identec SOLUTIONS

i-CARD
Reference Manual

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NOTE: This equipment has been tested and found to comply with the limits for a 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 the instruction manual, may cause harmful interference to radio communication. 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.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC ID:	**O2E-ICARD-NA**
CANADA:	**XXXXXXXXXXXX**
MODEL:	**i-CARD**
TYPE:	**NA**

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigencies du Règlement sur le matériel brouilleur du Canada.

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2 Introduction

2.1 General

This document provides information for the installation and operation of the IDENTEC i-CARD, a PC Card type RFID interrogator.

Other documentation that may be applicable includes the Application Developers Guide To Programming For The ILR Library, the i-COM User Manual, the i-CARD Installation & Configuration Sheet, and the i-Q Tag Technical Sheet.

2.2 Product Description

The i-CARD is a PC Card type RFID device for communicating with the i-Q series of active tags. It will plug into PCMCIA slots of portable devices like handheld scanners, etc. It must be powered by a 5V source, capable of supplying 150mA.
The i-CARD is configurable via firmware to provide application developers with both a PCMCIA, as well as a serial interface for advanced automatic data capture applications using ILR technology.

The operating system in the hosting device can be Windows 98®, Windows NT® or Windows CE®, providing the interface to the i-CARD Application programs developed to run on the i-CARD use calls to the IDENTEC i-PORT software library to access the RF functions on the i-CARD.

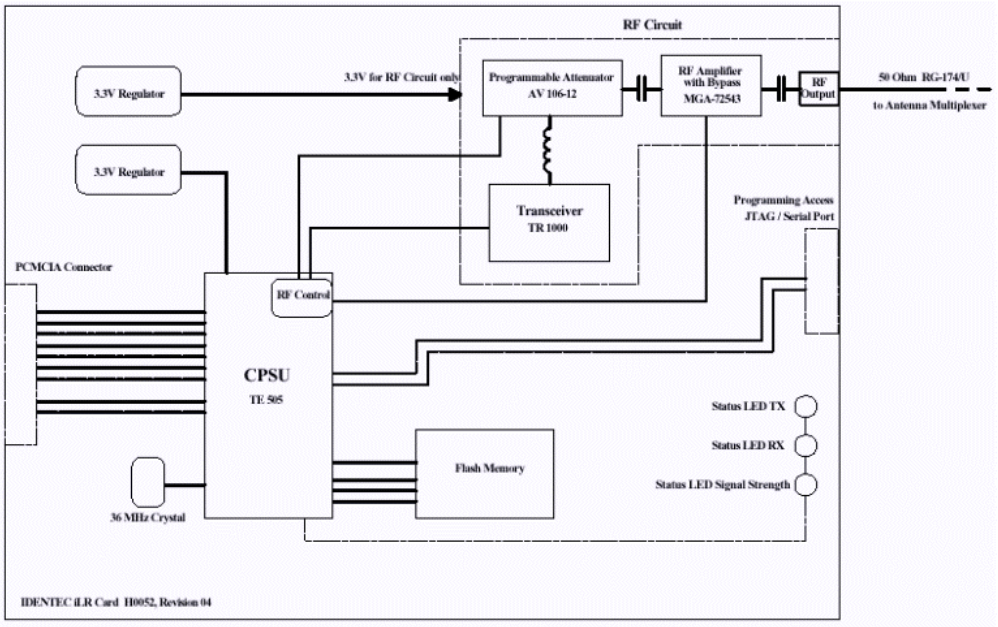
The i-CARD enclosure is a PC Card type II tin can. Three status LEDs can be viewed from the front edge; they are Carrier Detect (green), Transmit (red) and Receive (green). The front also hosts the MMCX 50Ù coax RF connector for the antenna.

In addition, the front edge holds a 15-pin PC Card I/O connector for serial (RS-232) access and card programming.

The i-CARD contains a Configurable Processor System Unit (CPSU) with internal non-volatile memory. The CPSU chip is programmed by IDENTEC and contains the firmware code.
The i-CARD contains the RF circuitry for the wireless communication with IDENTEC tags. The application software running on the i-PORT, or other host computer, sends commands to the CPSU to communicate with the tags. The CPSU on the i-CARD controls all functions of the board. The normal mode (power-up and standby) of the i-CARD is 'Receive Mode', as opposed to the time-limited 'Transmit Mode', which has to be initiated by the controlling host computer.

Note: The i-CARD used in the i-PORT is in a PC Card Type II housing but it is not configured with a PCMCIA interface. The i-CARD in the i-PORT has a serial interface and can only be used in the assigned card slot on the i-PORT.
i-CARDs with PCMCIA interface code are suitable for any other standard portable equipment.
Each i-CARD is marked with an interface type, either PCMCIA or serial. Do not use an i-CARD with a PCMCIA interface in the i-PORT. Vice versa, do not use an i-CARD with a serial interface in any other portable device with PCMCIA slot.

i-CARD Block Diagram



3 i-CARD Connectors — System Inputs and Outputs

The i-CARD's two I/O connector pinouts are depicted in figure 1 & 2. The function of the connectors is described below.
Caution: Never remove or install a PC Card while its supply power is turned on.

Pinout of 15-pin I/O serial & programming connector, located on front edge:

Pin Number	Signal Name
1	+5V Input
2	+5V Input
3	RXD
4	TXD
5	JTAG
6	JTAG
7	JTAG
8	JTAG
9	Powerdown (act. high)
10	Do not use
11	Do not use
12	RESET (active low)
13	Ground
14	Ground
15	+3.3V (do not use)

Figure 1

Pinout of 68-pin PCMCIA connector, located on the card's back edge:

Pin Number	Signal Name
1.	GND
2.	Reserve 1
3.	Reserve 2
4.	CONT
5.	i-PORT RXD
6.	i-PORT TXD
7.	ANTSEL 2#
8.	ANTSEL 1#
9.	ANTSEL 2
10.	N.C.
11.	N.C.
12.	DIR
13.	Charge_on
14.	N.C.
15.	Test RXD
16.	Test TXD
17.	Vcc
18.	N.C.
19.	ANTSEL 1
20.	RLY 1
21.	RLY 2
22.	N.C.
23.	N.C.
24.	Barcode Trig
25.	OPT 1
26.	OPT 2
27.	OPT 3
28.	OPT 4
29.	LCD Temp
30.	RLY 3
31.	RLY 4
32.	LCD Heat
33.	RESETb
34.	GND
35.	GND
36.	GND
37.	Barcode RXD
38.	Barcode TXD
39.	i-PORT RXD#
40.	i-PORT TXD#
41.	PWR LED
42.	BAT LED

43.	**ANTLED 1**
44.	**ANTLED 2**
45.	**Reserve 3**
46.	**30V LED**
47.	**12V LED**
48.	**5V LED**
49.	**Master Reset#**
50.	**RSSI LED**
51.	**Vcc**
52.	**N.C.**
53.	**N.C.**
54.	**N.C.**
55.	**N.C.**
56.	**N.C.**
57.	**N.C.**
58.	**AD5**
59.	**Beep 2**
60.	**Beep 1**
61.	**AD6**
62.	**AD4**
63.	**AD3**
64.	**AD2**
65.	**AD1**
66.	**AD0**
67.	**GND**
68.	**GND**

Figure 2

Most of these pins are being used for i-PORT operation. For operation in regular PCMCIA slots, the user does not have to worry about the above pinout table, since the configuration is done by the I-CARD's firmware for PCMCIA.

4 External Power Supply Requirements

Operation of the i-CARD requires a 5VDC power supply, which is an integral part of the PCMCIA slot.
Some slots may only provide 3.3V supply and are not suitable for this revision of the I-CARD.
The maximum supply current will not exceed 150mA.

5 Installation

This chapter describes the installation and antenna connection procedure for an i-CARD in mobile equipment, such as a handheld scanner. For installation in an i-PORT, see the *i-PORT Reference Manual*.

Important Note to Installer:

This device requires professional installation by a certified electronics technician or electrical engineer, following each and all procedures of the installation manual. This device is only legal to operate in conjunction with the antenna type approved by FCC and Industry Canada.
The installer is taking legal responsibility that all steps outlined in the IDENTEC installation manual have been executed properly, and that the installed device is complying with FCC Part 15 and the limits for a 'Class A Digital Device', as defined by Industry Canada.

5.1 Physical Installation

The I-CARD plugs into either an i-PORT's appropriate slot, or into any PCMCIA slot with a 5V supply voltage.

5.2 Electrical Installation

Every time the i-CARD's 5V power is cycled it is being reset. Thereby, a default sequence table is automatically loaded, limiting RF output power to a low level. The receiver sensitivity is also limited in this process.

6 i-CARD Antennas

Antennas for use with the i-CARD are required to have a gain equal to or less than $3dB_{(ic)}$. It is recommended that the antenna polarization should be elliptical or circular, although in applications where the orientation of the tag is in a consistent and known position linearly polarized antennas can also be used.

Normally, a miniature antenna, like a quarter-wavelength whip, a bent half-wavelength dipole or a subminiature patch antenna should be used. These antennas would typically be integrated in the portable device.

For any (external) antenna connection the maximum cable length allowed can produce a decibel loss no greater than 6dB. Each coax cable type and gauge will have different loss characteristics and the installer should contact the cable supplier to determine the suitability any cable for their application.

In most locations, it is probable that null spots will exist in the coverage of any single antenna. If a tag is in a null spot even though it is within range of an antenna it will not be interrogated. This is typically not a problem when tags are moving through a read zone, but if the tags must be interrogated while stationary it will be necessary to create redundancy in the read zone.

7 i-Q Tags

IDENTEC i-Q tags are available in a number of configurations to match the tag with the application. Tags of different types can be mixed in a single system and can be interrogated simultaneously by an i-CARD. Tags are available as read only, read/write with 8 KB of memory, and a read/write tag with and optional temperature monitor. Tag memory is expandable to 32KB.

Table 1

FEATURES	i - QR	i – Q8	i – Q8T
READ RANGE > THAN 100 FEET	YES	YES	YES
8 KBYTES OF MEMORY		YES	YES
BROADCAST CAPABILITY	YES	YES	YES
ANTI – COLLISION ALGORITHM	YES	YES	YES
5 YEAR BATTERY LIFE	YES	YES	YES
TEMPERATURE MONITORING			YES
OPERATES IN HARSH ENVIRONMENTS	YES	YES	YES

All i-Q tags are active and include an RF transmitter, RF receiver, and a microprocessor. The communication range between a tag and an antenna connected to an i-CARD interrogator will be up to 30 feet under typical conditions. Read range will vary depending on antenna gain and local conditions, and it is important to test tag read performance under a variety of probable scenarios.

For more information see the *i-Q Tag Technical Sheet.*

8 Software

This chapter provides basic information on how to control the operation of the i-CARD. For more detailed information please see the *Application Developers Guide To Programming For The ILR Library.*

ILR technology requires an application program to provide end-user functions, this level of software is provided by the System Integrator. To facilitate the development of user specific applications, IDENTEC has extended the Windows API (Application Program Interface) to include easy access to ILR functions using C program calls.

IDENTEC does provide a demonstration package to allow the installer to configure and to test the basic functions of the i-CARD.

To allow maximum flexibility in interrogating tags, scanning barcodes, allowing user data entry, providing user information, formatting and sorting data, and data transfer to tags and over a network (i.e. Wireless LAN), the i-CARD functions under the direction of a control program. This control program customizes the i-CARD to do the required task. It is generated by a menu-driven Windows application that allows the user to specify how the system will operate.

This is a simple but very powerful feature of the IDENTEC ILR system. It allows an i-CARD to perform similar tasks in very different ways from completely automated tag interrogation and reporting to automated assistance in process operations. The data source for various fields can be specified, e.g. tag ID, tag file or barcode scan. A sequence of events can be specified to gather data, format data in a specific way, and/or communicate data to a specific location.

Note:* Microsoft® Windows® CE Toolkit for Visual C++ *is required to make applications run on* Windows® CE *operating system for x86 microprocessors that is used on the i-PORT.

9 Product Support

Technical support for IDENTEC ILR products is available by e-mail, online and by telephone or fax. Full support is provided to Authorized Systems Integrators who have completed the technical training sessions and are certified ILR technicians.

Additional training and product support is available from IDENTEC under a support agreement. Field Support is also available on a contract basis. Support can be provided for site surveys, and for product installation and testing. Contact your account manager for full details.

9.1 To Reach IDENTEC Support

9.1.1 Online support

Technical support is available online to all IDENTEC Authorized System Integrators. Answers to many common questions and problems are included in our searchable database at www.IDENTEC.com\faq.htm this database can be made accessible to any product user.

9.1.2 E-mail support

When sending an e-mail include your name, company, telephone and fax numbers along with your question or problem.
In North America support@IDENTEC.com
In Europe and the UK support@IDENTEC.au

9.1.3 Telephone and Fax Support

Telephone assistance in North America is available from 8:30 to 5:30 Pacific time, Monday through Friday, Canadian holidays not included. .

9.1.4 Support numbers

North America

Tel: (250) 860-6567
Fax: (250) 860-6541
Toll Free Phone 1-877-IDENTEC

9.1.5 Order Desk

To order products contact the order desk by phone or fax
North America

Tel: (250) 860-6567
Fax: (250) 860-6541
Toll Free Phone 1-877-IDENTEC

9.1.6 Warranty Service

For warranty service contact the warranty department within your region to get a warranty claim number. All products returned for warrantee service must include a warranty service number for prompt processing.
In North America phone (250) 860-6567

9.1.7 Additional Tools and Training

Support is provided only to trained systems integrators. IDENTEC provides training in ILR technology with the purchase of a development kit. To have additional employees or third party consultants certified to receive full access to product support IDENTEC offers certification training.