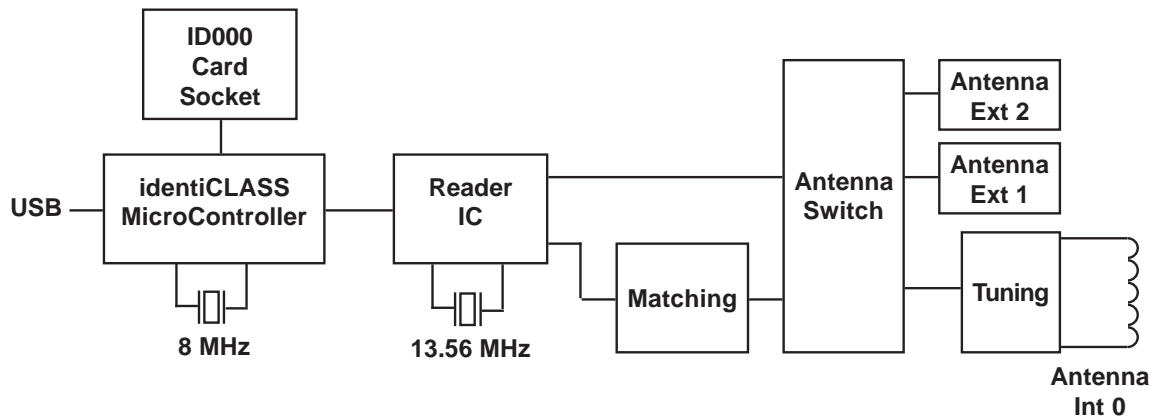### 9.1.2   System Description & How the Device Operates

The reader/writer is designed to communicate with a transponder IC using an RF interface, at distances up to 70 mm. The transmitter/receiver antenna emits a 13.56MHz AC magnetic field. The field "powers up" a passive credential which is brought into the proximity of the antenna. The transponder, when powered, operates as a field disturbance device and either receives or returns a serial data stream. The reader communicates with the transponder by 10% or 100% ASK modulation.

The reader/writer is controlled by its host by means of a USB interface. This USB interface operates on TTL voltage levels. The reader/writer is fully controlled by its host and does not act autonomously but communicates with the transponder when requested to do so.

When a transponder is presented, the reader may execute an application that can be as simple as reading a unique ID or reading and writing large amounts of data. The length of time the RF field is on when executing an application is entirely dependent upon the application itself.

9.1.3   Ground System

The transmitter driver circuitry, analog circuitry and digital circuitry all connect to the same ground plane.

Regulatory

HID OEM Reader Modules

The following describes HID OEM Reader modules regulatory guidelines.

- UL Recognition (Recognized Component) to UL294 for the USA and CSA C22.2 No. 205 for Canada. The mark is cRUus where the "R" is backwards and "Security" appears above the circle containing the Mark.

- OEM Final Product UL Listing

    Because OEM Modules are cRUus recognized, UL will treat them as a recognized component and only the remainder of the final product will need evaluation for a listing. The mark will be cULus with "Security" written above the circle containing the mark.

OEM Final Product Radio Certifications

- Because HID OEM modules contain a radio transmitter operating at 13.56 MHz and the module is integrated into the OEM's final product, Radio Certification will be required for the final product.

For 3300 Reader Core only:

- FCC Certification can be obtained by submitting the final product to a Telecommunications Certified Body (TCB) laboratory that can perform the testing and issue the FCC Grant. Standard: Part 15, Subpart C.

- Often the same TCB can also test to Canada requirements and grant certification as a Certification Body (CB). Standard: RSS-210, RSS-GEN and RSS-310 where applicable

- The same laboratory may also be an EU Communications Assessment Body (CAB) that is accredited to test to R&TTE Directive requirements for CE Marking. Standards: EN 300 330, EN 301 489-3, EN 50130-4, and IEC60950

- A laboratory that is a CAB testing to R&TTE Directive requirements will also be testing to Australia and New Zealand requirements because of a common test standard. Standard: AS/NZS 4268

- Asian country certifications are obtained on an individual country basis.

OEM Final Product US Dept. of Commerce Bureau of Industry and Security (BIS) approval
is required for USA based companies who export and re-export products using encryption.

Regulatory Compliance Assistance - HID Global will provide technical assistance and laboratory
recommendations as required.

FCC / Canada Radio Certification

These devices comply with part 15 of the FCC rules.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Le fonctionnement est soumis aux deux conditions suivantes : (1) Ce dispositif ne peut pas causer de perturbations nuisibles et (2) ce dispositif doit accepter toute perturbation quelconque qu'il reçoit, y compris des perturbations susceptibles de provoquer un fonctionnement indésirable. Les changements ou modifications n'ayant pas été expressément approuvés par la partie responsable de la conformité peuvent faire perdre à l'utilisateur l'autorisation de faire fonctionner le matériel.

Appendices

Product guide and ordering information

Description	Part Number
Readers	
HID identiCLASS 3300 Reader Core	DG3300A00
HID identiCLASS 3500 Reader Board	DG3500A00
Antennas	
HID identiCLASS ID1 Antenna - Molex Connector	4090A01
HID identiCLASS ID3 Antenna - Molex Connector	4090A02
Antenna Cables	
HID identiCLASS 10cm Antenna Cable - Molex Connector	4091A01
Smart Card Adaptor Cables	
HID identiCLASS 15cm Smart Card Adapter Cable	4091A04
Smart Card Adaptors	
HID identiCLASS Smart Card Adapter - Full Card Size	4093A01
HID identiCLASS Smart Card Adapter - SIM Card Size	4093A02

Contact

identiCLASS product support
HID Global email: identiclass_support@hidglobal.com web: www.hidglobal.com