

## GENERAL DESCRIPTION

This product is a sealed plastic stick containing three DS1921G iButtons®. The iButtons are connected in parallel through metal plates that are spot-welded to the IO and GND contact, respectively. Two stranded wires protruding from the top end of the stick allow for a 1-Wire® reader/writer to make contact to the iButtons for setup and data retrieval. Electrically, the product is specified by the DS1921G data sheet, with the proper scaling (e.g., current  $\times 3$ , capacitance  $\times 3$ ). The mechanical and thermal characteristics of the module are specified in this document.

## APPLICATIONS

Concrete Maturity Monitoring

## FEATURES

- Three DS1921G networked to monitor temperature at the top, bottom and center of the stick
- Connects to 1-Wire reader/writer through color-coded 18 AWG (1 mm Ø) stranded wires with ½ inch (1.3 cm) stripped ends
- Electrically compatible to the DS1921G ThermoChron iButton (3 in parallel)
- Sealed against liquid intrusion
- Module position information stored in DS1921G memory

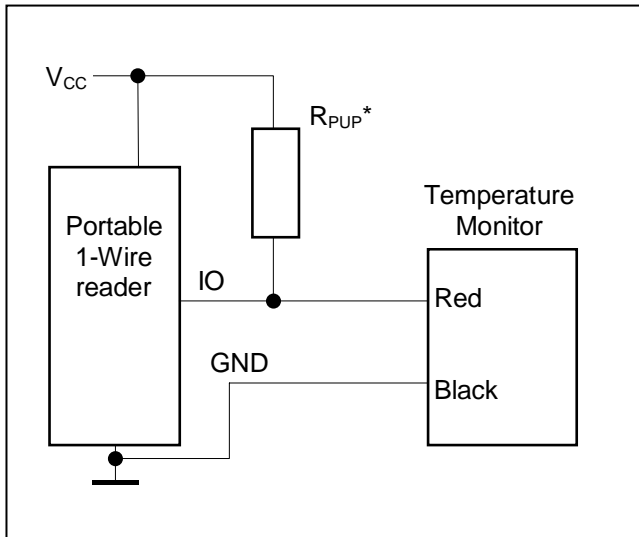
## ORDERING INFORMATION

| PART       | TEMP RANGE    | PIN-PACKAGE         |
|------------|---------------|---------------------|
| DS9108-8#  | -20°C to 65°C | 8" (20.3 cm) depth* |
| DS9108-10# | -20°C to 65°C | 10" (25.4 cm) depth |
| DS9108-12# | -20°C to 65°C | 12" (30.5 cm) depth |
| DS9108-15# | -20°C to 65°C | 15" (38.1 cm) depth |

Shipped in bulk with the wires bundled with a tie

\* Indicates depth of concrete to monitor, actual stick length is 0.25" (0.6 cm) less than depth

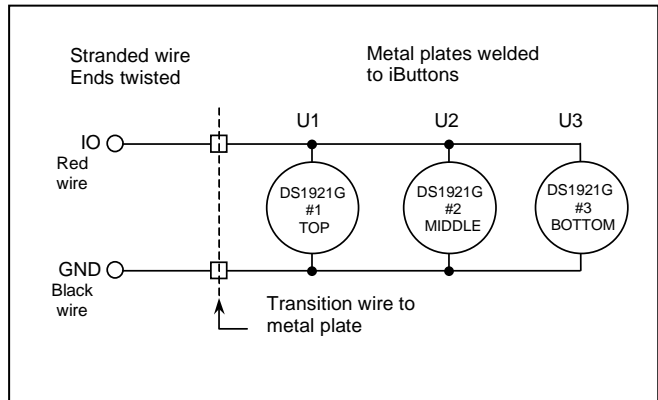
## TYPICAL OPERATING CIRCUIT



\* See Application Note 3829 for R<sub>pup</sub> resistor size selection.

iButton and 1-Wire are registered trademarks of Dallas Semiconductor.

## BLOCK DIAGRAM



**Note:** Some revisions of this device may incorporate deviations from published specifications known as errata. Multiple revisions of any device may be simultaneously available through various sales channels. For information about device errata, click here: [www.maxim-ic.com/errata](http://www.maxim-ic.com/errata).

**ABSOLUTE MAXIMUM RATINGS**

Voltage Range on Any Pin Relative to Ground  
 Operating Temperature Range  
 Storage Temperature Range

See DS1921G Datasheet  
 -4°F to 149°F (-20°C to +65°C)  
 See DS1921G Datasheet

*Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to the absolute maximum rating conditions for extended periods may affect device.*

**SPECIFICATIONS**

(See DS1921G datasheet,  $T_A = -4^\circ\text{F}$  to  $149^\circ\text{F}$  ( $-20^\circ\text{C}$  to  $+65^\circ\text{C}$ ) (Note 1))

| PARAMETER                 | CONDITIONS | MIN                   | TYP | MAX  | UNITS  |
|---------------------------|------------|-----------------------|-----|------|--------|
| Weight                    |            | 2.5                   |     |      | ounces |
|                           |            | 72                    |     |      | grams  |
| Physical Dimensions       |            | See technical drawing |     |      |        |
| Wire Length               |            | 12.9                  |     | 13.1 | inches |
|                           |            | 32.8                  |     | 33.3 | cm     |
| Tensile Strength of Wires |            | 10                    |     |      | lbf    |
|                           |            | 44.5                  |     |      | Newton |
| Thermal Response Time     | (Note 2)   | 500                   |     |      | s      |

**Note 1:** Assembled module production tested at 77°F (25°C).

**Note 2:** Response time in water is the time required for the recorded value to read 63% of the temperature's real variation.

Material: PVC with PVC cement and E-60NC black Hysol epoxy for wire sealant

**PIN DESCRIPTION**

| PIN        | NAME | FUNCTION  |
|------------|------|---|
| Red Wire   | IO   | 1-Wire bus interface. Open drain, requires external pull-up resistor. |
| Black Wire | GND  | Ground Reference  |

**iButton LOCATION WITHIN MODULE**

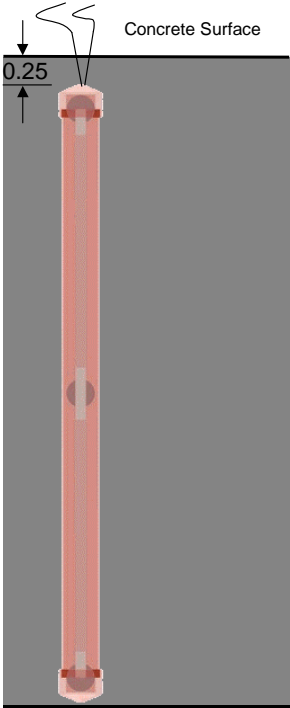
Each DS1921G in the DS9108 module contains a memory tag marker to indicate its position in the assembly. The position mark is a CRC16 validated packet starting on page 15 in the user memory. The memory image for 'TOP', 'MIDDLE', and 'BOTTOM':

**Table 1. Memory Tag Description**

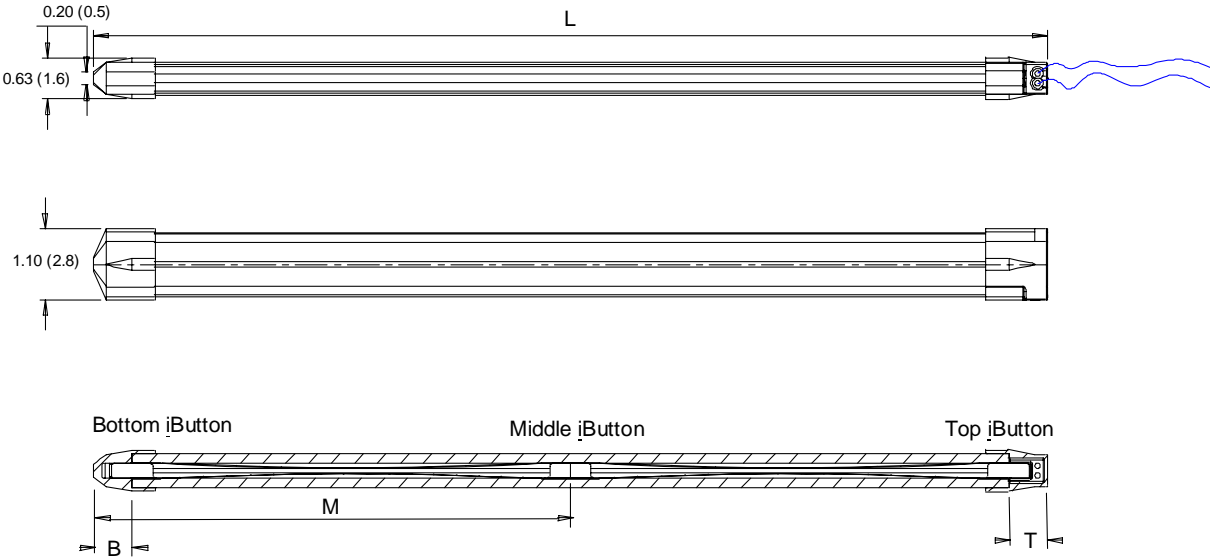
| TAG TYPE | ADDRESS   | CONTENTS (HEX) | DESCRIPTION                   |
|----------|-----------|----------------|-------------------------------|
| TOP      | 1E0h–1E3h | 01 54 FA 60    | 'T' in a CRC validated packet |
| MIDDLE   |           | 01 4D 3B AA    | 'M' in a CRC validated packet |
| BOTTOM   |           | 01 42 7B AE    | 'B' in a CRC validated packet |

### TYPICAL OPERATING CHARACTERISTICS

The module is inserted into wet concrete with the top approximately 0.25 inches (0.6 cm) below the surface. The wires are draped on the surface for later data retrieval.



### PACKAGE INFORMATION



| Concrete Depth | L            | B         | M           | T         |
|----------------|--------------|-----------|-------------|-----------|
| 8 (20.3)       | 7.75 (19.7)  | .60 (1.5) | 3.88 (9.9)  | .60 (1.5) |
| 10 (25.4)      | 9.75 (24.8)  | .60 (1.5) | 4.88 (12.4) | .60 (1.5) |
| 12 (30.5)      | 11.75 (29.8) | .60 (1.5) | 5.88 (14.9) | .60 (1.5) |
| 15 (38.1)      | 14.75 (37.5) | .60 (1.5) | 7.38 (18.7) | .60 (1.5) |

Inches (centimeters)