



# DS2746EVKIT

## Low-Cost 2-Wire Battery Monitor with Ratiometric A/D Inputs Evaluation Kit

[www.maxim-ic.com](http://www.maxim-ic.com)

### FEATURES

- Demonstrates the capabilities of the DS2746 Low-Cost 2 Wire Battery Monitor with Ratiometric A/D Inputs including:
  - Voltage measurement
  - Current measurement
  - Current accumulation
  - A/D input measurements for ID or Thermistor Reading
- Interfaces to the USB port of a PC running Windows XP® or older operating system

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### INTRODUCTION

The DS2746 evaluation kit (EV kit) makes performance evaluation, software development, and prototyping with the DS2746 Low-Cost 2 Wire Battery Monitor with Ratiometric A/D Inputs easy. The evaluation board interfaces to a PC through a DS91230 USB Adapter and RJ-11 cable connection.

Separate control tabs allow the user access to all memory locations, all control registers, and real-time updates of all monitored parameters. The software also incorporates a data-logging feature to monitor a cell over time.

The evaluation board circuit is designed to provide the DS2746 with accurate parameter measurements as well. Kit demonstration boards will vary as they are improved upon over time. For information on the demonstration board circuits refer to our website at [www.maxim-ic.com](http://www.maxim-ic.com).

### EVALUATION KIT CONTENTS

- 1 pc. Evaluation Board
- 1 pc. DS91230 USB Port Adapter
- 1 pc. RJ-11 Cable

### EQUIPMENT NEEDED

1. A PC running Windows XP or older operating system and an available serial port.
2. Cables with mini-grabber style clips or the ability to solder directly to connection pads.
3. A Lithium-Ion battery and a power supply and/or load circuit.

### ORDERING INFORMATION

PART	TYPE
DS2746EVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

*Windows XP is a registered trademark of Microsoft Corp.*

## SETUP AND INSTALLATION

### BOARD CONNECTIONS

Connections to the TSSOP demonstration board are best made either by soldering directly to the pads or by using cables with mini-grabber clips. Communication to the TSSOP board can be accomplished either through the RJ-11 jack by connecting the provided standard six conductor RJ-11 cord.

Figures 1a and 1b show the recommended circuits to simulate charging and discharging. The Lithium-Ion cell is connected between the P+ and P- pads. The battery charger/power supply or circuit load is connected between the P+ and SGND pads. The evaluation software can be run in either configuration as long as a cell is connected between the P+ and P- terminals providing a minimum of 2.5 volts to power the DS2746.

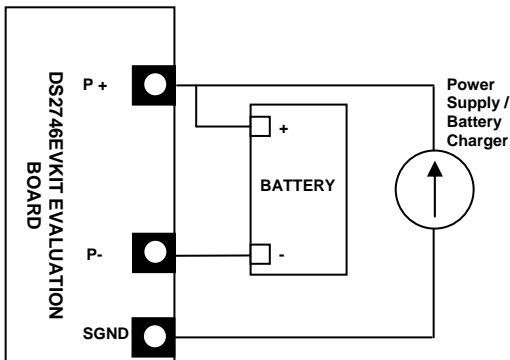


Figure 1a: Charging Circuit

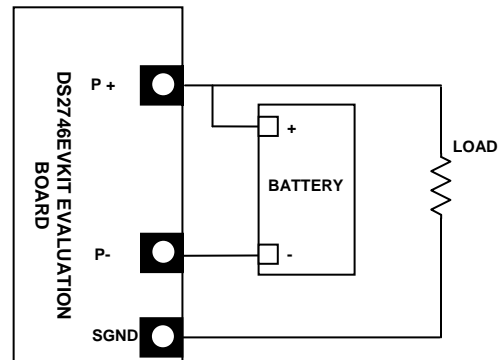


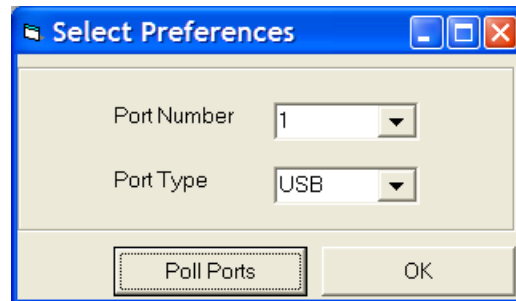
Fig 1b: Discharging Circuit

## SOFTWARE INSTALLATION

To install the DS2746 EV kit software, exit all programs currently running and download the latest DS2746 EV kit software from our website at [www.maxim-ic.com](http://www.maxim-ic.com). Unzip the compressed file and double click the SETUP.EXE icon to begin the installation process. Follow the prompts to complete the installation. The DS2746 EV kit software can be uninstalled in the Add/Remove Programs tool in the Control Panel. After the installation is complete, open the DS2746K folder and run DS2746K.EXE or select DS2746K from the program menu. A splash screen containing information about the evaluation kit appears as the program is being loaded. All relevant data sheets and application notes on the DS2746 and DS2746 EV kit can be found on our website at [www.maxim-ic.com](http://www.maxim-ic.com).

## SELECTING THE COMMUNICATION PORT

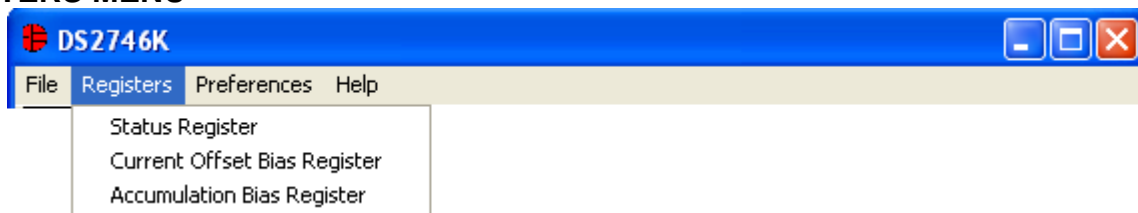
The first time the software runs, the Select Preferences window may appear. In this window, select either serial port or USB communication and the port number; then hit OK. The DS2746 EV kit software saves this port selection and automatically uses the selection each time the program starts. To change the port later, click the Preferences option on the menu bar, select Port Settings, and then select the appropriate port. To attempt to automatically locate the DS91230, click the Poll Ports button. Warning - automatically polling for the DS91230 can disrupt other devices connected to your computer's COM ports.



## PROGRAM MENUS

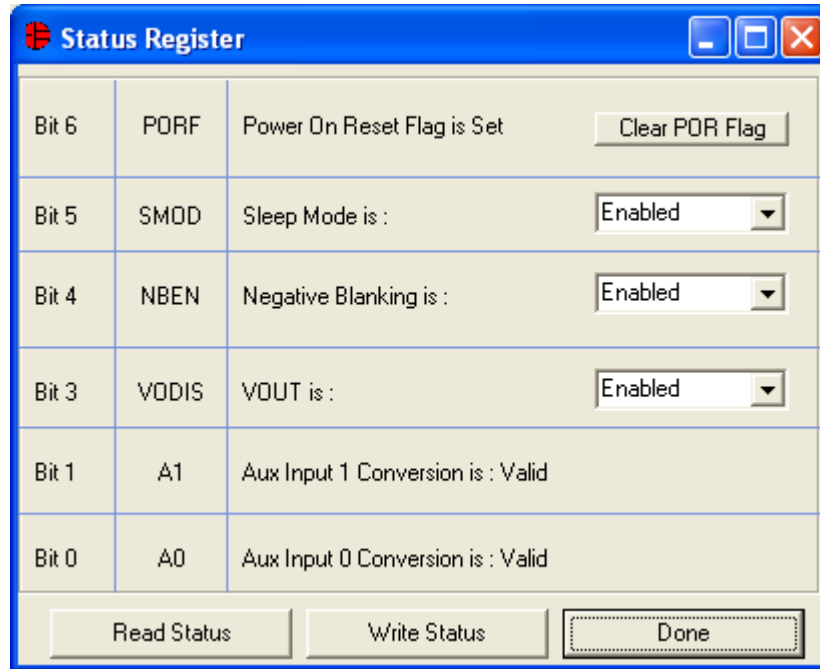
Several pull down menu options have been provided to simplify use of the DS2746 EV kit software for the user. Their functions are individually detailed below.

## REGISTERS MENU



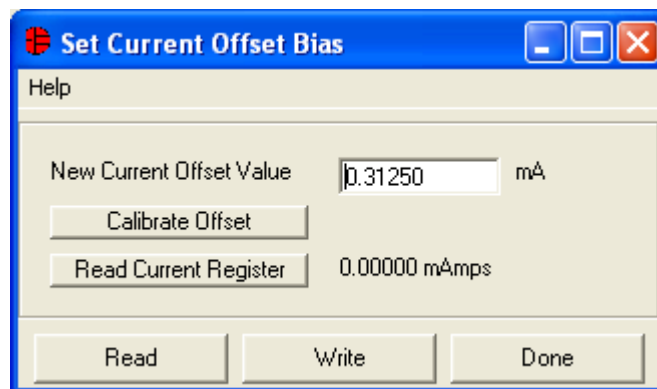
The Registers Menu gives immediate access to the Status register, Current Offset Bias Register and Accumulation Bias Register of the DS2746. Selecting either of the registers will open an individual control window giving the user a description of each register bit and the ability to read or write it.

## STATUS/CONFIGURATION REGISTER



The present state of all register bits are displayed immediately upon opening the register window. R/W locations contain a selection field or command button to allow the user to determine their state. Pressing the Write Status button will write the new value to the register and read the corresponding register inside the DS2746 to verify the correct value was written.

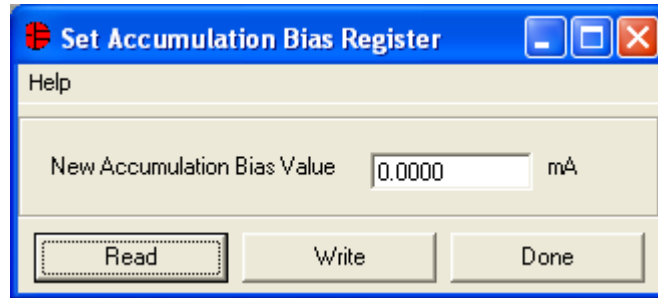
## CURRENT OFFSET BIAS REGISTER



The Current Offset Bias can be entered into the text box and then written to the device by left-clicking on the Write button.

The Calibrate Offset button allows the software to auto-detect the current offset based on the reading of the Current register. The Read Current Register button will display the real time current reading from the Current Register.

## ACCUMULATION BIAS REGISTER



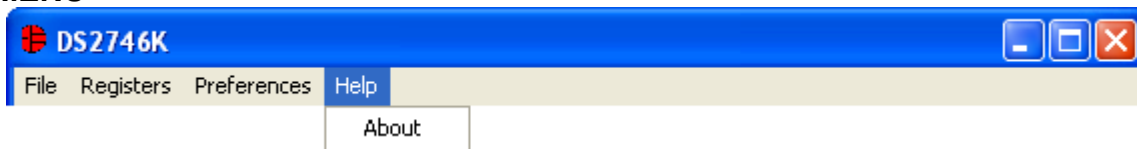
The Accumulation Bias Value can be entered into the text box and then written to the device by left-clicking on the Write button.

## PREFERENCES MENU



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

## HELP MENU

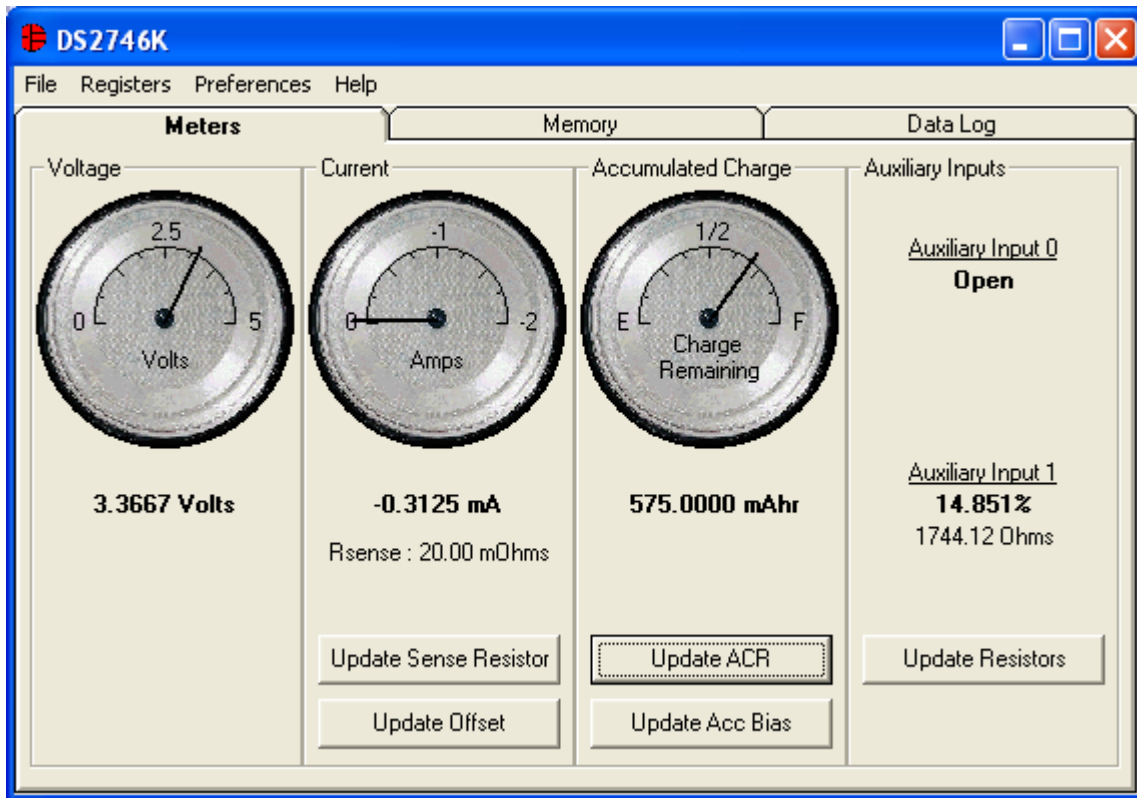


Selecting the About topic from the Help Menu will open a window containing information about the current revision of this program and Dallas Semiconductor.

## PROGRAM TABS

All functions of the program are divided under three tabs in the main program window. Left click on the appropriate tab to move to the desired function page. Located on the Meters tab is all of the information measured and calculated by the DS2746. The Memory tab displays the contents of every register and memory location inside the DS2746 and allows the user to alter the data. The Data Log tab allows the user to store all real time information to a file and view the data in a graphical form.

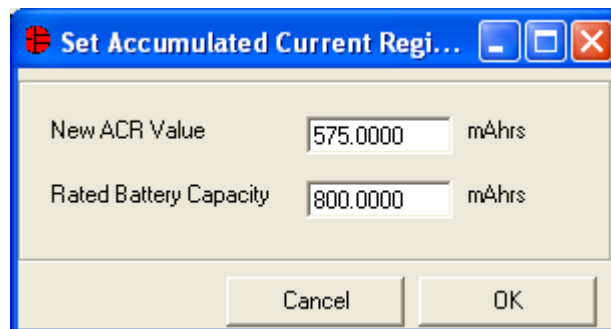
## METERS TAB



The Meters Tab displays the latest real-time measurements of cell voltage, auxiliary inputs, current and accumulated current with both analog meter readouts and digital values. The user can update the values of the Sense Resistor, Current Offset, Accumulation Bias, ACR, or Auxiliary Input Resistors by left-clicking on the appropriate button.

The Auxiliary Inputs can be used to measure an identification resistor or a thermistor that should be connected between AIN0 / AIN1 and SGND.

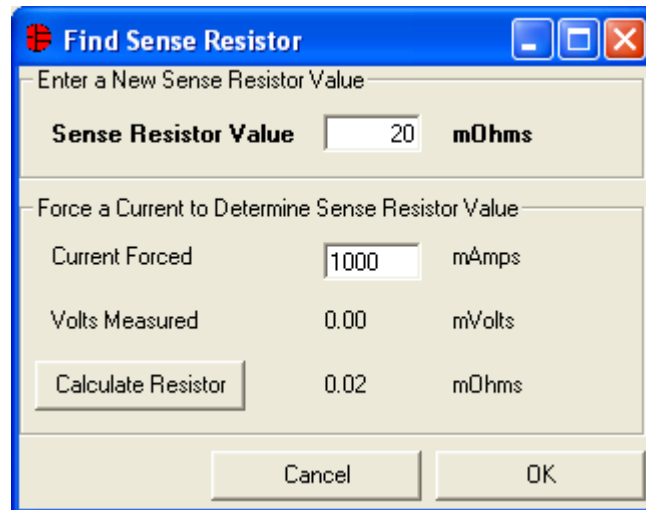
## Update ACR



The ACR value can be updated by simply entering the new ACR value into the text box and left-clicking the OK button.

The value of the Rated Battery Capacity is not stored by the DS2746, but this value is stored on the host computer to calculate a relative state of charge. This value will be remembered each time the DS2746 EV kit software is started.

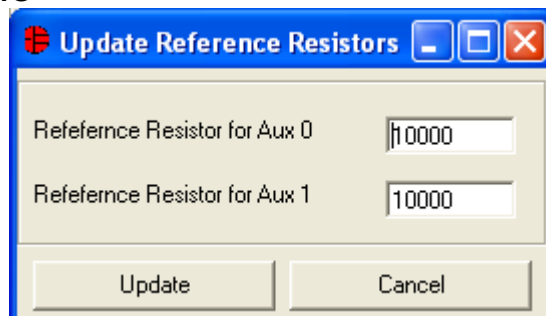
## Update Sense Resistor



The sense resistor value used to calculate the current reading is shown in the current section. Left-click on the Update Sense Resistor button to open the Find Sense Resistor window.

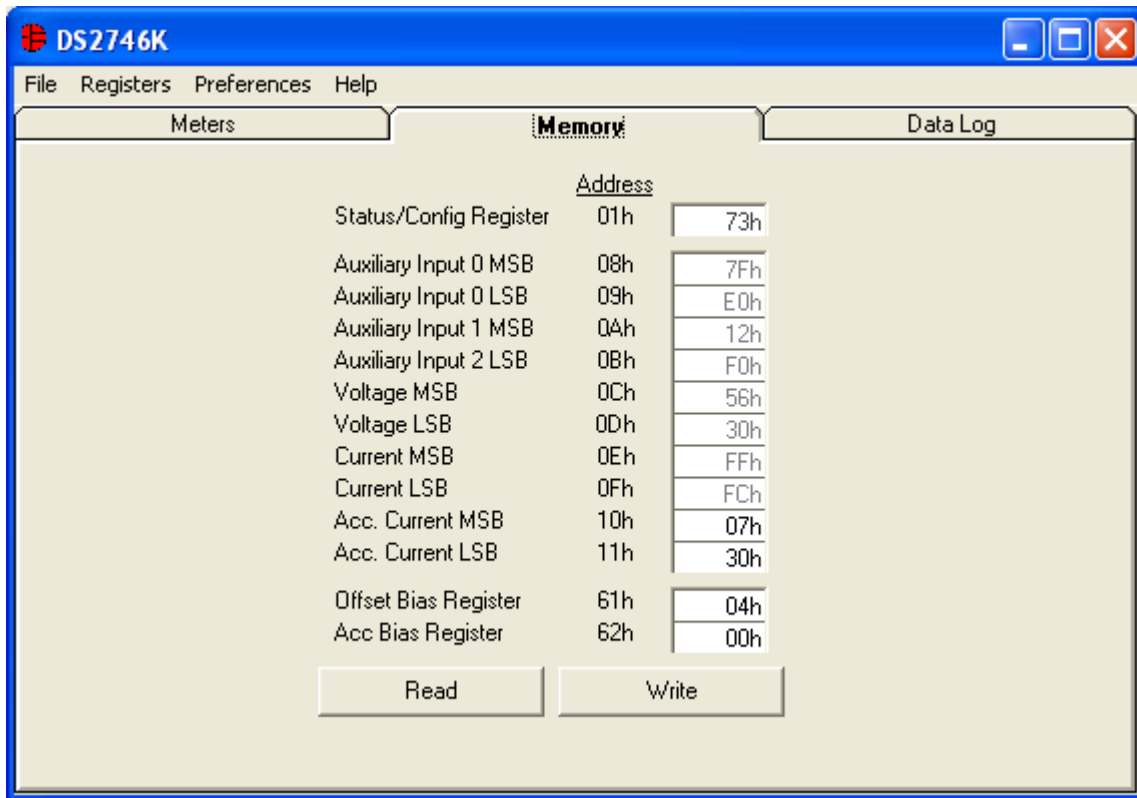
The value of the sense resistor is not stored by the DS2746, but this value is stored on the host computer to calculate the current flowing across the sense resistor. This value will be remembered each time the DS2746 EV kit software is started. The user can manually enter the Sense Resistor Value at the top of the window, or can allow the software to calculate the value. To allow the DS2746 EV kit software to calculate the sense resistor, simply enter the value of the current that is flowing across the sense resistor in the Current Forced text box in terms of mAmps. Then left-click the Calculate Resistor button and the software will determine the value of the sense resistor and put the new value in the Sense Resistor Value text box at the top of the window. Click OK to accept the new Sense Resistor Value, or Click Cancel to ignore the changes that were made.

## Update Reference Resistors



A known 10K resistor is used to determine the resistance of the Auxiliary Inputs. If the values of the resistors are not exactly 10K, or if other values are desired for the known resistors, simply left-click on the Update Resistors button and the Update Reference Resistors window will appear. Simply enter the correct reference resistance and left-click Update. Once again, this is only a software value, so it is not stored on the device, but it will be recalled each time the program is started.

## MEMORY TAB

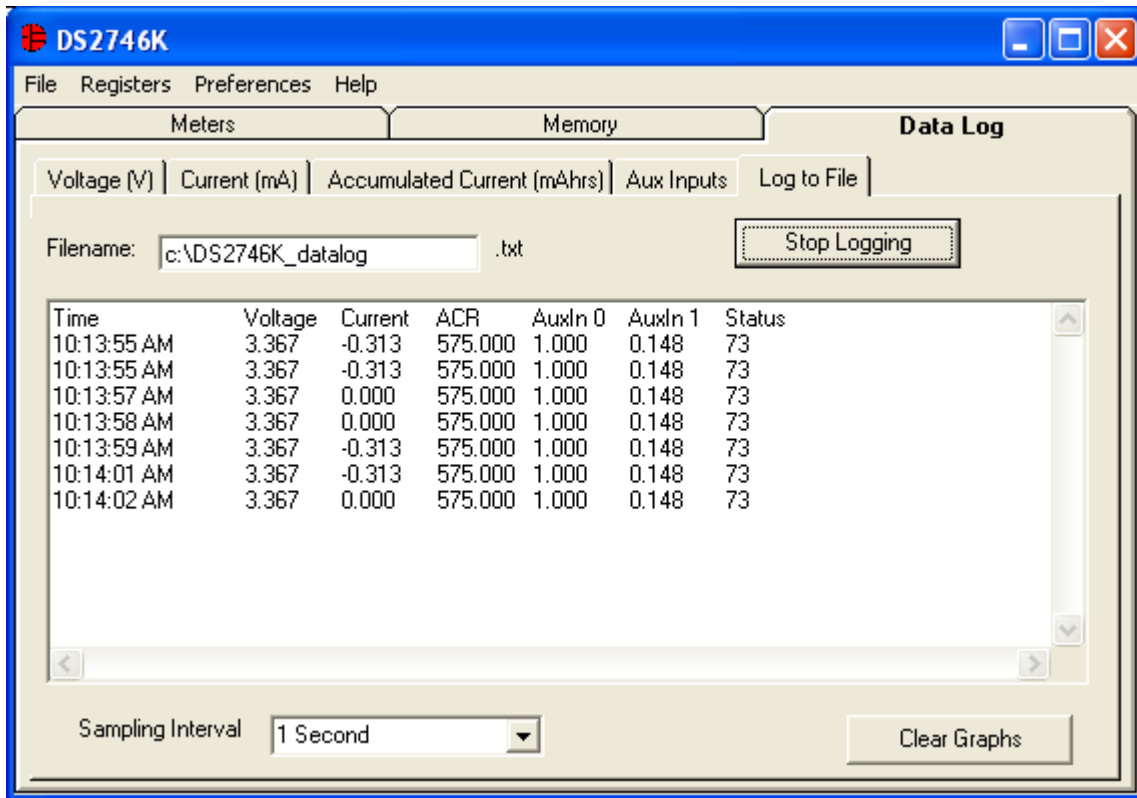


The Memory Tab gives the user access to read the contents of all of the Memory inside the DS2746. Left-clicking the Write or Read buttons will access the device.

Some memory locations in the DS2746 are read-only, so they will not be altered by writing them.



## DATA LOG TAB



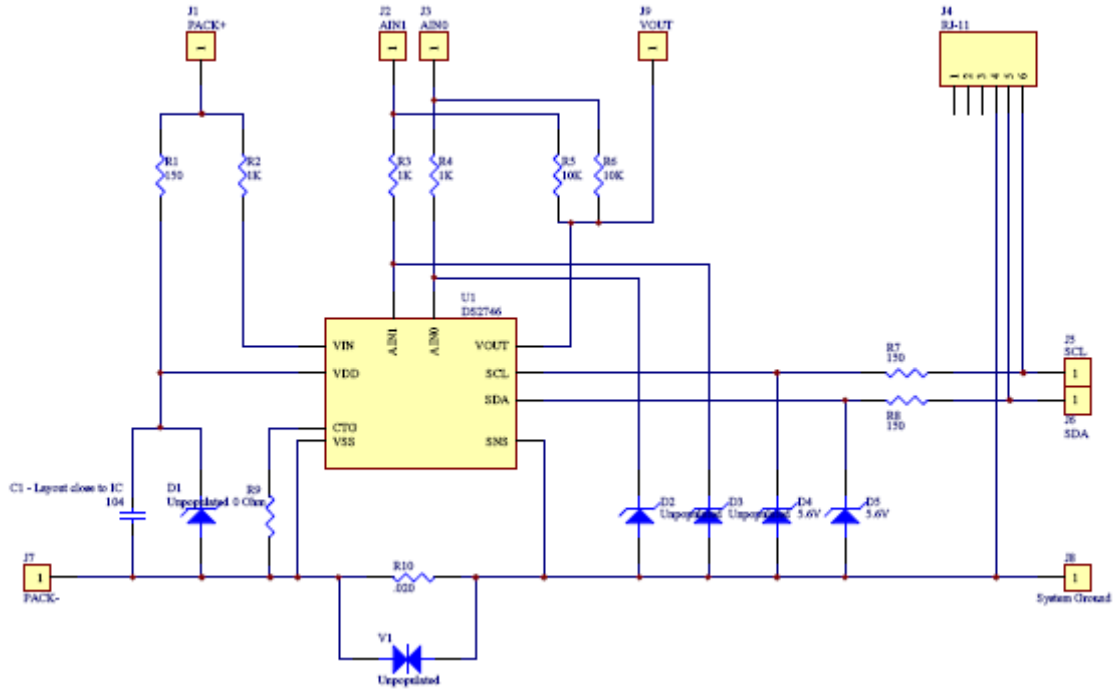
The Log Data tab allows the user to see the DS2746's real time measurements graphed over time. There are separate sub-tabs for voltage, current, accumulated current, and auxiliary inputs. Each graph displays the last 500 data points collected by the DS2746 EV kit software. The sampling interval can be adjusted from as fast as possible to 15 minutes and can be adjusted from the Sampling Interval Menu at the bottom of the window. The Clear Graphs button will clear all data from all four graphs, but does not reset the log to file function. When the Fastest sampling interval is selected, the graphs will not be updated, only the data logging is enabled.

The Log to File Sub Tab contains control information for storing all data to an ASCII file. The default filename is c:\DS2746K\_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 same interval selected for updating the graphs in the tab-delimited format of

“Time<tab>Voltage<tab>Current<tab>ACR<tab>AuxIn0<tab>AuxIn1<tab>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.

# DS2746 EV KIT SCHEMATIC



**REVISION HISTORY**

<b>REVISION DATE</b>	<b>DESCRIPTION</b>	<b>PAGES CHANGED</b>
10/09	Changed the part number from DS2746K to DS2746EVKIT.	All