

INTRODUCTION:

The battery-powered temperature logger in Figure 1 was built to demonstrate some features of the ADuC824 MicroConverter. This document briefly describes what the unit does and how to use it.

WHAT IT DOES:

In short, it logs a precise temperature reading every 10 minutes, storing the last 23 hours of temperature readings for upload to a PC. The temperature reading comes from a precision RTD connected directly to the ADC front-end of the ADuC824 (note that no external signal conditioning circuitry is needed). Software running on the ADuC824 applies a linearization routine to the RTD's transfer function, and then stores results in on-chip non-volatile Flash/EE data memory until they can be uploaded to a PC. In this "logging mode" of operation, the ADuC824 enters powerdown mode between conversions, thereby minimizing logging mode average current consumption allowing for extended battery life.



Figure 1:
The Temp Logger PCB

The unit enters a second mode of operation ("display mode") when you press the momentary pushbutton. In display mode, the ADuC824 performs a temperature measurement every half-second and displays the result on the LCD. It also sends each result out the UART as serial data that can be streamed to a PC. Even in display mode, the temp logger continues to log a reading every 10 minutes, thereby continuing the logging function uninterrupted.

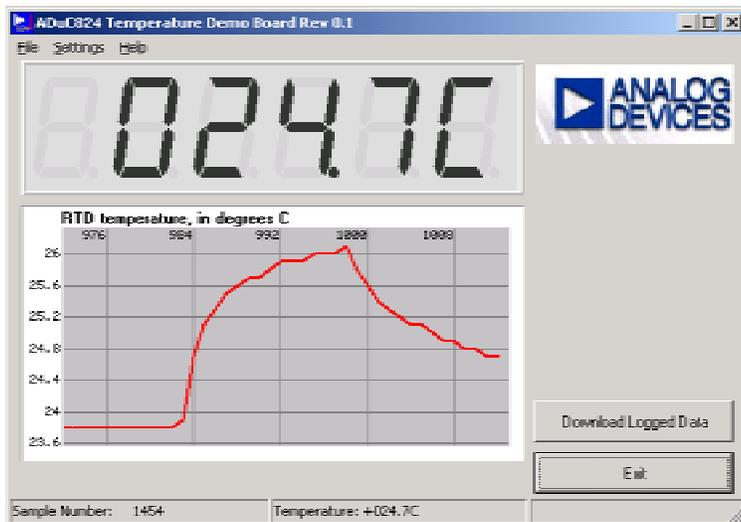


Figure 2: The GUI Screen Displaying Real Time Data

HOW TO USE IT:

To use the temperature logger for displaying real-time temperature, simply make sure no jumpers are inserted (i.e. J2 is open) and insert batteries (two CR2032 type), or just press the pushbutton if batteries are already inserted. To toggle between Celsius and Fahrenheit readings, hold the button in for at least 2 seconds and release it. If you don't press the pushbutton for ten minutes, the temperature logger will automatically switch to logging mode to conserve power. Pressing the pushbutton at any time restores display mode.

To access the logged data stored for the past 23 hours of operation you must connect the temperature logger to a Windows PC. To do this, you'll need the RS-232 dongle described

in MicroConverter application note uC006. This device will soon be available as part of newer MicroConverter QuickStart Development Toolkits. Using the RS-232 dongle, simply connect the temperature logger's J1 header to your PC's COM1 or COM2 serial port (note that the pin on J1 closest to the LCD is VDD) and tap the temp logger's pushbutton to wake it into display mode. Then launch the program "TempLoggerGUI.exe" on your PC to bring up the graphical interface to the temp logger. You should see a window similar to the screenshot of Figure 2 appear and begin displaying temperature data (if you're using COM2, you'll first have to select COM2 using the "Settings" pull-down menu). To view the data logged over the past 23 hours, simply click the "Download logged data" button on the GUI screen, and after the brief upload period you'll see a window similar to Figure 3.

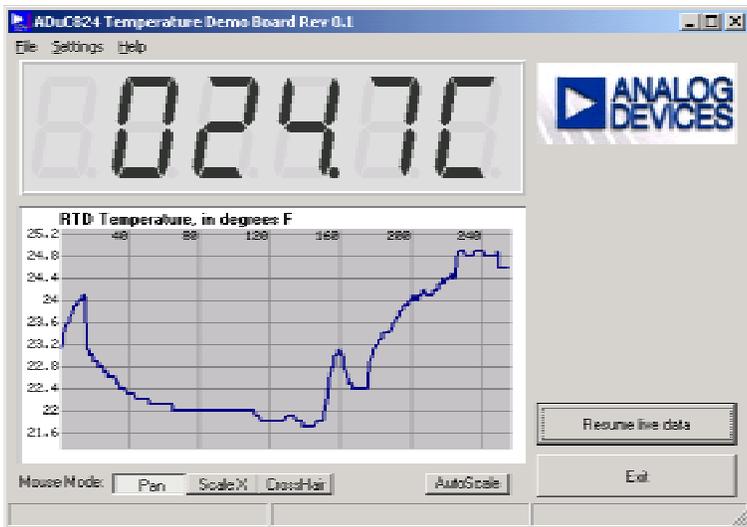


Figure 3: The GUI Screen Displaying Logged Data

The additional functions of the GUI are fairly straightforward, and can be accessed through the pull-down menus and on-screen buttons. You can scale the logged data output screen, you can select Celsius or Fahrenheit units, you can choose between the external precision RTD sensor (if installed) and the ADuC824's on-chip temperature sensor, etc. Note that when no external RTD is installed, the temperature logger defaults to using the ADuC824's on-chip temperature sensor, otherwise it defaults to using the external RTD.

PROBING FURTHER:

The schematic of the temperature logger is shown in Figure 4. If you want more information on how the unit works, refer to the well-commented source-code in the assembly file 'TempLogr.asm' that accompanies this document.

For more information on the ADuC824 and other MicroConverter products, visit the MicroConverter home page on the web at www.analog.com/microconverter where you'll find datasheets, application notes, and much more.

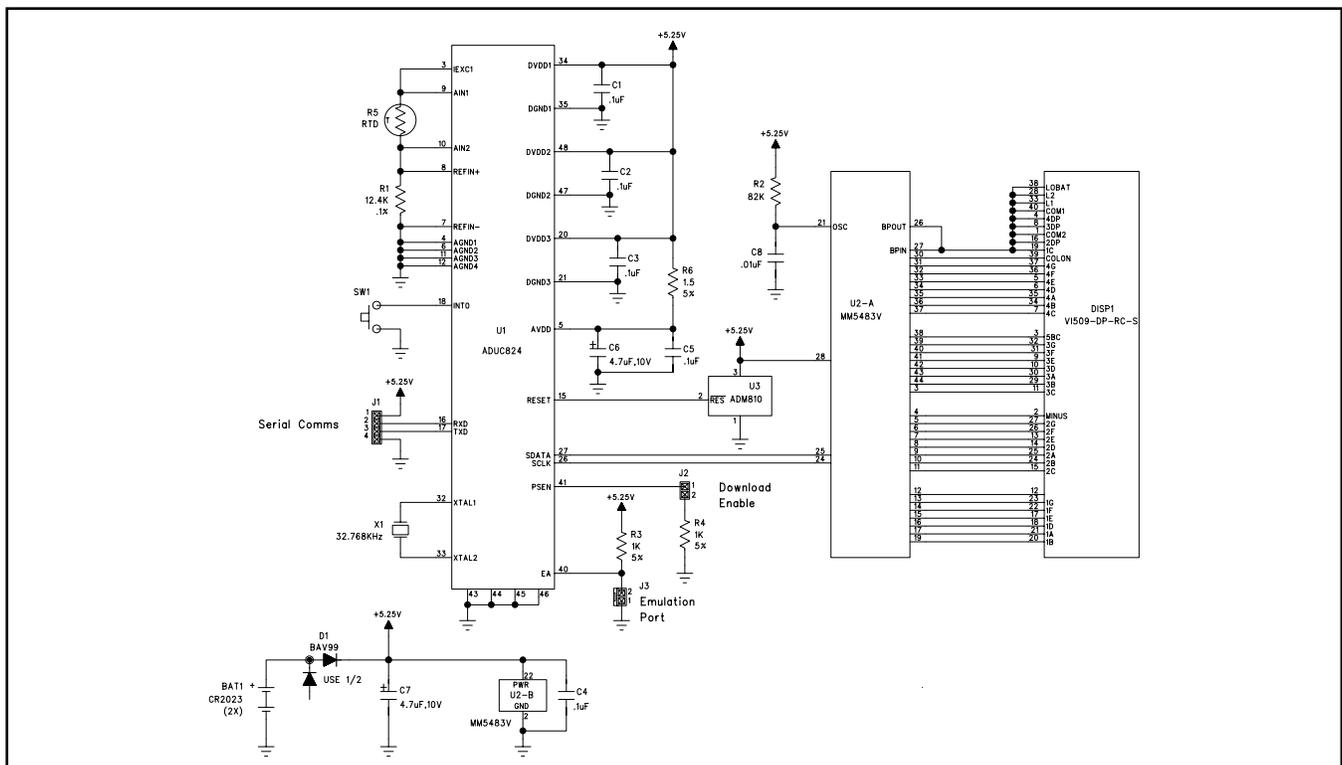


Figure 4: The Temp Logger Schematic