

# Thermochron and Hygrochron

## Revolutionary iButton Digital Temperature and Humidity Data Loggers

Tiny, Robust, Computer Chip-Based Loggers  
Deliver High Accuracy and Low Cost



Monitor:

Temperature-Sensitive Shipments  
Manufacturing Processes  
Environmental Conditions

# Industry's Smallest, Most Rugged, Lowest Cost Family of Digital Data Loggers

## What Is an iButton Data Logger?

An iButton® device is a computer chip with a globally unique address, factory-lasered at time of manufacture (think of it as a URL for each iButton device), enclosed in a 16mm stainless-steel case. iButton devices 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 iButton devices ideal for a wide range of applications including environmental data logging, access control, e-cash transactions, and asset tracking.

## The Globally Unique Tag— 281,000,000,000 Different Addresses!

An iButton device's 64-bit address provides a simple, secure way of identifying a location or an item. It can serve as an electronic serial number that is never duplicated. With onboard memory, iButton devices can also store critical information about an item or location, such as container contents, shipping destination, or owner information.

## Rugged Durability That Lasts and Lasts!

iButton devices bring unparalleled durability to data logger applications. Expose it to high or low temperature extremes. Step on it. Splash it with water.\* There is no need to worry about destroying this data logger, because iButton devices can withstand harsh indoor or outdoor environments. Durable iButton devices can be reprogrammed and reused for many years, significantly reducing operating costs.

## iButton Capsule—Simple, Low-Power Interface!

iButton devices require a physical/electrical connection to whatever is reading or writing data. However, a novel digital communication scheme 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 iButton devices have all their electrical components inside, with only the two electrical contact points exposed, separated by a wide gap. With the connection so simplified, you get very durable, dust- and moisture-immune probes that interface to most surfaces. 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 device's unique address takes no more than 5ms. Now users can finish their data collection tasks without having to worry about changing batteries in their handheld device every few hours.



*Minimal power requirements make iButtons ideal for handheld and PDA data-collection applications.*



*The DS9107 iButton capsule protects iButton data loggers from moisture, solvents, and pressure.*

\*See Application Note 4126, "Understanding the IP (Ingress Protection) Ratings of iButton Data Loggers and Capsule," for iButton IP ratings. ([www.maxim-ic.com/AN4126](http://www.maxim-ic.com/AN4126)) iButton and 1-Wire are registered trademarks of Maxim Integrated Products, Inc.

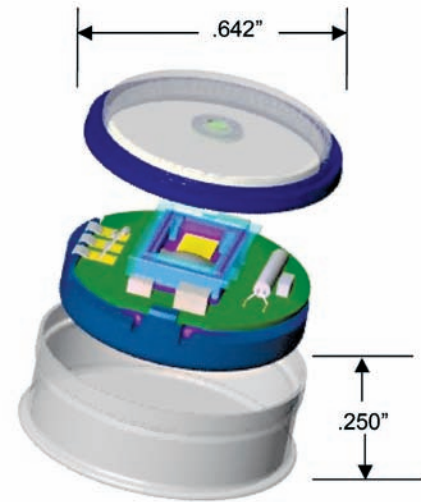
# iButton Temperature and Humidity Data Loggers Address a Wide Variety of Applications

## Temperature Data Loggers

Our ThermoChron® family of iButton devices (DS1921/DS1922) are temperature data loggers that track the temperature of specific assets or locations. Now you can easily log the thermal exposure of an asset during shipment to see if it stays within specified temperature ranges. ThermoChron data loggers make it simple and inexpensive to monitor anything that is temperature sensitive, including pharmaceuticals (vaccines, drugs, reagents), fresh or frozen foods (fruits, vegetables, dairy/ dessert products), biological items (animals, blood products, soil), or heating/refrigeration/freezer systems. The ThermoChron data logger can also be used for warranty-tracking 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. Like all iButton devices, the stainless-steel casing of a ThermoChron data logger makes it rugged, reusable, and portable. It is so small that it fits anywhere and can deliver years of reliable, highly accurate temperature readings.

## Temperature/Humidity Data Loggers

Our HygroChron™ family of iButton data loggers (DS1923) adds an embedded humidity sensor to the temperature-logging capability of the ThermoChron family to create a data logger that records both temperature and humidity. With these two pieces of data, relative humidity can be logged as a function of time. The tiny opening in the lid of the HygroChron iButton data logger employs a special filter that allows water vapor to pass through and reach the internal humidity sensor, but repels liquid-phase water. For applications where both temperature and humidity are important (foods, chemicals, powders, HVAC systems), the HygroChron data logger delivers unprecedented performance in an unbelievably compact size.



## iButton Data Logger Product Selection Guide

iButton Type	Part	Description		
Temperature Data Loggers	<b>Part</b>	<b>Temperature Range (°C)</b>	<b>Accuracy (°C, max)</b>	<b>Data Log Size (Points)</b>
	DS1921G (TC)	-40 to +85	±1 (-30°C/+70°C)	2K
	DS1921H	+15 to +46	±1	2K
	DS1921Z	-5 to +26	±1	2K
	DS1922L (TCS)	-40 to +85	±0.5 (-10°C/+65°C)	4K/8K
	DS1922T (TCX)	0 to +125	±0.5 (+20°C/+100°C)	4K/8K
	DS1922E (TCU)	+15 to +140	±1.5 (+110°C/+140°C)	4K/8K
Temperature/Humidity Data Logger	DS1923 (HC)	-20 to +85	±0.5, 5%RH	8K (temp), 4K (temp/RH)

ThermoChron is a registered trademark and HygroChron is a trademark of Maxim Integrated Products, Inc.  
 \*Future product—contact factory for availability.

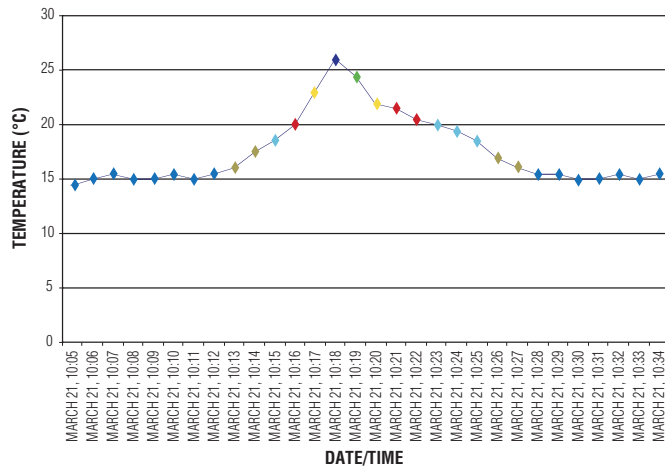
# Thermochron Devices Support Temperature-Logging

## Time/Temperature

Each Thermochron data logger will log up to 2K (DS1921) or 8K (DS1922/DS1923) temperature readings before the logger memory is full. When the device is initialized, the user can configure it to terminate logging or roll over and begin writing over the oldest data points when the memory capacity is reached. If the logger is set to record a temperature every minute, the DS1921 memory will be full after approximately 1.4 days and the DS1922 after approximately 5.6 days. The example data to the right shows the partial log for a device monitoring a product kept at 15°C, and the resulting time/temperature graph is below on the left. The change in temperature due to the refrigerator door being opened and then later closed is captured.

Time	Temperature (°C)
March 21, 10:05	14.5
March 21, 10:06	15
March 21, 10:07	15.5
March 21, 10:08	15
March 21, 10:09	15
March 21, 10:10	15.5
March 21, 10:11	15
March 21, 10:12	15.5
March 21, 10:13	16
March 21, 10:14	17.5
March 21, 10:15	18.5
March 21, 10:16	20
March 21, 10:17	23
March 21, 10:18	26
March 21, 10:19	24.5
March 21, 10:20	22
March 21, 10:21	21.5
March 21, 10:22	20.5
March 21, 10:23	20
March 21, 10:24	19.5
March 21, 10:25	18.5
March 21, 10:26	17
March 21, 10:27	16
March 21, 10:28	15.5
March 21, 10:29	15.5
March 21, 10:30	15
March 21, 10:31	15
March 21, 10:32	15.5
March 21, 10:33	15
March 21, 10:34	15.5

Time/Temperature Recording

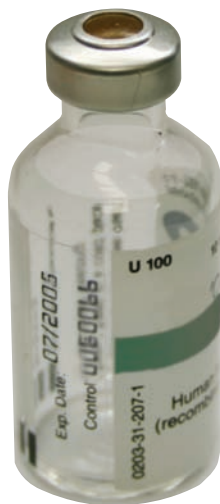




## Turnkey Systems Available

Maxim has teamed with third-party systems integration experts around the world to combine the power of our iButton products with their market knowledge, systems expertise, and local support. Together with these independent companies, we created a powerful suite of ready-to-use products. Our authorized solutions developers (ASDs) already have developed turnkey iButton systems to address typical data-logging applications, such as cold-chain shipping, process monitoring/quality control, and refrigerator/freezer system tracking.

When you attach a tiny ThermoChron data logger anywhere on your shipment, you will know whether the temperature environment changed during transit and by precisely how much. Using ThermoChron data loggers, companies are discovering that their quality goes up while their operating costs come down.



If you're shipping highly sensitive products like pharmaceuticals, the shift of even a few degrees can mean the difference between delivering a safe, effective product and rendering it completely useless.



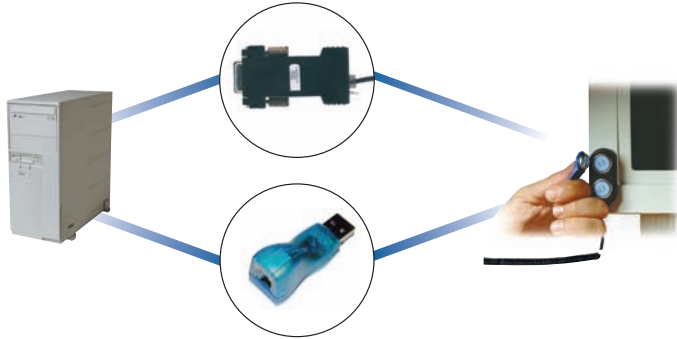
Photo courtesy of Stanford Blood Center.

Refrigeration/freezer systems that malfunction can cause significant financial loss if left unchecked. However, temperature can easily be monitored by strategically placing ThermoChron or HygroChron data loggers throughout the areas that require accurate, yet potentially highly dispersed monitoring.

## Interface Is Simple and Low Cost

### One-Touch Interface

How do I communicate with an iButton device? Interfacing an iButton device to any type of electronics is easy. Information transfers between an iButton device and a PC, PDA, a variety of handhelds, or a microcontroller with a momentary contact at up to 125kbps. Simply touch the iButton device to a Blue Dot™ receptor or other types of mating probes.



*For PCs, we provide low-cost adapters for serial and USB ports.*



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

## eTemperature Software

### Simple, Intuitive PC Data Logging Software

If you've ever tried to use the free software that's available for ThermoChron, you'll know how frustrating and confusing it is.

eTemperature is powerful ThermoChron software developed in Australia. It features a range of built-in one-click configurations that will have you up and running in no time.

And if you do get stuck, you get Australian phone support to answer your questions and solve any issues you come across.

**All you need is ThermoChron, a USB reader, and eTemperature software for your PC**

eTemperature comes bundled with the USB reader you will need to configure and read data from your ThermoChron.

Just call or email Esis today to get started.

iBR9000 photo courtesy of Videx, Inc.  
Blue Dot is a trademark of Maxim Integrated Products, Inc.  
Microsoft, Windows, Windows XP, and Windows Vista are registered trademarks of Microsoft Corporation.  
Java and J2ME are trademarks of Oracle and/or its affiliates.