



































































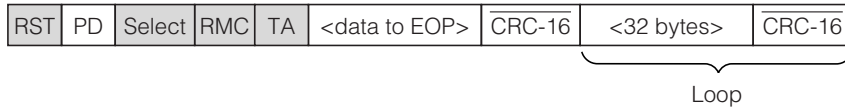




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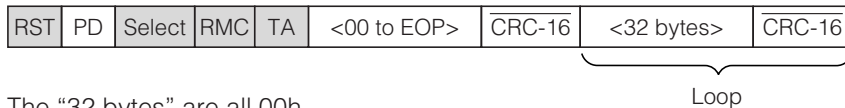
## 1-Wire Communication Examples (continued)

### Read Memory with CRC (Success)



The “32 bytes” are either valid page data or 00h bytes when reading reserved pages 20 through 63 or 68 through 127 or pages 192 and higher (beyond data-log memory).

### Read Memory with CRC (Invalid Address)



The “32 bytes” are all 00h.

### Clear Memory



To verify success, read the Status register at address 0214h. If MEMCLR is 1, the command was executed successfully.

### Convert Temperature



To read the result and to verify success, read the addresses 0211h (result) and the Device Samples Counter at address 021Dh to 021Fh. If the count has incremented, the command was executed successfully.

## **Mission Example: Prepare and Start a New Mission**

Assumption: The previous mission has ended. To end an ongoing mission write the MIP bit in the Status register to 0.

The preparation of a DS1921G for a mission including the start of the mission requires up to four steps:

Step 1: Set the RTC (if it needs to be adjusted).

Step 2: Clear the data of the previous mission.

Step 3: Set the search condition and Mission Start Delay and clear the alarm flags.

Step 4: Set the temperature alarms and write the Sample Rate to start the mission.

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DS1921G

## Step 1: Set the RTC

Let the actual time be 15:30:00 hours on Monday, the 1st of April in 2002. This results in the following data to be written to the RTC registers:

<b>ADDRESS</b>	200h	201h	202h	203h	204h	205h	206h
<b>DATA</b>	00h	30h	15h	01h	81h	04h	02h

With only a single DS1921G connected to the bus master, the communication of step 1 is as follows:

MASTER MODE	DATA (LSB FIRST)	COMMENTS	
Tx	(Reset)	Reset pulse (480µs to 960µs)	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	0Fh	Issue Write Scratchpad command	
Tx	00h	TA1, beginning offset = 00h	
Tx	02h	TA2, address = 0200h	
Tx	<7 data bytes>	Write 7 bytes of data to scratchpad	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	AAh	Issue Read Scratchpad command	
Rx	00h	Read TA1, beginning offset = 00h	
Rx	02h	Read TA2, address = 0200h	
Rx	06h	Read E/S, ending offset = 6h, flags = 0h	
Rx	<7 data bytes>	Read scratchpad data and verify	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	55h	Issue Copy Scratchpad command	
Tx	00h	TA1	(AUTHORIZATION CODE)
Tx	02h	TA2	
Tx	06h	E/S	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	

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### Step 2: Clear the data of the previous mission

Set the EMCLR bit to 1, enable the RTC, and then execute the Clear Memory command. The RTC oscillator must be stable before the Clear Memory command is issued. Wait 500 $\mu$ s after issuing the Clear Memory command before proceeding to step 3. This results in the following data to be written to the Status register:

<b>ADDRESS</b>	20Eh
<b>DATA</b>	40h

With only a single DS1921G connected to the bus master, the communication of step 2 is as follows:

MASTER MODE	DATA (LSB FIRST)	COMMENTS
Tx	(Reset)	Reset pulse (480 $\mu$ s to 960 $\mu$ s)
Rx	(Presence)	Presence pulse
Tx	CCh	Issue Skip ROM command
Tx	0Fh	Issue Write Scratchpad command
Tx	0Eh	TA1, beginning offset = 0Eh
Tx	02h	TA2, address = 020Eh
Tx	40h	Write status byte to scratchpad
Tx	(Reset)	Reset pulse
Rx	(Presence)	Presence pulse
Tx	CCh	Issue Skip ROM command
Tx	AAh	Issue Read Scratchpad command
Rx	0Eh	Read TA1, beginning offset = 0Eh
Rx	02h	Read TA2, address = 020Eh
Rx	0Eh	Read E/S, ending offset = 0Eh, flags = 0h
Rx	40h	Read scratchpad data and verify
Tx	(Reset)	Reset pulse
Rx	(Presence)	Presence pulse
Tx	CCh	Issue Skip ROM command
Tx	55h	Issue Copy Scratchpad command
Tx	0Eh	TA1
Tx	02h	TA2
Tx	0Eh	E/S
		(AUTHORIZATION CODE)
Tx	(Reset)	Reset pulse
Rx	(Presence)	Presence pulse
Tx	CCh	Issue Skip ROM command
Tx	3Ch	Issue Clear Memory command
Tx	(Reset)	Reset pulse
Rx	(Presence)	Presence pulse

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### Step 3: Set the search condition and Mission Start Delay and clear the alarm flags

In this example, the rollover is disabled and the search condition is set for a high temperature only. The mission is to start with a delay of 90min (005Ah) and the alarm flags TLF, THF, and TAF are cleared. This results in the following data to be written to the special function registers:

ADDRESS	20Eh	20Fh	210h	211h	212h	213h	214h
DATA	02h	00h*	00h*	00h*	5Ah	00h	00h

\*Writing through address locations 20Fh to 211h is faster than accessing the Mission Start Delay register in a separate cycle. The write attempt has no effect on the contents of these registers.

With only a single DS1921G connected to the bus master, the communication of step 3 is as follows:

MASTER MODE	DATA (LSB FIRST)	COMMENTS	
Tx	(Reset)	Reset Pulse (480µs to 960µs)	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	0Fh	Issue Write Scratchpad command	
Tx	0Eh	TA1, beginning offset = 0Eh	
Tx	02h	TA2, address = 020Eh	
Tx	<7 data bytes>	Write 7 bytes of data to scratchpad	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	AAh	Issue Read Scratchpad command	
Rx	0Eh	Read TA1, beginning offset = 0Eh	
Rx	02h	Read TA2, address = 020Eh	
Rx	14h	Read E/S, ending offset = 14h, flags = 0h	
Rx	<7 data bytes>	Read scratchpad data and verify	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	55h	Issue Copy Scratchpad command	
Tx	0Eh	TA1	(AUTHORIZATION CODE)
Tx	02h	TA2	
Tx	13h	E/S	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	

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### Step 4: Set the temperature alarms and write the Sample Rate to start the mission

In this example, the temperature alarms are set to -5°C for the low temperature threshold and 0°C for the high temperature threshold. The sample rate is once every 10min, allowing the mission to last up to 14 days. This results in the following data to be written to the special function registers:

<b>ADDRESS</b>	20Bh	20Ch	20Dh
<b>DATA</b>	46h	50h	0Ah

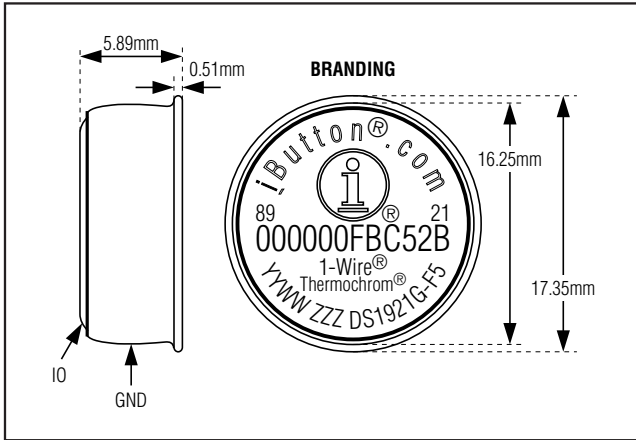
With only a single DS1921G connected to the bus master, the communication of step 4 is as follows:

MASTER MODE	DATA (LSB FIRST)	COMMENTS	
Tx	(Reset)	Reset pulse (480µs to 960µs)	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	0Fh	Issue Write Scratchpad command	
Tx	0Bh	TA1, beginning offset = 0Bh	
Tx	02h	TA2, address = 020Bh	
Tx	<3 data bytes>	Write 3 bytes of data to scratchpad	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	AAh	Issue Read Scratchpad command	
Rx	0Bh	Read TA1, beginning offset = 0Bh	
Rx	02h	Read TA2, address = 020Bh	
Rx	0Dh	Read E/S, ending offset = 0Dh, flags = 0h	
Rx	<3 data bytes>	Read scratchpad data and verify	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	
Tx	CCh	Issue Skip ROM command	
Tx	55h	Issue Copy Scratchpad command	
Tx	0Bh	TA1	(AUTHORIZATION CODE)
Tx	02h	TA2	
Tx	0Dh	E/S	
Tx	(Reset)	Reset pulse	
Rx	(Presence)	Presence pulse	

If step 4 is successful, the MIP bit in the Status register is 1, the MEMCLR bit is 0, and the Mission Start Delay counts down.

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## Pin Configuration



## Package Information

For the latest package outline information and land patterns (footprints), go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
F5 <i>i</i> Button	IB#5CP	<a href="#">21-0266</a>	—

# Thermochron *i*Button

## Revision History

REVISION DATE	DESCRIPTION	PAGES CHANGED
120407	Added bullet "Water resistant or waterproof if placed inside DS9107 iButton capsule (Exceeds Water Resistant 3 ATM requirements)"	1, 2
	Deleted "application pending" from UL bullet and safety statement	
	Added text to <i>Detailed Description</i> section: Note that the initial sealing level of DS1921G achieves IP56. Aging and use conditions can degrade the integrity of the seal over time, so for applications with significant exposure to liquids, sprays, or other similar environments, it is recommended to place the Thermochron in the DS9107 iButton capsule. The DS9107 provides a watertight enclosure that has been rated to IP68 (See <a href="http://www.maxim-ic.com/AN4126">www.maxim-ic.com/AN4126</a> )	
4/09	Created newer template-style data sheet	All
4/10	Overdrive specifications for $t_{RSTL}$ , $t_{PDL}$ , and $t_{W0L}$ split into range $V_{PUP} > 4.5V$ and full range. New values for the full range	2-4
4/11	Updated UL certificate reference; deleted $\epsilon$ from the $t_{W1L}$ specification in the <i>Electrical Characteristics</i> table; applied note 13 to the $t_{W0L}$ specification in the <i>Electrical Characteristics</i> table; added more details to <i>Electrical Characteristics</i> table notes 7, 13, and 14	1, 3, 4

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