

A New Era in RFID Technology: IDENTEC Intelligent Long Range Active Tags

IDENTEC's Intelligent Long Range (ILR) technology tracks assets and improves business processes in ways never before possible. Systems using ILR tags and interrogators provide highly accurate, real-time data collection and retrieval with minimal human intervention. The i-Q tags communicate over long ranges to fixed i-PORT interrogators or to portable computing equipment with an installed ILR-CARD. IDENTEC's ILR-CARD is an RFID interrogator on a PC Card.

ILR technology employs a sophisticated anti-collision algorithm that allows large numbers of tags to be read virtually simultaneously. The high-speed data rate

used by ILR technology allows hundreds of tags to be identified in seconds. The tags in the i-Q series communicate in the 915 MHz or 868 MHz ISM band; these frequencies allow long read-range and high data transmission rates with minimal communication interference due to local conditions.

Tags in the i-Q line are available as read-only and read/write with expandable memory and an optional internal sensor for monitoring temperature.

Tags are filled with impact-resistant epoxy to make them waterproof and able to withstand the abuse expected in work processes. Tag memory is non-volatile for reliable data storage that is unaffected by harsh environments or battery life.

ILR Features:

Flexibility of an interrogator on a PC Card

Easy system installation, integration and maintenance

Long communication range of up to 30 meters (100 feet)

Sophisticated anti-collision protocol

Large tag memory capacity

Temperature monitoring and logging ability

Respond and broadcast modes

Long tag battery life





Memory Tags

Memory tags function like a portable floppy disk, with users able to write and retrieve data from the tag as needed. The memory can be segmented and protected to allow only the required data to be read or written to. Data is encrypted to ensure access to information is controlled, so regardless of the whereabouts of the tag, the data is secure and cannot be tampered with.

The memory on the i-Q active tags is available in two configurations, 8KB or 32KB. The tag can be used to store any information and can be used as an electronic packing slip or as an electronic shop traveler. The memory on the i-Q8T temperature tag is also used to store temperature and time stamp information. Tag data is communicated to a handheld or fixed interrogator for integration with any corporate software. The temperature or other tag data can also be exchanged over the internet or as E-commerce for distribution within your company or business partners.

Active Technology

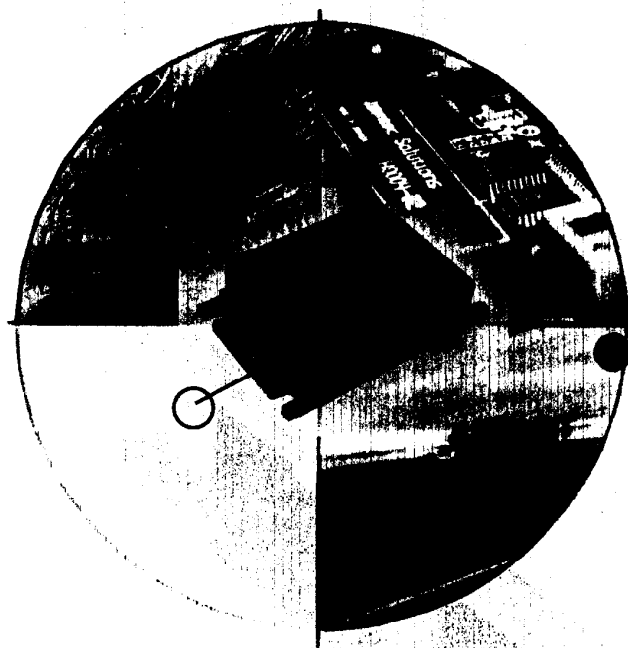
Active RFID tags are battery-powered for exceptionally long communication ranges. The read/write range for active tags in the i-Q series is up to 30 meters (100 feet), providing very reliable data exchange even over large work areas. The lithium battery used in the i-Q tag has a 10 year life expectancy.

Active tags in the i-Q series can be interrogated as soon as they are in range of a reader, or they can be programmed to broadcast at preset intervals for continuous monitoring of tag location. With the broadcast feature, location and presence of the tag is continually monitored, and with memory tags, the broadcast function assures communication of all data on the tag. Even with 32KB of data storage on the tag, or with many tags in the field, no data will be lost.

The battery power on the tag can also be used to power other tag components such as a temperature monitor or other sensor. Tag memory on all IDENITEC tags is non-volatile and is not affected by battery power.

i-Q Tag Family Comparison

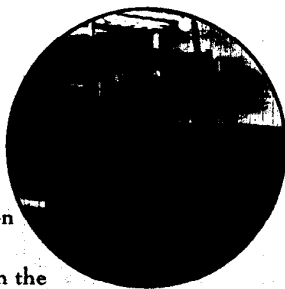
FEATURES	I-QR	I-Q8	I-Q8T
30 m (100 feet) read range	✓	✓	✓
8KB memory, expandable to 32KB		✓	✓
Broadcast capability	✓	✓	✓
Anti-collision algorithm	✓	✓	✓
Up to ten year battery life	✓	✓	✓
Temperature monitor			✓
Operates in harsh environments	✓	✓	✓



Solutions. It's in our name.

i-Q8 Active Response Tag

The i-Q8 is an active RFID tag with 8KB of memory for storing the tags' identification and user-defined information. The tag is a portable database carrying information with the product. Tag memory is expandable to 32 KB.



RFID and bar code can be combined in a single system

i-Q8T Temperature Monitor Tag

Monitoring the temperature of perishable goods is critical to assure quality has not been compromised. Now with the new i-Q8T, IDENTEC introduces the most automatic data collection system for monitoring and logging temperature. By adding a temperature sensor to the i-Q8 tag, IDENTEC has developed a RFID tag capable of providing temperature profiles at any point in a distribution system.



Tag memory is expandable up to 32KB



Long read range to the portable or fixed reader

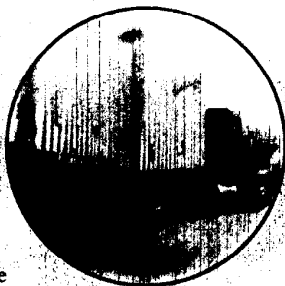
The i-Q8T can measure temperature, with an accuracy of $\pm 0.5^{\circ}\text{C}$ (1°F), in 1 minute intervals up to every 255 minutes. With 8KB of memory, the i-Q8T can store 1024 temperature data points and still have over 5KB for user-defined data storage. The available data storage for user information and temperature data points is expandable up to 32KB.



Anti-collision technology assures all tags are read

i-QR Active Response Tag

The i-QR is a low-cost, read-only, RFID tag for use in applications where tag identification is the only information required. The i-QR is an integral part of IDENTEC's ILR technology and can be used in conjunction with other tags in the i-Q series. Like all i-Q tags, the i-QR can be interrogated for a response as soon as it is in range of an interrogator or it can be programmed to broadcast at preset intervals for continuous monitoring of the location of the tag.



Temperature recorder documents product integrity

identec
SOLUTIONS

Tag Specifications

Communication Range

- To i-PORT 30m (100 feet)
- To ILR-CARD PC Card 10m (30 feet)

Electrical Specifications

- Power source Lithium Battery
- Expected battery life 10 years (normal use)
- Frequency 915 or 868MHz ISM band
- Emissions FCC part 15

Environmental Specifications

- Operating temperature -45°C to +85°C (-49°F to 185°F)
- Humidity (functioning) 90% non-condensing
- Humidity (non-functioning) .. Immersible in 30 cm (1 foot) of water for no more than 5 minutes
- Shock Multiple drops to concrete from 1.2 m (4 feet)
- Vibration 50G/10ms

Physical Specifications

- Dimension 8.4 x 5.7 x 1.9 cm (3.3" x 2.25" x .75")
- Case material Plastic

Data Specifications

- Data retention 10 years without power
- Identification code 40 bit fixed IID (one in one trillion)
- i-Q8 memory 7936 bytes user definable
- i-Q8T memory 5888 bytes user definable

Temperature Logging

- Number of samples 1024
- Interval User definable in 1 minute intervals from 1 minute to 255 minutes
- Accuracy +/-0.5°C over a range of -40°C to +70°C (+/-1°F from -40°F to 158°F)
- Resolution 0.25°C (0.5°F)

To learn more about IDENTEC's ILR technology, integration partners, or how ILR technology can increase efficiency and profitability for your business, contact us directly or visit our website at www.identec.com.

(Patent pending)

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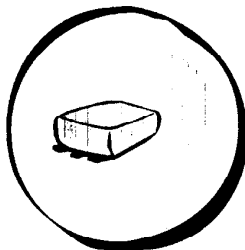
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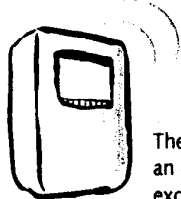
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A portable database that carries information with the product

The IDENTEC i-Q series of tags are go-anywhere portable databases. The powerful i-PORT interrogator and the versatile ILR-CARD combine to provide an innovative radio frequency solution to distributed intelligence.

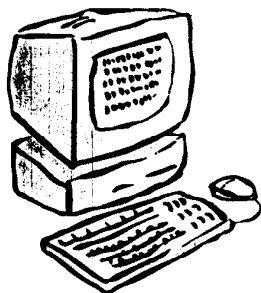


- 1 The read/write tag is a portable database that is affixed to the product and acts as an electronic shop traveller.



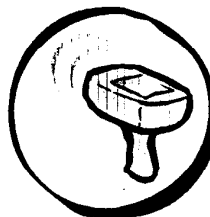
2

The i-PORT fixed interrogator, with an embedded computer, can exchange information between a tag and a host computer, and can process and respond to tags from 30 meters (100 feet) away.



4

Information on the tag is easily integrated with other corporate databases for consistent, real-time information when and where it is needed.

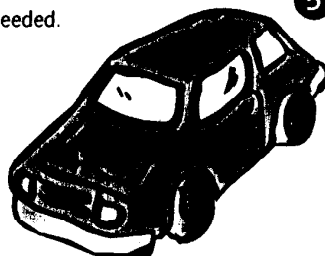


3

The portable ILR-CARD can be installed in the PC Card slot of handheld computers and bar code scanners.

5

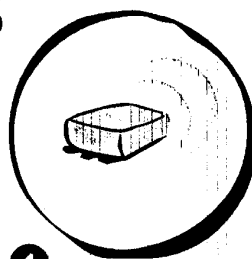
The tag can remain attached to the product to track its use and maintenance, or the tag can be removed and reused in the production process.



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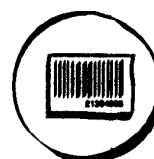
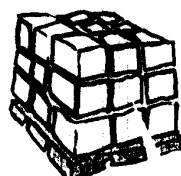
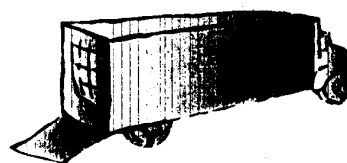
An innovative solution for tracking products

The IDENTEC i-Q series of tags combined with the powerful ILR-CARD and i-PORT, use radio frequency to provide a paperless solution to product distribution, with the added value of temperature monitoring and electronic tracking of assets.



1

With up to 32 KB of user-defined memory, the tag is an electronic packing slip (EPS), storing any information needed for the efficient movement of product through the supply chain.



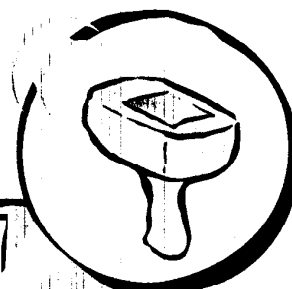
2

The i-Q8T tag provides continuous temperature monitoring for accurate temperature profiles of products as they move through the cold chain.



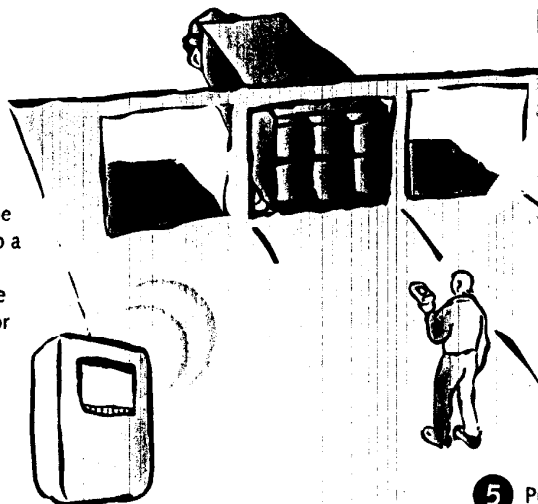
3

The powerful ILR-CARD is a radio frequency interrogator on a PC Card, for use in bar code readers and handheld computers.



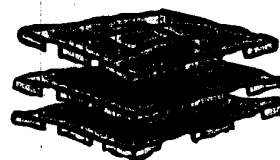
4

Information from the tag can be automatically communicated to a fixed i-PORT interrogator. The embedded computer in the i-PORT processes data locally or exchanges info with a host computer.



5

Product carried on tagged returnable transport material is continuously monitored as it moves through the warehouse. The tag provides location information and improves inventory management. Tagged pallets and other RTMs are monitored for efficient re-use.



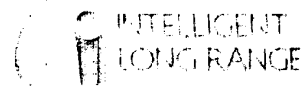
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Solutions. It's in our name.

Using state-of-the-art radio frequency identification (RFID) technology, IDENTEC Solutions offers the most advanced automatic data collection system available. Intelligent Long Range (ILR) technology is a family of RFID interrogators and tags used in information systems to provide unmatched asset tracking and process automation solutions.



IDENTEC's ILR technology was specifically designed to address these needs. The system allows companies to track assets and improve processes in ways never before possible. Although initially developed to track Reusable Transport Material (RTM) such as pallets, totes or other shipping containers, ILR technology has applications in industries where highly accurate, real-time data collection and retrieval, with a minimum of human intervention, is of benefit.

The i-Q active tags are available in a variety of configurations to meet the data requirements of users. Tags are read-only for identification (i-QR), read/write with data storage to carry user defined information (i-Q8), and read/write with built-in temperature monitor to track perishable goods (i-Q8T). Information from the tag is transmitted at high-speed data rates for reliable data communication. Information can be written or read from the tags either automatically or on demand, depending on the requirements of the user.

Interrogators to communicate with IDENTEC tags are available as fixed or portable. The IDENTEC ILR-CARD is a RFID interrogator on a PC Card and can be used in any portable computer equipment with a Type II slot. The ILR-CARD is the most adaptive and flexible RFID interrogator available, allowing users to select handheld equipment specific to their needs. The ILR-CARD allows RFID to be combined with other technologies, such as touch screen computers and bar code scanners. The ILR-CARD is also compatible with portable computers, communicating in real-time over wireless LAN connections.

The ILR-CARD comes pre-installed in the portable i-COM interrogator. The i-COM is a handheld Windows CE® computer with a touch screen and bar code scanner. The i-COM is available with an optional RF LAN for wireless real time data communication.

IDENTEC's i-PORT is a fixed interrogator with an embedded computer. Data can be processed locally on the i-PORT or communicated to a host computer system over a wired or wireless LAN. All of IDENTEC's interrogators operate in Windows® environments and include application development software.



i-Q memory tags are a portable database with up to 32KB of memory



ILR is the only RFID based technology that can collect temperature readings—important for perishable goods



ILR increases manufacturing process efficiency while reducing costly errors

What is ILR?



INTELLIGENT
LONG RANGE

IDENTEC's Intelligent Long Range (ILR) technology is reinventing RFID for automatic data capture. The system is a leading-edge data gathering solution designed to optimize the capabilities of RFID while adding previously unavailable features. ILR allows data gathering and retrieval to be completely automatic—without user intervention or complicated logistical systems. With long read ranges for interrogating tags, and a tag that can be programmed to broadcast data at pre-set times, the system can track many tags simultaneously and can communicate large amounts of data over large work areas. ILR technology meets the most demanding data collection requirements with expandable tag memory and advanced features such as temperature monitoring and anti-collision protocol.

RFID Technology

RFID is the fastest growing segment of the automatic identification industry. Using radio waves to transmit data between tags and interrogators, RFID provides users with non-line of sight access to information stored on the tag. With the ILR system, tags and interrogators can communicate at distances up to 30 meters (100 feet). RFID tracking and control using ILR has a number of benefits over traditional identification technologies in manufacturing, warehousing, logistics and distribution environments. Large amounts of information can be exchanged automatically and from significant distances, even in unfavorable conditions created by dust, dirt, grease, paint and extremes in temperature.

ILR Components

As the trend towards globalization increases and pressures mount from domestic and foreign competitors, businesses must react quickly and efficiently. Regardless of the industry or type of business, having access to accurate data in real time is critical.



The long read range of ILR technology tracks tags over a large operating area



Data can be integrated with corporate software to update information automatically or only on demand

Company Overview

IDENTEC Solutions is dedicated to providing innovative data-gathering solutions to reduce losses and increase profitability for our customers.

At IDENTEC we are rapidly building a reputation as a company whose leading-edge technology is turning complex data gathering and management challenges into solutions in a number of industries. With offices located in North America and Europe, IDENTEC assures global coverage and responsive customer support worldwide.

To learn more about how ILR technology can increase efficiency and profitability for your business, or to find out about System Integration or Partnership opportunities, please contact us directly or visit our website at www.identec.com.

ILR, ILR-CARD, I-Q, I-QR, I-Q8, I-Q8T, and I-PORT
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Windows® is a trademark of Microsoft Corp.

ILR technology is ideally suited for automatic identification and data capture in a supply chain



Custom data collection and management systems are easily developed

Worldwide support:



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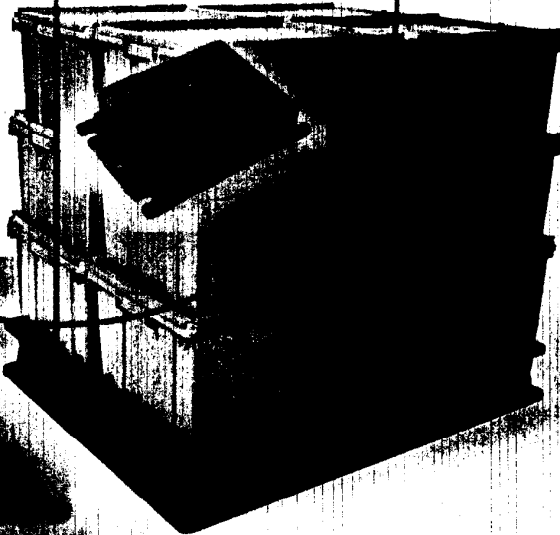
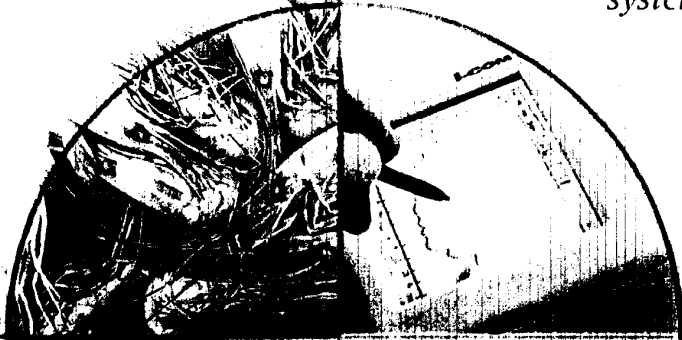
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Temperature Tracking



The combination of RFID technology and temperature monitoring creates the most automatic product tracking system available



 Solutions. It's in our name.

Using ILR technology to monitor the temperature of perishable goods

IDENTEC introduces the most automatic and reliable data collection system available for tracking temperature. By adding a temperature sensor to a radio frequency identification (RFID) tag, IDENTEC has developed tracking technology capable of communicating a temperature log automatically to a host computer system or to the handheld computer with an ILR-CARD installed.

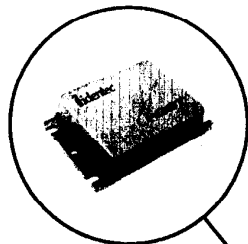
As soon as a tag comes within range of an interrogator, communication of the temperature log is immediate, providing instant access to the temperature conditions experienced by the product. Data can also be automatically distributed by e-mail, internet or fax, to keep those who need to know informed.

Intelligent Long Range Data Collection

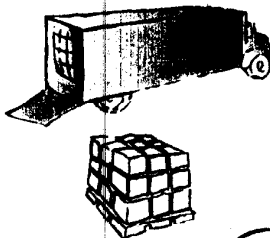
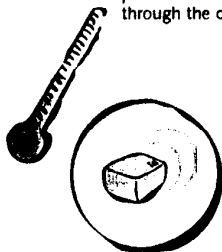
ILR allows data collection to be completely automatic—without the need for choke points or other complicated logistical systems. With long read ranges of over 30 meters (100 feet) and a tag that can broadcast data at preset time intervals, the system can track many tags simultaneously and can communicate large amounts of data over large work areas.

Expanding RFID Technology

RFID technology is the fastest growing segment of the automatic identification industry. Using radio waves to communicate data, RFID does not require line-of-sight. Radio waves can travel through walls or other solid objects. Non-metallic materials such as dirt, concrete, wood, plastic, paint, oil or water do not interfere with the reading. The large memory available on IDENTEC's RFID tag, and the integration of RFID and barcode, make ILR technology the leading edge in automatic data capture. Information has never been as portable or accessible. IDENTEC has created a new set of highly adaptable productivity tools to allow companies to track temperature sensitive assets and improve business processes in ways never before possible.



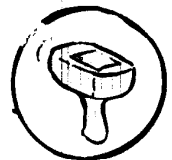
- 1 The I-QBT tag provides continuous temperature monitoring for an accurate temperature profile of products as they move through the cold chain.



- 2 With up to 32KB of memory, the tag is an electronic packing slip (EPS), storing any information needed for the efficient movement of product through the supply chain.



- 3 The powerful handheld I-COM combines a radio frequency (RFID) interrogator and a barcode scanner with a touch screen computer running the Windows CE operating system.





ILR Components

i-Q8T Temperature Tag

The i-Q8T can take temperature measurements in 1 minute intervals up to every 255 minutes. Temperature is recorded with an accuracy of $\pm 0.5^{\circ}\text{C}$ and stored on the tag. With 8KB of memory, the i-Q8T can store up to 1024 data points.

The i-Q8T tag can carry information other than temperature and can be used as an electronic packing slip or to exchange other business information.

With ILR technology, data is communicated to a host network for integration with any corporate software, including internet or E-commerce.

Memory on the tag is expandable to 32KB, for an increased number of temperature data points or for other data requirements.

Temperature data can be read continuously from the i-Q8T tag or the tag can transmit batch temperature data when requested by a handheld or fixed interrogator.

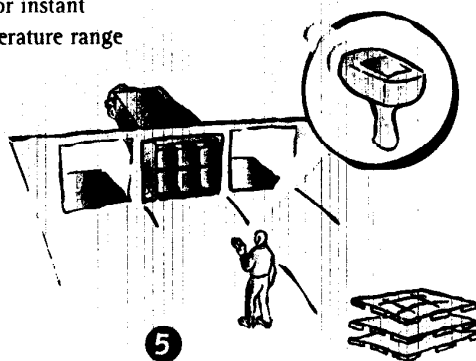


- 4 Information on the tag is automatically communicated to a host computer for storage and analysis. With an Internet connection the information can also be distributed to other companies in the supply chain.

ILR-CARD PC Card Portable Interrogator

Because the ILR-CARD slots into any handheld computer or bar code scanner with a type II or III PC Card slot, it is the most flexible and convenient RFID interrogator available. Users can select computer hardware to meet their specific needs, or they can use the powerful i-COM portable computer with an installed ILR-CARD. The i-COM combines the best in automatic data capture in a handheld touch screen computer that communicates to IDENITEC's RFID tags and scans bar codes. The ILR-CARD is compatible with equipment communicating over a wireless RF LAN and can be used in real time portable data capture solutions. The communication range from tag to handheld equipment using the ILR-CARD is up to 10 meters (30 feet).

The ILR-CARD includes Windows CE drivers and utilities software for graphing and analyzing the temperature data logged by the i-Q8T for instant recognition of out-of-temperature range problems.

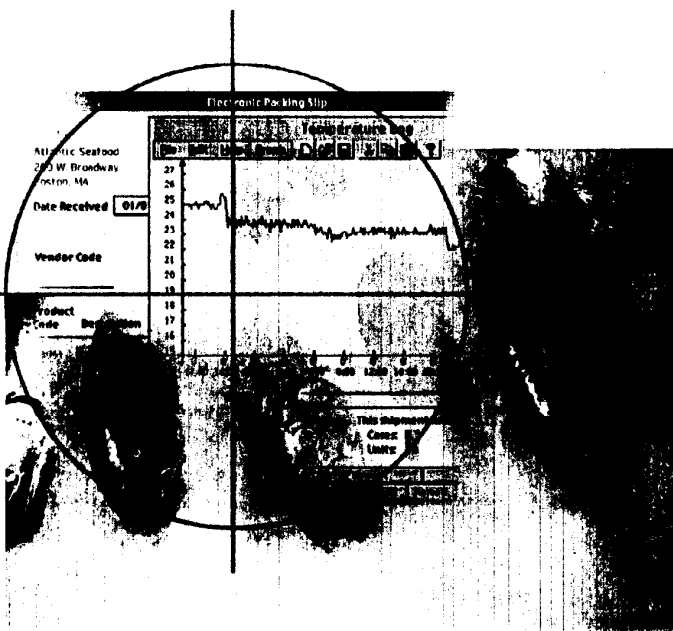


- 5 Movement and location of pallets and other returnable transportation materials can be monitored for efficient re-use.

I-PORT Fixed Interrogator

The i-PORT is a fixed RFID interrogator which provides the communication link between components in IDENITEC's Intelligent Long Range (ILR) technology. The i-PORT connects to a host computer via RS 232 or PC Card-based connection, including Ethernet or RF modem. The i-PORT sends and receives information using radio frequency to IDENITEC's i-Q series of RFID tags and the i-COM handheld reader.

The i-PORT, combined with the i-Q line of tags and the advanced i-COM handheld interrogator, comprise a data gathering and management solution that optimizes the capabilities of RFID, while adding previously unavailable features. The i-PORT allows the seamless integration of i-Q tag, barcode, and i-COM information to a host computer system. The result is real-time information, where and when it is needed.



Company Overview

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IDENTEC ILR-CARD™ PC Card interrogator

The ILR-CARD is an Intelligent Long Range (ILR) radio frequency interrogator on a PC Card. To convert any handheld, portable or fixed computer into a powerful radio frequency read/write interrogator is a simple matter of plugging the card into a type II or III PC Card slot. This provides systems integrators and end users flexibility in the integration of ILR into existing and new systems.

By placing an RFID interrogator onto a PC Card, IDENTEC has created a highly adaptive RFID solution. The flexibility of an interrogator on a PC Card allows users to select from a variety of advanced computers and automatic data capture technologies. RFID can be integrated into industry standard tools such as handheld computers and bar code scanners and is compatible with wireless LANs. This innovation provides a cost-effective means to create advanced data capture solutions not previously available.

Software to control the ILR-CARD runs on the Windows CE® operating system for handheld computers and on Windows 98/NT® for fixed computers. With a Windows-based graphical user interface and multitasking capability, the ILR-CARD is a powerful, easy-to-operate enhancement to any data collection application.

The powerful RFID module in the card is designed to interrogate the IDENTEC i-Q active tags operating in the 915 or 868 MHz ISM band. The tags in the i-Q line include read-only and read-write tags and an optional internal sensor for monitoring temperature.

IDENTEC's ILR technology is designed to be integrated into leading edge data gathering and management solutions. The technology adds previously unavailable features that allow data gathering and retrieval to be completely automatic—without the

need for choke points or other complicated logistical systems. With the flexibility of the powerful ILR-CARD interrogator module, the ILR components are highly adaptable productivity tools.

The ILR-CARD can communicate to active tags from over 10 meters (30 feet) at high-speed transmission rates. Data can be stored and processed as required at point of collection or can be communi-





cated to other computer systems in real-time over RF networks. Designed to communicate and distribute a wealth of dynamic information in real-time, the ILR-CARD ensures that the right information is immediately available for improved business processes.

Software Tools

The ILR-CARD comes with application development software to aid in the development of user programs. Programming tags to set broadcast modes and temperature sampling frequency is a menu-driven procedure. Software is also included for graphing the temperature data logged by the i-Q8T. IDENTEC's temperature reading RFID tag. With available Windows CE/98/NT* development tools and with the utility programs that are provided, the ILR-CARD, combined with the other components of IDENTEC's ILR technology, provide leading-edge automatic data collection tools for integration into advanced information systems.

To learn more about IDENTEC's ILR technology, integration partner opportunities, or how ILR technology can increase efficiency and profitability for your business, contact us directly or visit our website at www.identec.com.



*RFID and barcode
can be combined in
a single system*



Tag memory is
expandable up to
32KB



*Long read range
to the portable or
fixed reader*



Anti-collision technology assures all tags are read



*Temperature
recorder documents
product integrity*



ILR-CARD Specifications

Electrical Specifications

Safety	UL, CSA and applicable EU standards
Emissions	FCC, part 15
Operating system	Windows CE/98/NT*
Power	<15 mA during read/write minimal when idle

Environmental

Operational

Temperature 0°C to +70°C (32°F to +158°F)
Humidity 90% non-condensing

Storage

Temperature -40°C to +85°C (-40°F to +185°F)
Humidity 90% non-condensing

Physical

Dimensions Standard Type II PC Card with antenna
Weight 32 grams (1.13 oz.)
Frequency 915 or 868 MHz ISM band
Communication range
. 10 m (30 feet)

(Patents pending)

This device has not been authorized as required by the rules of the Federal Communications Commission. This device is not and may not be offered for sale or lease, or sold or leased, until authorization is obtained.

ILR, i-Q, i-QR, i-Q8, i-Q8T, ILR-CARD and i-PORT are trademarks of IDENTEC Solutions.

Windows CE/98/NT® are registered trademarks of Microsoft Corporation™

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IDENTEC i-PORT Fixed Interrogator

The i-PORT is an ILR system interrogator complete with an embedded Windows CE® computer for use in fixed reading locations. The i-PORT sends and receives information using radio frequency to IDENTEC's i-Q series of RFID tags, and can communicate to i-Q tags and to equipment with an installed ILR-CARD over distances of up to 30 meters (100 feet).

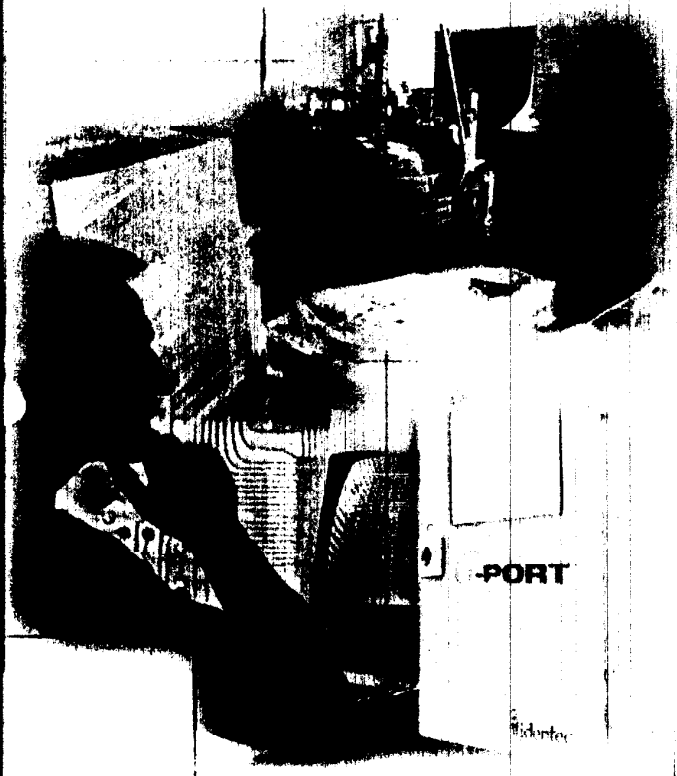
The i-PORT, combined with the i-Q line of tags and the advanced ILR-CARD installed in a hand-held computer, comprises a data gathering and management solution that optimizes the capabilities of RFID, while adding previously unavailable features. The i-PORT allows the seamless integration of i-Q tag and ILR-CARD information to a host computer system. The result is real-time information, where and when it is needed.

User application software can reside on the i-PORT, eliminating the need for separate computer resources to manage communication and data storage. The i-PORT comes with basic functionality and can be configured with options such as a Liquid Crystal Display touch screen, antenna multiplexer, and barcode scanner to suit the user's specific data capture needs.

The i-PORT can connect to the user's system over an RS 232 connection or by using the PC Card slot (type II or III) for an Ethernet or an RF LAN PC Card.

The computer in the i-PORT includes an internal real-time clock to provide accurate time stamps to data read from the tags. Up to 2000 messages can be stored on the i-PORT's available memory space, allowing real-time data analysis on site or providing

a buffer to assure no data is lost in communication to a host system. The user has 4 digital inputs available for such activities as event triggering interrogation. There are also 4 relay outputs and 30 status LEDs.





Software Tools

The i-PORT comes with software to allow quick development of user applications. The programs run on Windows CE® and allow the user, via menu-driven procedures, to program tags for broadcast modes and temperature monitoring parameters. Software is also included for graphing the temperature data logged by the i-Q8T. IDENITEC's temperature recording tag. The i-PORT, combined with other components of IDENITEC's ILR technology, provide leading-edge automatic data collection tools that can be integrated into existing information systems.

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RFID and barcode can be combined in a single system



Tag memory is expandable up to 32KB



Long read range to the portable or fixed reader



Anti-collision technology assures all tags are read



Temperature recorder documents product integrity

i-PORT Specifications

Electrical Specifications

Power source 12 VDC
Safety UL, CSA and applicable EU standards¹
Emissions FCC, part 15

Embedded Computer

CPU 100 MHz 486
OS memory 20 MB
Non-volatile file memory . 8 MB
OS Windows CE®
User interface slot 1 type II or III PC Card
Module interface RS-232

RFID Control Module

ILR-CARD (PC Card) TX data RX data
TX power control, RF signal strength
Barcode scanner port. . . . RS-232
Digital inputs 4 - Opto-isolated
Relay outputs 4 - Solid state relays
I/O status 30 status LEDs
(for servicing and installation)
Optional 4 way antenna multiplexer
Optional LCD with touch sensitive overlay
Enclosure P66 / NEMA 4 (CSA/UL/VDE)

Environmental

Operational

Temperature 0°C to +70°C (32°F to +158°F)
Humidity 90% non-condensing

Storage

Temperature -40°C to +85°C (-40°F to +185°F)
Humidity 90% non-condensing

Physical

Dimensions 30 x 20 x 8 cm (11.75" x 7.75" x 3.2")
Case material Metal
Weight 3.6 kg (7.9 lbs)
Frequency 915 or 868 MHz ISM band

(Patents pending)

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