



# Asset/Data-Management Tags Deliver Information Wherever It Is Needed

Computer Chip-Based Electronic Tags  
Attach Easily and Are Extremely Durable



*Maintenance Records*  
*Safety Inspections*  
*Route Compliance*  
*Fleet Management*

*Key Control*  
*Patient Medical Records*  
*Temperature Data Logging*  
*Shipping Compliance*

# Rugged Tag Dependably Binds Data to an Object, Place, or Person

## What is an iButton?

An iButton® is a computer chip with a globally unique address, factory-lasered at time of manufacture (think of it as a URL for each iButton), enclosed in a 16mm stainless-steel case. iButtons can include read/write memory, real-time clocks, and temperature/humidity data loggers. They deliver or record data wherever needed. All this power and capability make iButtons ideal for a wide range of applications including asset tracking, environmental data logging, access control, and eCash transactions.

## The Globally Unique Key— 281,000,000,000 Different Combinations!

An iButton's 64-bit address provides a simple, secure way of identifying a person or asset. It can serve as an electronic serial number that is never duplicated. With onboard memory, up to 32k bytes, iButtons can also give your assets their own personalized database. Each asset now has the ability to store unique information about itself and have that information permanently affixed to the asset. This makes iButtons perfect for various asset management and data collection functions such as equipment maintenance records and inventory management.

## So Rugged It Lasts Forever!

iButtons bring unparalleled durability to asset and data-management applications. Kept outside? Used in industrial applications? Exposed to rough treatment? There is no need to worry about destroying them and the valuable data inside because iButtons can withstand harsh indoor or outdoor environments. The durable iButton is wear-tested to last a minimum of ten years, so you are not constantly replacing barcodes and re-tagging all of your assets.

## iButtons—Simple and Low Power Interface!

iButtons require a physical/electrical connection to whatever is reading or writing data. However, an innovative digital communication technique called a 1-Wire® interface reduces the number of electrical contact points to just one, plus a ground reference. A single conductor for both power and data communications is all that is needed. Devices that read and write to iButtons seal all the electrical components inside and expose only the two electrical contact points, separated by a wide gap. You get very durable handheld iButton readers that are low cost and are immune to dust and moisture. They can easily read or write iButtons mounted to practically anything. An iButton reader draws virtually no power in standby mode and less than 2mA during communication—making it ideal for battery-powered devices such as handheld computers and PDAs. Reading an iButton's unique address takes no more than 5ms. Now users can finish their data collection tasks without having to worry about constantly changing batteries in their handheld device every few hours.



iButtons provide an exceptional value compared to other Auto ID technologies. Every iButton delivers a minimum of 10 years of trouble-free performance, which significantly reduces operating costs.



Minimal power requirements make iButtons idea for handheld and PDA data collection applications.

# Products to Solve a Wide Variety of Asset or Data-Management Problems

## A Unique Address for Each Asset or Location

The DS1990A, simplest of all iButtons, contains only the unique 64-bit ROM address. Now each asset or location has its own permanent address that can be read almost instantly with a simple touch using very low-cost readers.

## Memory to Store Critical Data

Specific asset information to define maintenance, inspection, calibration, warranty, or shipping information can now be stored directly on the asset and updated as needed without removing the iButton. The asset and the data describing it remain permanently bonded together. iButtons are offered with programmable memory using a variety of technologies, allowing you to create records that are either permanent and unalterable or that can be easily and quickly updated in the field. To secure information stored in memory, data can be encrypted. By using the unique address during the encryption process, even higher levels of security are possible.

## Memory with Time-Dependent Access

The DS1994 iButton has an on-board real-time clock that can be armed to expire at a future date and time. This feature can be used to disable access to data inside the iButton. Access can also be denied based on elapsed time (cumulative usage) or number of accesses.

## Time or Temperature Data Collection

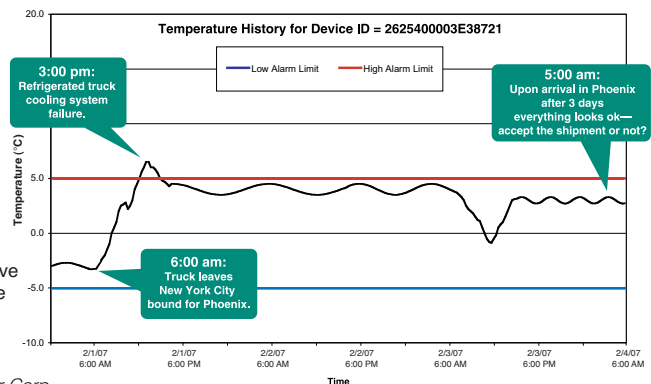
The DS1904 contains a real-time clock that provides an independent time base and lets you record the time that someone interrogated a specific iButton along with the unique address for that device. The DS1920 lets you measure and record the temperature at a specific location together with the unique address for that device.

## Temperature/Humidity Data Loggers

Our ThermoChron<sup>®</sup> and HygroChron<sup>®</sup> family (DS1921/DS1922/DS1923) of iButtons are temperature and humidity data loggers that track the temperature/humidity of specific assets or locations. Now you can easily track an asset during shipment to see if it stays within specified temperature/humidity ranges. Track the temperature/humidity of perishables, animals, flowers, fruits and vegetables, soil, or electronic equipment. You could even use the ThermoChron for warranty purposes on equipment that must be kept within a certain temperature range or to log the results of a process that must be monitored for compliance to a temperature profile.



Use a PDA-type device in the field to retrieve logged data from the ThermoChron before uploading to a central database.



ThermoChron and HygroChron are registered trademarks of Dallas Semiconductor Corp.

## iButton Memory Technologies

**EPROM (DS198x) iButtons** are write-one-time, read-many-times devices. The memory can be written incrementally until it is completely full. EPROM devices are ideal for applications where the data never changes, like warranty information or original equipment specifications. Alternately, EPROM memory lets you concatenate new records but not overwrite existing data on an iButton, which addresses applications like maintenance or audit records where existing information should never be altered yet periodic updates are also required during the service life of an asset.

**EEPROM (DS197x) iButtons** allow users to read and write data to the device. Some or all of the information about the asset can be completely rewritten multiple times.

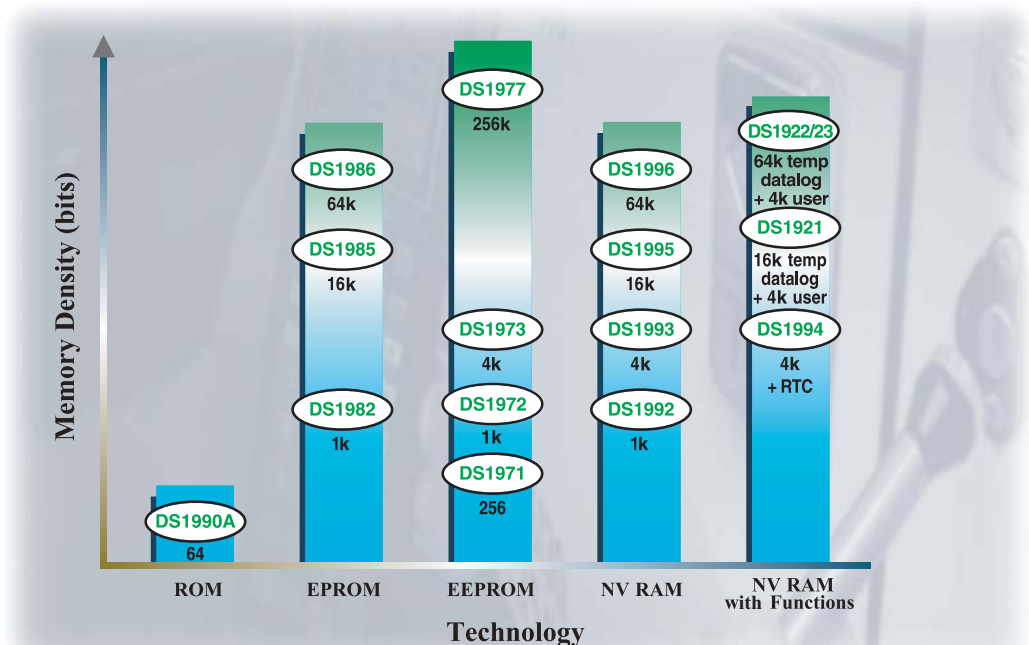
**NV RAM (DS199x) iButtons** are similar to EEPROM iButtons, but can be rewritten many more times. They are generally used for applications where data is updated frequently. In addition, the on-board lithium-energy source guarantees that memory updates, once initiated, are always completed because the power to finish the transfer is supplied by the lithium cell, not the reader/writer. This is important in the typical iButton environment where electrical contact can be intermittent.

# iButton Asset and Data-Management Products Selection Guide

REQUIREMENTS	SUGGESTED PARTS	REMARKS
Need unique address only.	DS1990	Easiest to implement; ideal for simple systems. Typically the host would store the address and cross-reference it with asset information stored in a remote database.
Need read/write memory that requires frequent updates	DS1971 DS1972 DS1973 DS1977 DS1992 DS1993 DS1995 DS1996	Store specific asset information directly on the asset itself, up to 32kB. For data security, information can be encrypted by the host prior to writing, or password protected (DS1997 only).
Need write-once, read-many-times memory for permanent application data.	DS1982 DS1985 DS1986	Ideal where application data will not change once written to the iButton. Updated or new information can be written to unused memory, but existing data cannot be altered.
Time or timed data collection.	DS1904 DS1994	Good for application where time-stamped or time-protected data is needed.
Temperature/humidity data collection.	DS1920 DS1921 DS1922 DS1923	Enables user to collect current temperature (DS1920) or entire temperature/humidity log of an asset over time (DS1921/DS1922/DS1923).

## Type vs. Memory Capacity

A variety of iButton memory technologies and densities address different needs. Interchanging device types or upgrading memory capacity is simple since the 1-Wire protocol is common to all iButtons.



# Complete Application Solutions Utilizing iButtons Are Available

Our Authorized Solutions Developers (ASDs) have already developed turnkey iButton systems to address typical asset/data-management applications such as guard tour tracking, equipment inspection and maintenance, key control systems, and many others. In addition, these developers can also design custom iButton software and/or hardware solutions. Review our partners and their products at [www.iButton.com/solutions](http://www.iButton.com/solutions).

The iButton provides an ideal labeling means for storing critical calibration, warranty, or maintenance information directly on an object even in harsh industrial or outdoor environments. A complete turnkey system can be purchased from Cirro NetworX.



Adding data to or retrieving data from a patient's personal credential is simple and unobtrusive by using integration packages like those offered by Optimus EMR, Inc. Unlike chip-based cards, iButtons can easily attach to wristbands, rings, watches, or other commonly worn items. The stainless-steel encased iButton protects critical data from exposure to liquids, chemicals, body fluids, and other destructive elements.



iButtons are ideal for simplifying key management. By attaching an iButton to a keyring, tracking mechanical keys is fast and easy. KeyTrak offers complete key management systems. Alternatively, Schlage offers standalone electronic iButton locks where the iButton itself is the key.

The ThermoChron iButton not only stores critical data about an object but also tracks the thermal history of any temperature-sensitive product. Proges Plus has produced a custom ThermoChron application to help Nestlé maintain the quality of their ice cream products during deliveries.



Guard tour systems maintain audit trails to ensure that assets and facilities are properly monitored. The rugged iButton attaches to virtually any indoor or outdoor location and operates reliably for years.

IKEA uses the iButton Guard Tour products from TOMST in all of their European facilities.

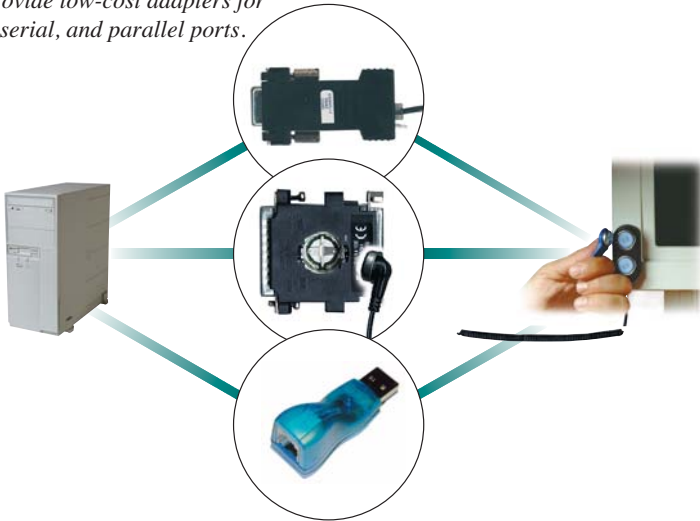


# Interface Is Simple and Low Cost

## One-Touch Interface

How do I communicate with an iButton? Interfacing an iButton to any type of electronics is easy. Information transfers at up to 142kbps between an iButton and a PC, PDA, a variety of handhelds, or a microcontroller with a momentary contact. Simply touch the iButton to a Blue-Dot™ receptor or other types of mating probes.

*We provide low-cost adapters for USB, serial, and parallel ports.*



*For portable handhelds, see our website to examine the wide range of products available from our third-party developers.*



## Free Software Development Tools

Free iButton and other 1-Wire software development kits address different platforms and programming language preferences. Multiple application notes and papers reduce the development burden and help ensure your success.

PLATFORM	RESOURCE	DESCRIPTION
Windows® 32 (XP, 2K, NT, ME, 98SE, 95)	1-Wire SDK*	Windows programming language-independent library. Supports all 1-Wire adapter types with traditional API* (TMEX) and Windows .NET (OW.NET) interfaces.
Windows 32 (XP, 2K, ME, 98SE)	Software Authorization	Portable 'C' library for software developers to control unauthorized use of programs. Supports serial, parallel, and USB 1-Wire adapters.
Any platform with a 'C' compiler	1-Wire Public Domain Kit	Portable 'C' library. Supports both a serial port plus a DS2480B bridge or custom 1-Wire interface. Many 1-Wire adapter and platform-specific example builds provided.
Any Java™ platform (J2ME™ also available)	1-Wire API for Java	Portable Java library. Supports both a serial port plus DS2480B bridge or custom 1-Wire interface. All 1-Wire adapters supported on the Windows platform.
Microprocessor	<ul style="list-style-type: none"> <li>• Application Note 126 (I/O port pin for 1-Wire)</li> <li>• Application Note 192 (Serial port + DS2480B bridge for 1-Wire)</li> <li>• Application Note 3684 (I<sup>2</sup>C port plus DS2482)</li> <li>• Some I/O port assembly examples in 1-Wire Public Domain (PD) Kit</li> </ul>	Documentation to add a 1-Wire port to a microprocessor. Some assembly examples available. If the microprocessor has a 'C' compiler, the 1-Wire Public Domain code can be used.

*\*Refer to Application Note 155: 1-Wire Software Resource Guide for an overview of all available APIs. For all iButton application notes and software tools visit [www.maxim-ic.com/ibutton](http://www.maxim-ic.com/ibutton). For support, contact [autoinfo.support@dalsemi.com](mailto:autoinfo.support@dalsemi.com).*

*Blue Dot is a trademark of Dallas Semiconductor Corp. Windows is a registered trademark of Microsoft Corporation. Java and J2ME are trademarks of Sun Microsystems.*













# iButtons—More Than Just An Asset and Data-Management Tag

The iButton product family has over 20 different products that meet all application needs—maintenance and inspection data management, guard tour monitors, temperature data logging, access control, device and software authorization, and eCash.

## Product Quickview

	PART	DESCRIPTION		
Address Number Only	DS1990A	64-bit ROM ID		
NV RAM Memory	DS1992/3/5/6L	1kb/4kb/16kb/64kb NV RAM		
EEPROM Memory	DS1971/2/3/7	256-bit/1kb/4kb/32kb EEPROM		
EPROM Memory	DS1982/5/6	1kb/16kb/64kb EPROM		
Password-Protected Secure Memory	DS1991L/DS1977	Three 384-bit partitions NV RAM/one 32kB partition EEPROM		
Challenge-and-Response Secure Memory	DS1961S	1kb EEPROM with SHA-1		
	DS1963S	4kb NV RAM with SHA-1 and counters		
Real-Time Clock	DS1904/DS1994L	RTC/RTC with 4kb NV RAM		
Temperature Sensor	DS1920-F5	Enables user to collect current temperature upon contact with a reader. Digital thermometer, $\pm 0.5^{\circ}\text{C}$ accuracy ( $-55^{\circ}\text{C}$ to $+100^{\circ}\text{C}$ )		
Temperature Data Loggers	PART	TEMP RANGE	MAX ACCURACY	DATA LOG SIZE
	DS1921G-F5	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	$\pm 1^{\circ}\text{C}$ ( $-30^{\circ}\text{C}/+70^{\circ}\text{C}$ )	2k points
	DS1921H-F5	$+15^{\circ}\text{C}$ to $+46^{\circ}\text{C}$	$\pm 1^{\circ}\text{C}$	2k points
	DS1921Z-F5	$-5^{\circ}\text{C}$ to $+26^{\circ}\text{C}$	$\pm 1^{\circ}\text{C}$	2k points
	DS1922L-F5	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	$\pm 0.5^{\circ}\text{C}$ ( $-10^{\circ}\text{C}/+65^{\circ}\text{C}$ )	4k/8k points
DS1922T-F5	$0^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	$\pm 0.5^{\circ}\text{C}$ ( $+20^{\circ}\text{C}/+100^{\circ}\text{C}$ )	4k/8k points	
Temperature/Humidity Data Logger	DS1923-F5	$-20^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	$\pm 0.5^{\circ}\text{C}$ , 5%RH	4k/8k points

## Accessories Quickview

COMMUNICATION PORT ADAPTERS		
	DS9490R	1-Wire USB Adapter: 1-Wire to USB interface. Connects to all reader/probes with RJ-11 interface.
	DS9490B	USB iButton Holder/Dongle: 1-Wire to USB interface. Designed for applications in which iButton is infrequently removed from holder.
	DS9097U-S09/009/E25	Universal 1-Wire COM Port Adapter: 1-Wire to RS-232 COM port interface (DB9). Connects to all reader/probes with RJ-11 interface. 009 version includes DS2502 for ID. E25 version includes a 12V power port for writing to EPROM iButtons and comes in a DB25 package.
	DS1410E-001	1-Wire Parallel Port Adapter: 1-Wire to parallel port interface. Insert iButton directly or use with DS1402D-DB8 or DS1402BP8.
PROBES/RECEPTORS (READER/WRITER INTERFACES)		
	DS1402D-DR8/DB8	Blue Dot Receptor Cable: iButton read/writer interface. iButtons communicate through Blue Dot interface with just a touch or can be snapped into the Blue Dot for continuous connection. DR8 has RJ-11 interface. DB8 has button interface.
	DS1402RP8/BP8	iButton Touch-and-Hold Probe Cable: iButton read/writer interface. iButtons communicate through probe with just a touch or can be snapped into the probe for continuous connection. DR8 has RJ-11 interface. DB8 has button interface.
	DS9092GT	iButton Handheld Wand: Plastic wand with an integrated iButton probe, shaped to self-align with iButtons. Gives tactile feedback. The wand comes with a 10cm handle and a 1m cable that is terminated with an RJ-11 jack.
	DS9092/T/L	Panel-Mount Probe. T version has tactile feedback. L version has LED and is recommended for outdoor use.
	DS1402D-041	Blue Dot probe component for embedded touch and hold applications.
iBUTTON MOUNTS		
	DS9093Ax/F/N	Key Fobs: Allow an iButton to be carried conveniently on a key chain. Available in three different versions and five different colors.
	DS9093S/P	Wall Mounts: Allows you to securely mount iButtons to most surfaces. Available in two versions.
	DS9096P	iButton Adhesive Pads. Allow you to easily mount iButtons to anything.

# iButton®

## Touch the Future!



### WHAT'S NEW?

#### Overview

- What is an iButton?
- Applications
- Brochures
- Videos
- Photo Library

#### iButtons

- ID Only
- Memory
- Real-Time Clock
- Secure
- Sensor
- Data Logger

#### Accessories

- Adapters
- Readers and Probes
- Mounting Options
- Starter Kits

#### Sales

- Direct
- Buy Online
- Partners
- Distributors
- Samples
- Trade Shows

#### Solution Partners

- Solutions Search
- Become a Partner

#### Contact Us

- Contacts and Support
- Sales Information

#### Software Resources

- Software Development Kits
- Software Search Engine
- 1-Wire Drivers
- OneWireViewer Demo

#### Technical Support

- Lead-Free/RoHS Information for iButtons
- Data Sheets
- Application Notes
- Certifications
- FAQs
- Discussion Groups
- E-mail Updates

Visit Our Website to Find the Latest Information on iButtons—  
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