iButton Data Loggers 🔘

Brochure





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

What Is an iButton Data Logger?

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 environmental data logging, access control, e-cash transactions, and asset tracking.

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

An iButton 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, iButtons 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

iButtons 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 iButtons can withstand harsh indoor or outdoor environments. Durable iButtons can be reprogrammed and reused for many years, significantly reducing operating costs.

iButton Capsule—Simple, Low-Power Interface!

iButtons 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 iButtons 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'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 (Ingess Protection) Ratings of iButton Data Loggers and Capsule," for iButton IP ratings. 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 Collection

The **DS1920** lets you measure and record the temperature at a specific location together with the unique address for that device.

Temperature Data Loggers

Our Thermochron[®] family of iButtons (**DS1921/DS1922/DS1925**) 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 iButtons, 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 temperaturelogging 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	Part	Description		
Temperature Sensor	DS1920-F5+	Enables user to collect current temperature upon contact with a reader; digital thermometer, $\pm 0.5^{\circ}$ C accuracy (0°C to 70°C)		
Temperature Data Loggers	Part	Temperature Range (°C)	Accuracy (°C, max)	Data Log Size (Points)
	DS1921G-F5#	-40 to +85	±1(-30°C/+70°C)	2К
	DS1921H-F5#	+15 to +46	±1	2К
	DS1921Z-F5#	-5 to +26	±1	2К
	DS1922L-F5#	-40 to +85	±0.5 (-10°C/+65°C)	4K/8K
	DS1922T-F5#	0 to +125	±0.5 (+20°C/+75°C)	4K/8K
	DS1922E-F5#	+15 to +140	±1.5 (+110°C/+140°C)	4K/8K
	DS1925L-F5#	-40 to +85	±0.5 (-40°C/+85°C)	61k/122k
Temperature/Humidity Data Logger	DS1923-F5#	-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.

Thermochron Data Loggers Support Two Temperature-Logging Modes

Time/Temperature Mode

Each Thermochron data logger will log up to 2K (DS1921), 8K (DS1922/DS1923), or 144k (**DS1925**) 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



Histogram Recording Mode



Histogram Mode (DS1921 Only)

A temperature histogram runs concurrently with the time/temperature logging for each DS1921 Thermochron data logger. The histogram logs temperature occurrences into one of 64 different temperature ranges that are each approximately 2°C wide (e.g., +22°C to +23.99°C, +24°C to +25.99°C). A counter is incremented for the corresponding range each time a measured temperature falls within that range. Using the same example data above, the result represented in histogram format would look like the graph on the right. Each range can increment up to 65536. If set to log every minute, the histogram counter would reach 65536 after approximately 44 days (or even longer if the measured temperatures fall into multiple ranges, as in the example). Therefore, the histogram can be used in applications where total thermal exposure is important, but the exact times that particular temperatures occurred is not. For example, it may be important to monitor a process and record the total number of minutes of exposure at various temperatures. In another type of application, the useful life of temperature-sensitive products may be extended significantly (and thus reduce their effective costs) by storing them well below the maximum allowed temperature and using the histogram function to accurately determine the remaining life of the material.

Data Logger Applications

Fresh/Frozen Food

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.

Pharmaceuticals

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 or rendering it completely useless.

Heating/Refrigeration/Freezer Systems

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



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

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 bit or 64 bit (Windows XP® SP2 or higher, 2008, Windows Vista®, Windows 7, Windows 10)	1-Wire SDK*	Windows programming language-independent library. Supports all 1-Wire adapter types with traditional API* (TMEX) and Windows.NET and Compact.NET interfaces.	
Windows 32 bit or 64 bit (Windows XP SP2 or higher, 2008, Windows Vista, Windows 7, Windows 10)	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 DS2480B bridge or custom 1-Wire interface. Many 1-Wire adapter and platform-specific example builds are 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	 Application Note 126 (I/O port pin for 1-Wire) Application Note 192 (Serial port + DS2480B bridge for 1-Wire) Application Note 3684 (I²C port plus DS2482) Some I/O port assembly language examples in 1-Wire Public Domain Kit 	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 Device Description," for an overview of all available APIs. For all iButton application notes and software tools, visit www.iButton.com. For support, open a request online at Maxim Support Center.

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iButtons—More Than Just Temperature/ Humidity Data Loggers

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

Product Overview

Feature	Part	Description	
Address Number Only	DS1990A	64-bit ROM ID	
NV RAM Memory	DS1992/DS1993/ DS1995/DS1996	1Kb/4Kb/16Kb/64Kb NV RAM	
EEPROM Memory	DS1971/DS1972/ DS1973/DS1977	256-bit/1Kb/4Kb/32KB EEPROM	
EPROM Memory	DS1982/DS1985	1Kb/16Kb/EPROM	
	DS1961S	1Kb EEPROM with SHA-1	
Challenge-and-Response Secure Memory	DS1964S	0.5Kb EEPROM with SHA-256	
	DS1963S	DS1963S 4Kb NV RAM with SHA-1 and counters	
Real-Time Clock	DS1904	RTC	

Accessories Overview

Communication Port Adapters				
A	DS9490R	1-Wire USB Adapter: 1-Wire to USB interface. Connects to all reader/probes with RJ11 interface.		
2 9 P	DS9490B	USB iButton Holder/Dongle: 1-Wire to USB interface. Designed for applications in which the iButton is infrequently removed from holder.		
	DS9481R-3C7	1-Wire USB Adapter: 1-Wire to USB interface. Connects to all reader/probes with RJ11 interface.		
Probes/Receptors (Reader/Writer Interfaces)				
	DS1402D-DR8	Blue Dot Receptor Cable with RJ11 Connector: iButton reader/writer interface. iButtons communicate through Blue Dot interface with just a touch or can be snapped into the Blue Dot for continuous connection.		
\mathbb{D}	DS1402-RP8	Touch and Hold Probe Cable with RJ11 Connector: iButton reader/writer interface. iButtons communicate through probe with just a touch or can be snapped into the probe for continuous connection.		
0	DS9092GT	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 RJ11 jack.		
	DS9092/DS9092T /DS9092L	Panel Mount Probe. T version has tactile feedback. L version has LED and is recommended for outdoor use.		
	DS1402D-41	Blue Dot Probe Component for Embedded Touch and Hold Applications		
iButton Mo	unts			
	DS9107	Capsules: Protect iButton loggers from moisture, solvents, and pressure.		
	DS9093A/DS9093F /DS9093N	Key Fobs: Allow an iButton to be carried conveniently on a key chain. Available in three different versions and five different colors.		
	DS9096P	iButton adhesive pads: Allow you to easily mount iButtons to anything.		

Learn more

For more information, visit: www.iButton.com

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