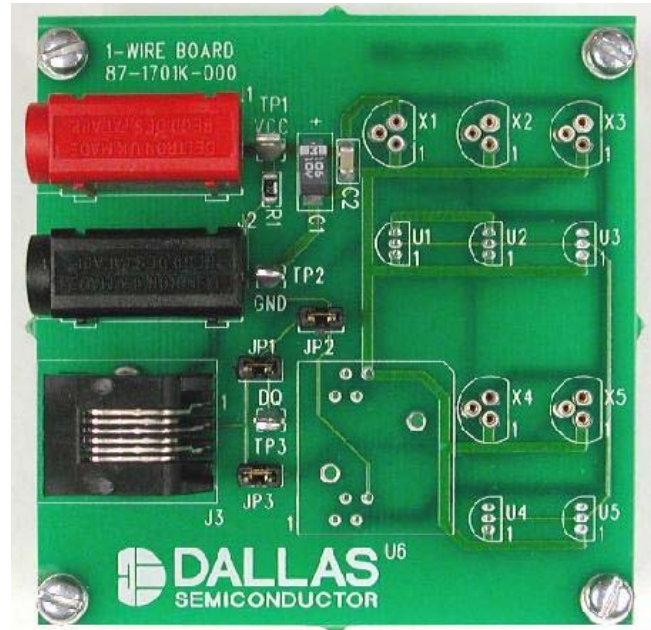


FEATURES

- Demonstrates the Full Features of the Dallas 1-Wire[®] Thermal Devices, Including:
 - DS18B20
 - DS18S20
 - DS1821
 - DS1822
- Complete Read/Write Access to All Registers Within the Devices.
- Measures Temperatures from the Full Range of the Devices -55°C to +125°C. Fahrenheit Equivalent is -67°F to +257°F.
- Celsius and Fahrenheit Temperature Reading and Charting is Provided for All Supported Devices.
- Interfaces to the Serial Port of a PC Running Windows[®] 95 or Newer.



1-Wire Board
 87-1701K-000*

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EVALUATION KIT CONTENTS

- 1 pc. DS1701K 1-Wire Board
- 1 pc. DS9123 Serial Port Adapter
- 1 pc. RJ-11 Phone Cable
- 1 pc. DS1701K CD Containing:
 - DS1701K Evaluation Software
 - DS1701K Related Data Sheets

EQUIPMENT NEEDED

1. A PC Running Windows 95 or Newer with a CD-ROM Drive and an Available Serial Port
2. A Battery or a Power Supply with Output Between +3.0V and +5.5

**Kit demonstration boards will vary as they are improved upon over time.*

1-Wire is a registered trademark of Dallas Semiconductor.
 Windows is a registered trademark of Microsoft Corp.

INTRODUCTION

The DS1701K evaluation kit makes performance evaluation, software development, and prototyping with the Dallas 1-Wire thermal devices easy. The evaluation board interfaces to PC through a DS9123 serial port adapter and RJ-11 cable connection. The provided CD-ROM contains all related data sheets along with the evaluation software, which can be run under Windows 95 or newer.

The DS1701K evaluation software gives the user complete control of all functions of the Dallas 1-Wire thermal devices. Separate control tabs allow the user to view the real-time updates of the temperature at the desired resolution as well as access to all scratchpad and EEPROM memory locations. The software incorporates a datalogging feature to monitor a device over time. Additionally the software provides the ability to select and read various devices on the 1-Wire bus.

SETUP AND INSTALLATION

BOARD CONNECTIONS

The Dallas 1-Wire thermal devices can be placed in any or all of the X1 through X5 3-pin sockets and be soldered into any or all of the U1 through U5 holes. The user can install up to 10 devices on the 1-Wire bus on this evaluation board and then use the software to select which device to read. See the *Device Select Menu* section below. However, make sure there is a maximum of one DS1821 on the bus, because the DS1821 does not offer the multidrop functionality and will create data collisions if more than one is on the bus at a time.

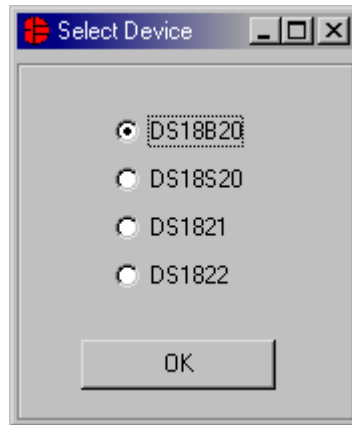
Communication to the board can be accomplished by connecting the DS9123 serial port adapter to an available serial port on a PC. Then connect the RJ-11 jack to the DS9123 serial port adapter with the provided 6 conductor cable. The DS1701K software can communicate with the Dallas 1-Wire thermal devices without a power supply being connected to the board. However, temperature readings will not be performed unless the device is configured in parasite power mode (see device data sheets for information on parasite power mode.)

SOFTWARE INSTALLATION

To install the DS1701K software, exit all programs currently running and insert the DS1701K software CD into your computer's CD-ROM. The user can run SETUP.EXE from the setup directory and the installation process begins. Follow the prompts to complete the installation. The DS1701K software can be uninstalled in the *Add/Remove Programs* tool in the *Control Panel*. After the installation is complete, open the DS1701K folder and run DS1701K.EXE or select DS1701K from the program menu. A splash screen containing information about the evaluation kit appears as the program is being loaded.

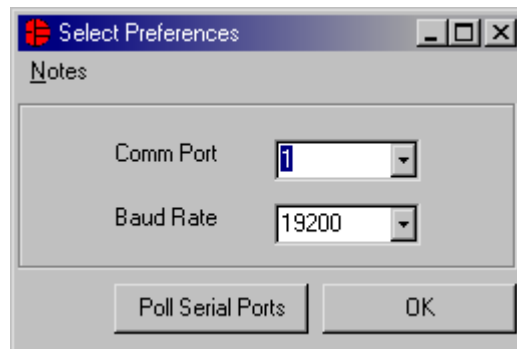
The documentation directory, also located on the CD, contains all relevant data sheets and application notes on the DS18B20, DS18S20, DS1821, DS1822, and DS1701K. They are stored in Adobe Acrobat format for easy viewing.

SELECTING THE DEVICE



The user will be prompted to select which Dallas 1-Wire thermal device the DS1701K should expect to find on the DS1701K board. If more than one device is connected, simply select which device will be initially communicated with, and that selection can be changed while the program is running if necessary by accessing the *Select Device* option on the menu bar.

SELECTING THE COM PORT

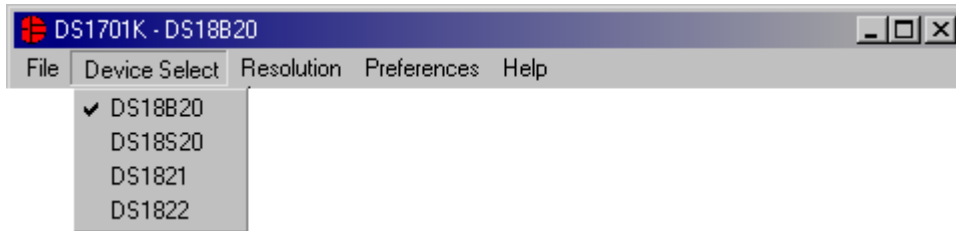


The first time the software runs the *Serial Port Settings* window appears. In this window, select the COM port to which the DS9123 is attached and the desired communication rate; then click *OK*. The DS1701K software saves this COM port selection and automatically uses the selection each time the program starts. To change the COM port later, click the *Preferences* option on the menu bar, select *Serial Port Settings*, and then select the appropriate port. To attempt to automatically locate the DS9123, click the *Poll Serial Ports* button. Warning—automatically polling for the DS9123 can disrupt other devices connected to your computer's COM ports.

MENUS

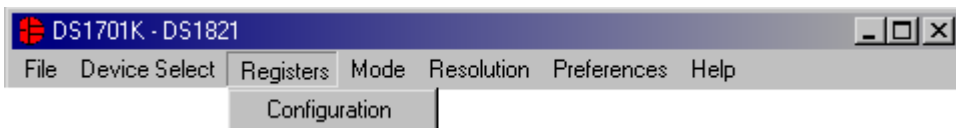
Several pulldown menu options have been provided to simplify use of the DS1701K software for the user. Their functions are individually detailed below.

DEVICE SELECT

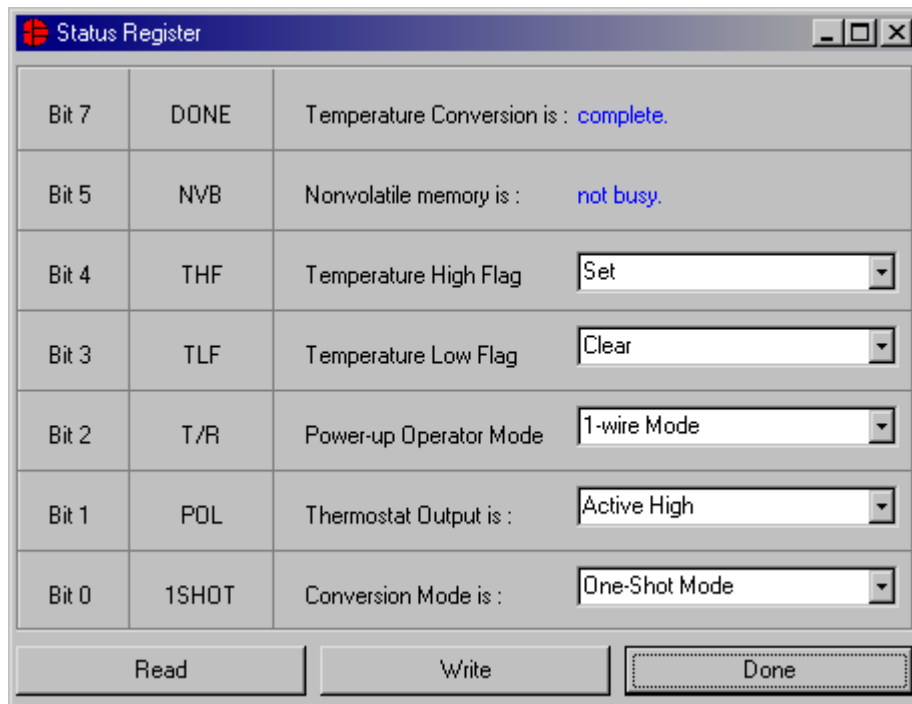


The *Device Select* menu allows the user to select which type of Dallas 1-Wire thermal device will be read. When one of the devices is selected from the menu, the program will find a device that matches the ROM Code of the selected device type and begin reading and making calculations based on the new device selection.

REGISTERS

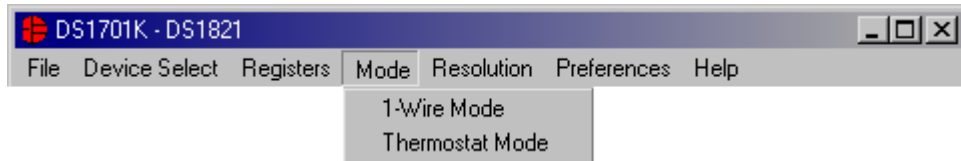


When the DS1821 is the device selected, the *Registers* menu appears and gives immediate access to the status/configuration register. See the *Status Register* window example.



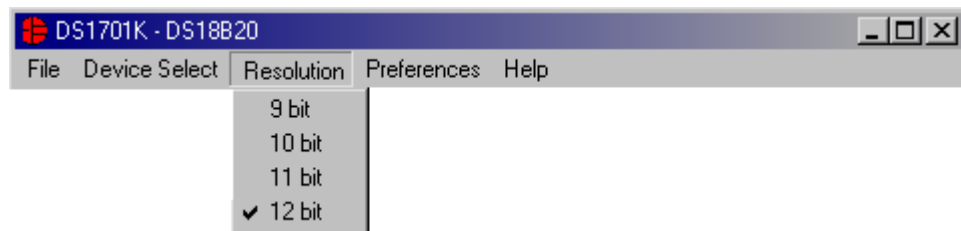
The present state of all register bits are displayed immediately upon opening the register window. R/W locations contain a selection field to allow the user to determine their state. Pressing the *Write* button will write the register with the new value.

MODE



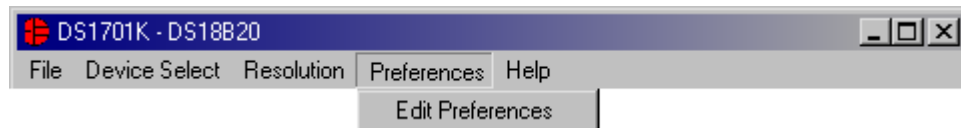
The *Mode* menu is also only visible when the DS1821 is selected. This allows the user to switch between the *1-Wire Mode* and *Thermostat Mode* of the DS1821. When entering the *Thermostat Mode*, the software will automatically set the power-up operating mode bit of the *Status Register* and then prompt the user to “Set V_{DD} to 0V”. When V_{DD} is set to 0V, click *OK*, and the DQ line will be pulsed 16 times in order to temporarily enter *Thermostat Mode* as outlined in the DS1821 data sheet. When exiting *Thermostat Mode*, the program will prompt the user to again “Set V_{DD} to 0V”. When that is done, click *OK* and DQ will be pulsed 16 times to temporarily enter the *1-Wire Mode* and the power-up operating mode bit of the *Status Register* is cleared. In order to power-up in the new mode, DQ and V_{DD} should be low for approximately 10 seconds.

RESOLUTION



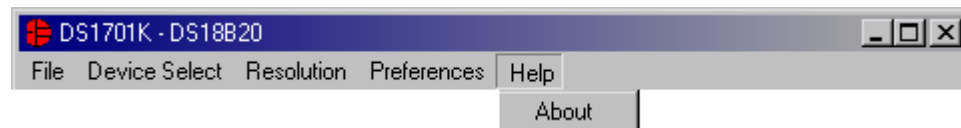
The *Resolution* menu allows the user to select the resolution of the temperature conversion. The DS18B20 and DS1822 will produce temperature results in 9-, 10-, 11-, or 12-bit resolution. The DS18S20 allows for 9-bit or a *High-Resolution* mode. The DS1821 allows for 8-bit or a *High-Resolution* mode. When the resolution is changed for the DS18B20 or the DS1822, the resolution bits of the configuration register will be updated. When the *High-Resolution* mode is selected for the DS18S20 or the DS1821, the additional steps, as outlined in the device data sheets, will be taken to appropriately read the *Count Remaining* and *Count Per °C* registers and make the required calculations.

PREFERENCES



The *Preferences* menu allows the user to change COM port settings at any time. *Edit Preferences* opens the *Select Preferences* window. See *Selecting the COM Port* above.

HELP

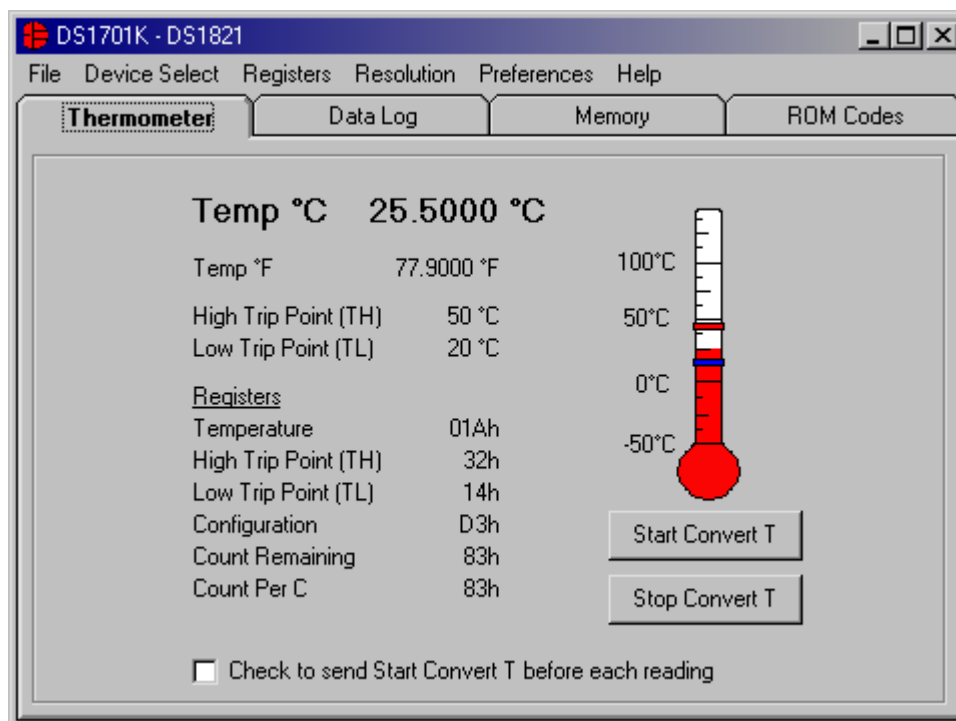


Selecting the *About* topic from the *Help* menu will open a window containing information about this program and Dallas Semiconductor.

PROGRAM TABS

All functions of the program are divided under four tabs in the main program window. Left click on the appropriate tab to move to the desired function page. Located under the *Thermometer* tab are all of the real-time updates of all the registers and the calculated results. The *Data Log* tab allows the user to log the data to a file. The *Memory* tab displays the contents of every register and memory location inside the Dallas 1-Wire thermal devices and allows the user to alter the data. The *ROM Codes* tab gives the user the ability to read all 1-Wire devices on the 1-Wire bus and read any devices with an alarm condition set.

THERMOMETER TAB

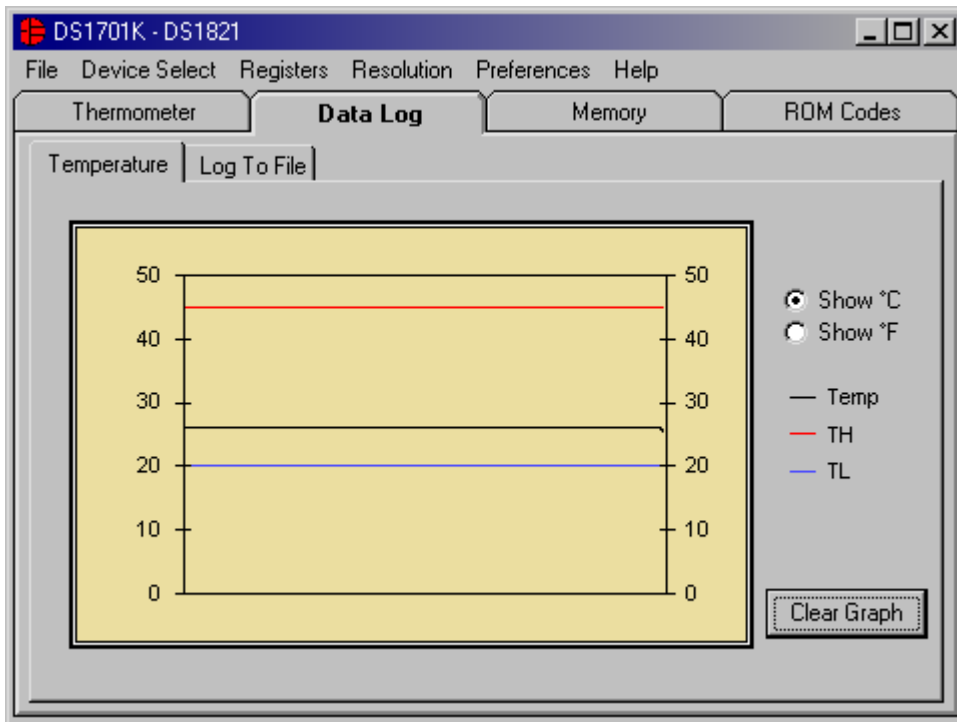


The thermometer screen displays the latest real-time temperature measurement and the TH and TL values with both analog thermometer readout and digital values. All registers are read and displayed on this screen. To edit any of the values that can be modified by the user, left-click on the associated label and the program will go to the *Memory* tab where the values can be read and written to the scratchpad and EEPROM. For the DS1821, left clicking on the *Configuration* register label will open the *Status/Configuration Register* window.

For the DS18B20, DS18S20 and DS1822, the user can check the box at the bottom of the window to perform an *Alarm Search* routine during each loop to check for any alarm flags that are set by any devices on the bus. If the selected device has an alarm condition, the alarm LED will be lit. Any devices with an alarm condition will have its *ROM Code* displayed on the *Alarm Search* sub-tab of the *ROM Codes* tab.

For the DS1821, a *Start Convert T* command is required to start a temperature conversion. If the device is in *Continuous Mode*, sending one *Start Convert T* command will allow the device to continuously monitor the temperature in 8-bit resolution. If the device is in *1-Shot Mode*, one-temperature conversion, in either 8-bit or high resolution, will be performed for each *Start Convert T* command that is sent. Since the device cannot continuously monitor temperature in high resolution, a check box has been included so that a *Start Convert T* command will be automatically sent prior to reading the temperature.

DATALOG TAB



The *Data Log* tab allows the user to see the temperature, TH and TL points graphed over time. The graph displays the last 500 data points collected by the DS1701K software and can be displayed in either °C or °F. The *Clear Graphs* button will clear all data from the graph, but does not reset the log to file function.

The screenshot shows the 'Data Log' tab for the DS1701K - DS18B20 device. The interface includes a menu bar (File, Device Select, Resolution, Preferences, Help) and a sub-menu (Thermometer, Data Log, Memory, ROM Codes). The 'Data Log' sub-tab is active, showing a 'Temperature' section with a 'Log To File' button. The main area contains a 'Filename' text field with the value 'c:\DS1701K_datalog.txt' and a 'Stop Logging' button. Below this is a table of log data. At the bottom, there is a 'Sampling Interval' dropdown menu set to '1 Second'.

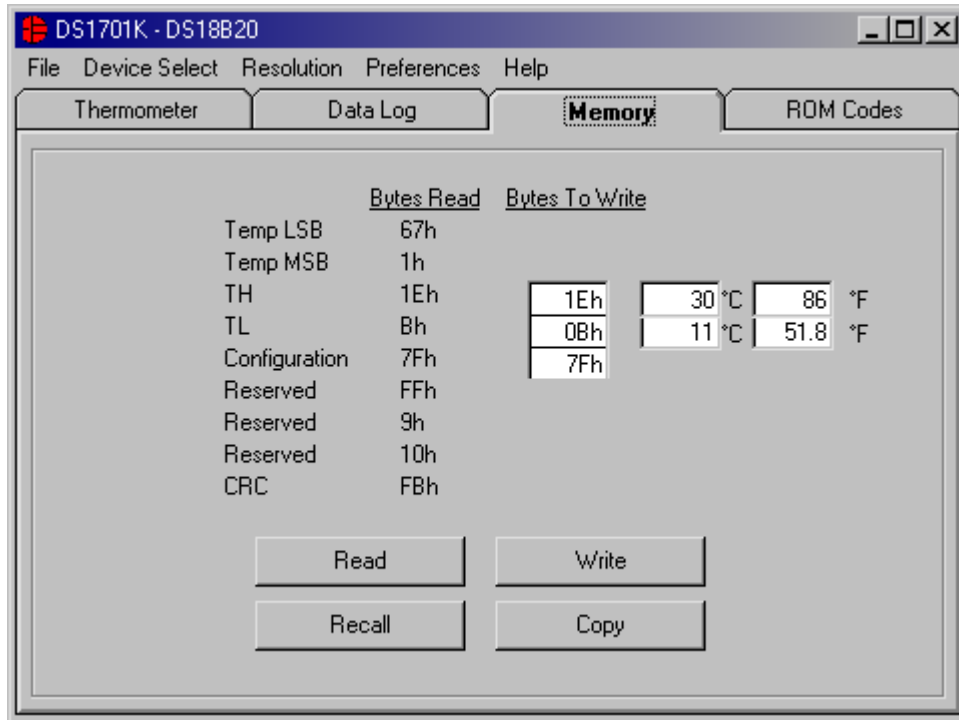
Time	Temp C	TH	TL	Alarm Status
1:56:44 PM	22.4375	30	11	No Alarm
1:56:44 PM	22.4375	30	11	No Alarm
1:56:45 PM	22.4375	30	11	No Alarm
1:56:47 PM	22.4375	30	11	No Alarm
1:56:48 PM	22.4375	30	11	No Alarm
1:56:49 PM	22.4375	30	11	No Alarm
1:56:50 PM	22.4375	30	11	No Alarm
1:56:51 PM	22.5000	30	11	No Alarm
1:56:52 PM	22.4375	30	11	No Alarm

The *Log to File* sub-tab contains control information for storing all log data to an ASCII file. The default filename is c:\DS1701K_datalog.txt, but can be modified in the filename text field. The *Log Data* button toggles data logging off and on. Data will be stored at the interval selected in the tab-delimited format of

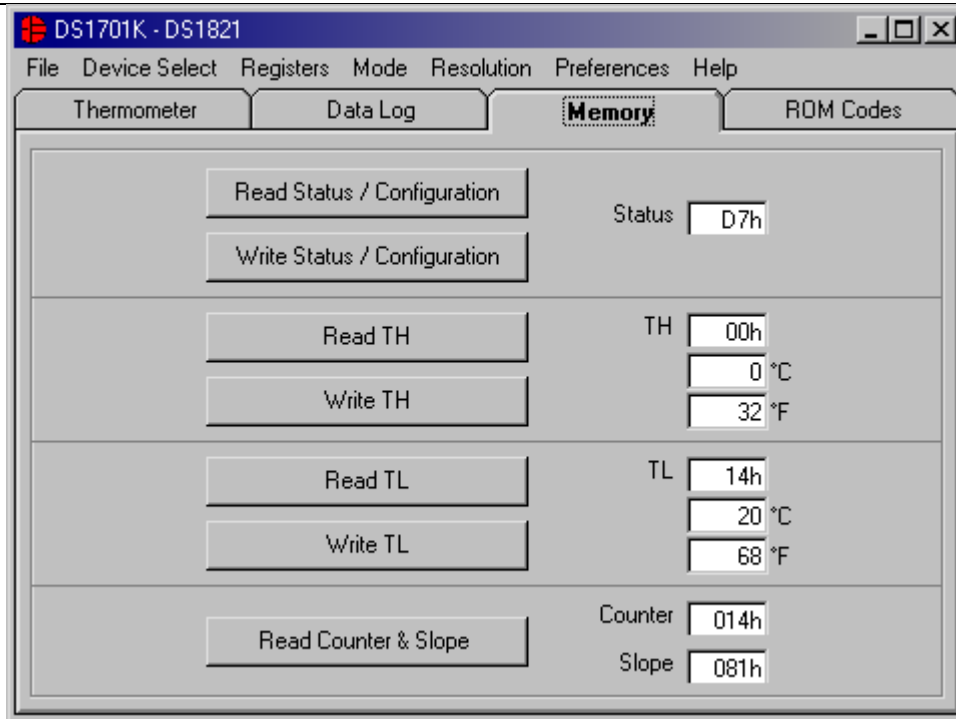
“Time<tab>Temperature<tab>TH<tab>TL<tab>Alarm Status”

for easy import into a spreadsheet. The most recent 50 samples are displayed in the window for observation. Warning—the *Log Data* function overwrites previous file information. Data previously stored in the file will be lost unless you change the filename. The sampling interval can be set from 1 second to 15 minutes and can be adjusted from the *Sampling Interval* menu at the bottom of the window.

MEMORY TAB

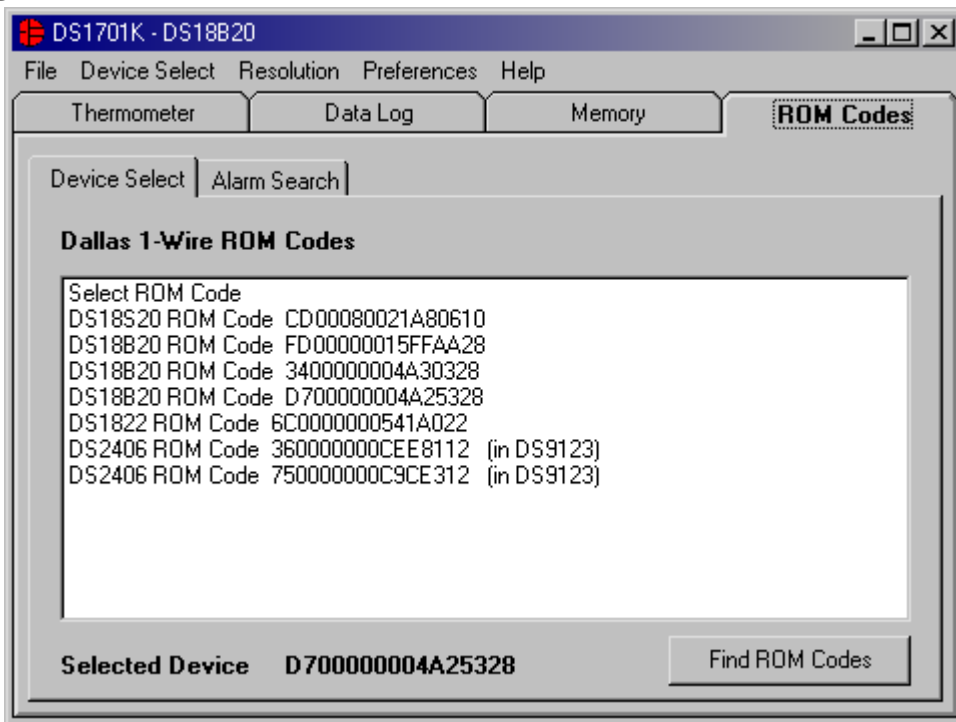


The *Memory* tab allows the user to see all 9 bytes that are read from the DS18B20, DS18S20, and DS1822. The user also can modify and write the 2 user bytes (TH and TL) and the configuration register. By left-clicking on the *Write* button, the scratchpad will be modified with new data, but the EEPROM values are not updated until the *Copy* button is pressed. The user can change the TH and TL registers in one of three formats: in hexadecimal form, in degrees C, or in degrees F. The program will detect which text box was the last one updated, and write that value to the device.



For the DS1821, the *Memory* tab allows the user to read and write the *Status/Configuration*, *TH* and *TL* registers. The *Counter* and *Slope* registers, which are used in calculating the high-resolution temperature, can also be read.

ROM CODES TAB



All of the 1-Wire ROM codes found on the 1-Wire bus will be displayed in this window. The user can request a new search ROM routine by left-clicking on the *Find ROM Codes* button in order to find any new or removed ROM codes on the bus. The user also can select a specific ROM code to read by left clicking on the desired ROM code. In that event, the program will identify which type of device is selected and make the appropriate readings and calculations.