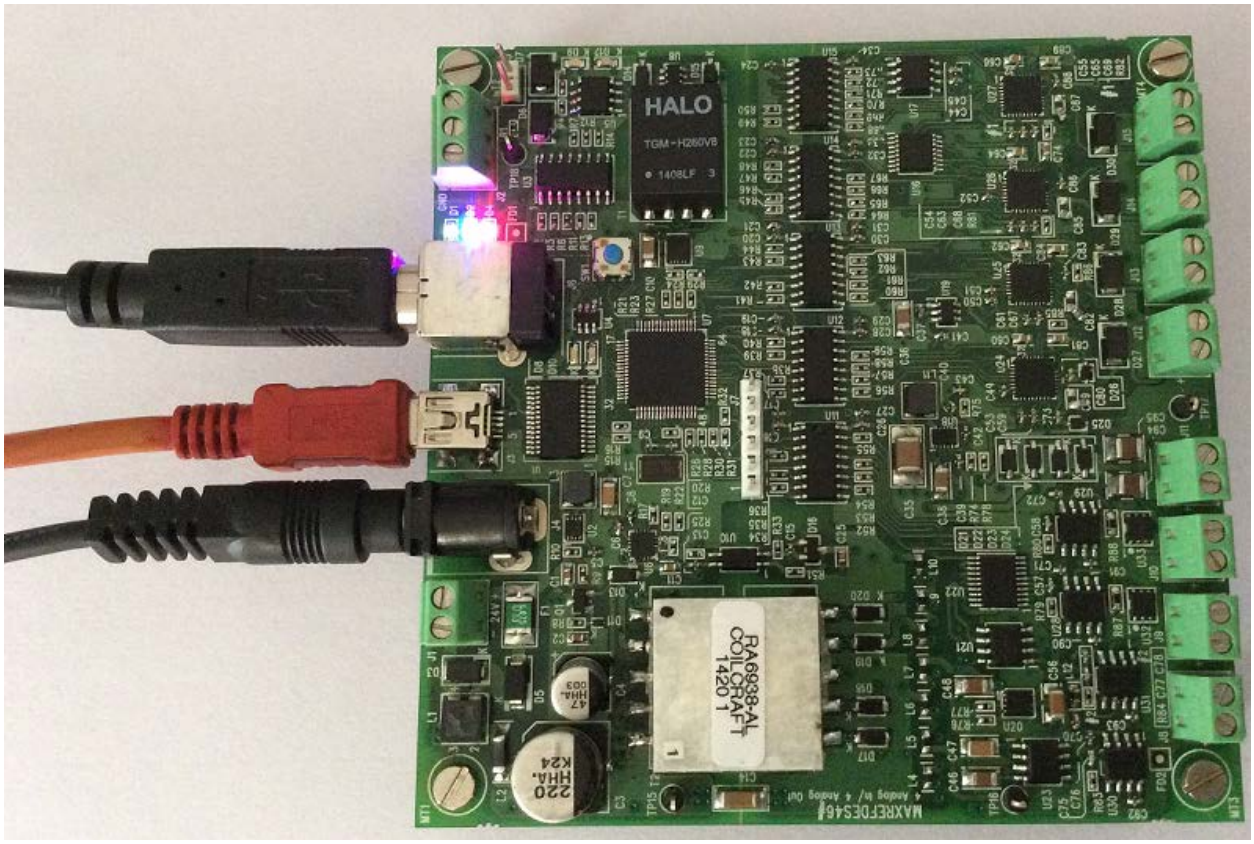


MAXREFDES46# Quick Start Guide

UG6207; Rev 1; 9/15

Abstract

The MAXREFDES46# 4-Channel Analog Input Output Quick Start Guide describes the steps required to quickly get the MAXREFDES46# reference design up and running.

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1. Required Equipment

- PC with Windows® OS with two USB ports
- MPLAB X IDE 2.35
- MAXREFDES46# board
- 24V power adapter
- Tera term serial terminal utility
- USB type B cable
- Industrial sensor or signal source
- 8.5 digits multimeter

2. Overview

Below is a high-level overview of the steps required to quickly get the MAXREFDES46# design running by downloading and running the firmware. Detailed instructions for each step are provided in the following pages.

1) Connect the MAXREFDES46# board to the PC by using USB type B cable as shown in **Figure 1**.
2) Download the latest **RD46V01_00.ZIP** file located at the MAXREFDES46# page.
3) Extract the **RD46V01_00.ZIP** file to a directory on your PC.
4) Open a terminal program to communicate with MAXREFDES46# board.

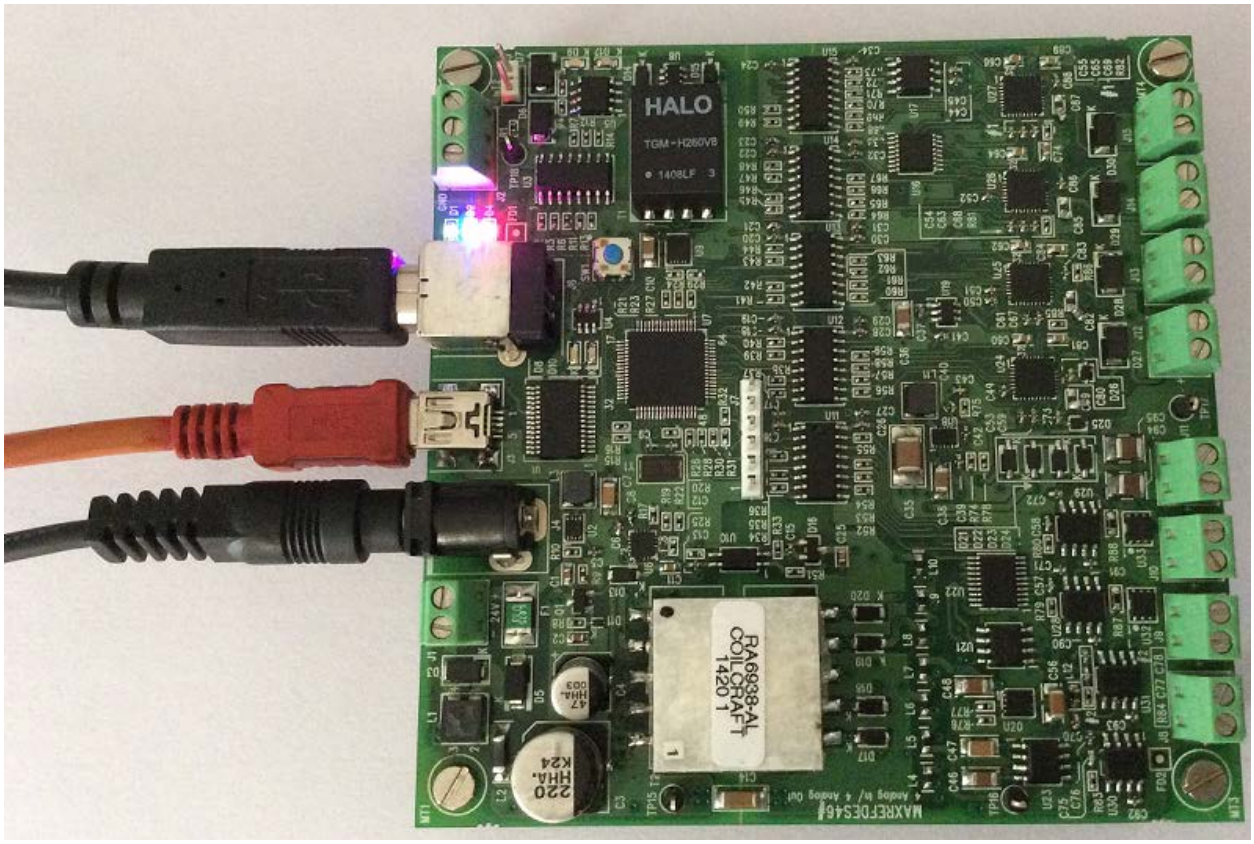


Figure 1. MAXREFDES46# board.

3. Procedure

1) Connect a 24V adapter to the J4 port to power up the MAXREFDES46# board.

2) Connect the USB type B cable to your PC and to the J6 port of MAXREFDES46# board as shown in Figure 1.

3) Download the latest **RD46V01_00.ZIP** file at http://www.maximintegrated.com/en/design/reference-design-center/system-board/6160.html/tb_tab2. All files available for download are available at the bottom of the page.

4) Extract the **RD46V01_00.ZIP** file to a directory on your PC. The location is arbitrary but the path prior to where you extract the .ZIP file must not exceed 82 characters due to the Windows 250-character total path limitation. For example, this 90-character preceding path would be an example of a path that would be too long:

   C:\0123456789\0123456789\0123456789\0123456789\0123456789\0123456789\0123456789\0123456789\0123456789\RD46V01_00.ZIP
   (This path is too long.)

   For the purposes of this document, it will be **C:\designs\maxim\RD46V01_00\.**
   See Appendix A: Project Structure and Key Filenames in this document for the project structure and key filenames.

1. Set up the terminal program to run on the PC using the following steps. To establish this communication link, the PC must be configured with the appropriate Windows drivers. A suitable terminal program such as Tera Term or HyperTerminal should be used.

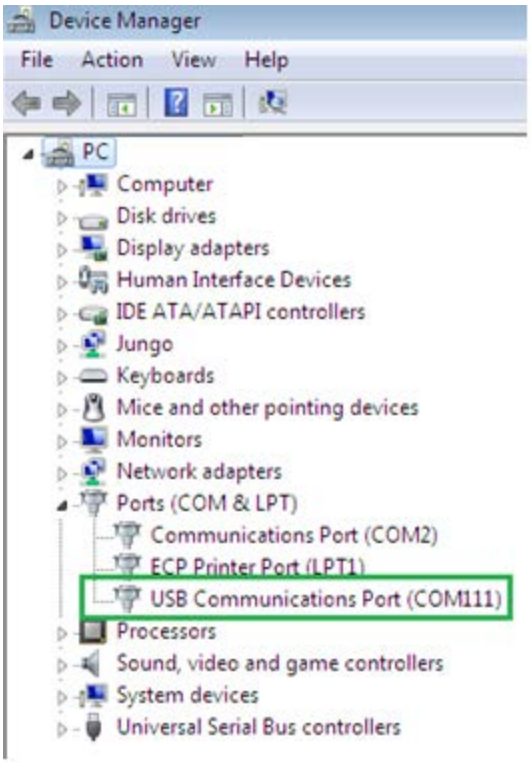


Figure 2. COM for for USB communication to the MAXREFDES46# board thru the USB type B connector at J6.

The MAXREFDES46# utilizes the PIC32 MCU with standard CDC class, so you need to install USB device driver that virtual Com Port, also known as VCP from **C:\designs\maxim\RD46V01_00\Device driver**.

Once installed, Windows assigns a previously unused COM port. Use the Windows **Control Panel** | **System** | **Device Manager** to determine the COM port number. (It will be named **USB Serial Port**) as shown in **Figure 2**. Make a note of which COM port this is since that information is needed in the next step.

Next, a terminal emulation program needs to be installed and launched. For Windows XP® and earlier systems, the HyperTerminal program is the usual choice. However, since HyperTerminal was eliminated from Windows 7, it may be necessary to locate an alternative. Several are available; one good choice is called Tera Term (http://ttssh2.sourceforge.jp/). Whatever terminal program you choose, the communication should be set up by opening the COM port number previously described above and the port configured as:

bits per second: **115200**

data bits: **8**;

parity: **none**;

stop bits: **1**;

flow control: **none**.

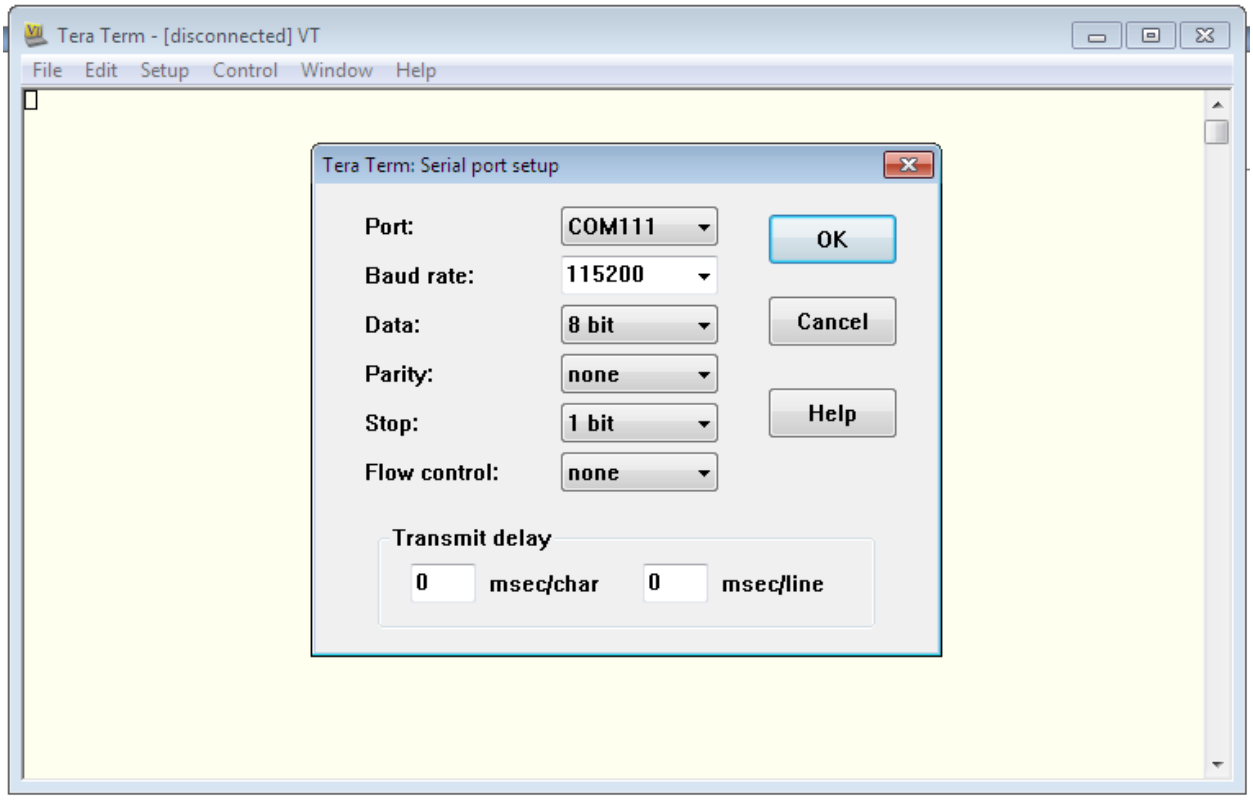


Figure 3. Parameters for the serial port communication.

At this point, the application is running on the MAXREFDES46# and the terminal program is running on your PC. Press "Enter" to get the Maxim console and then enter the 'help' command to get the following window. Make the desired selections by pressing the appropriate keys on the keyboard.

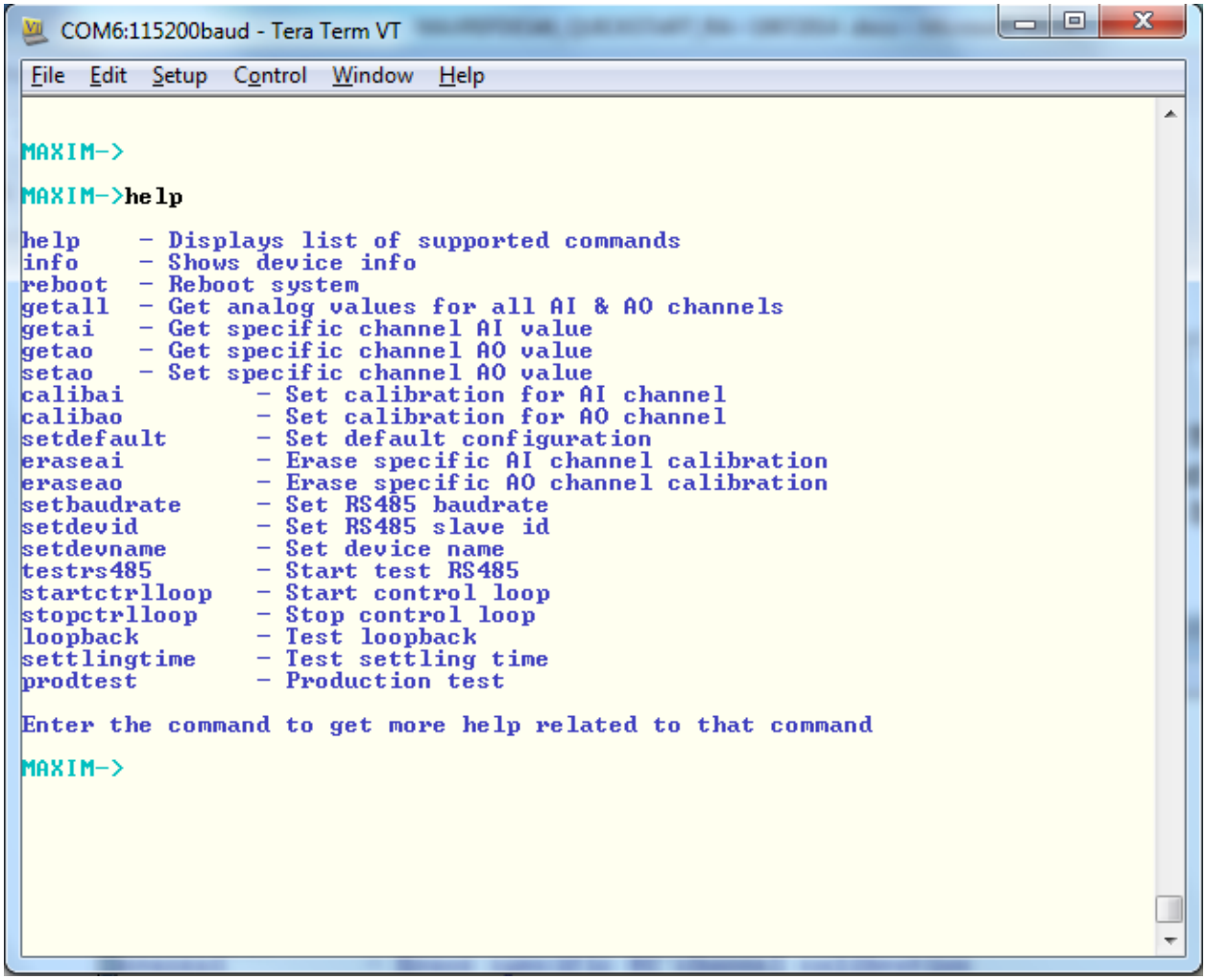


Figure 4. The 'Help' menu in the MAXREFDES46# terminal program.

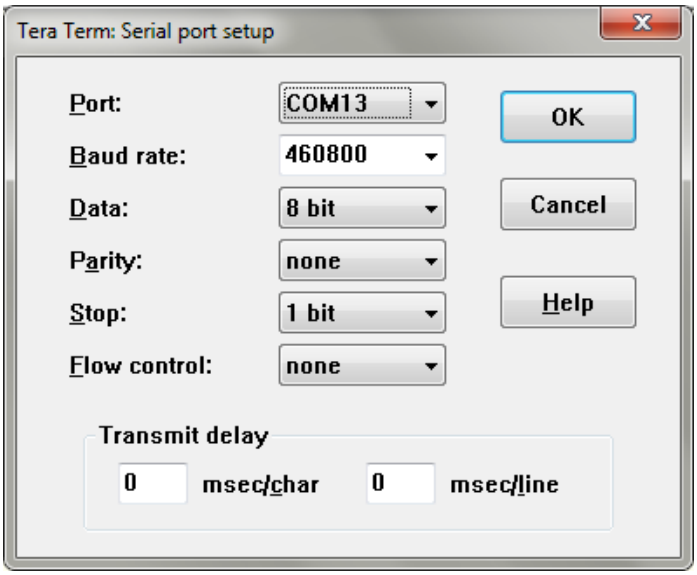
2. DC histogram test

The MAXDESREF46# board is tested for the DC histogram to calculate variation of ADC readings.

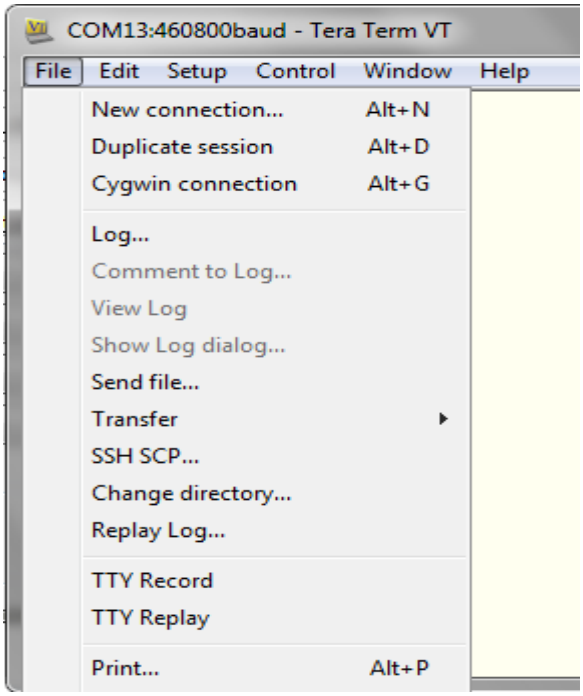
ADC sampling is very critical and a small mismatch would result in failure of the test. Therefore, a special code is programmed for the histogram with all debug prints and conversions disabled. Raw ADC values in hexadecimal digits for 64K readings are out on debug port console.

Steps to capture DC histogram data:

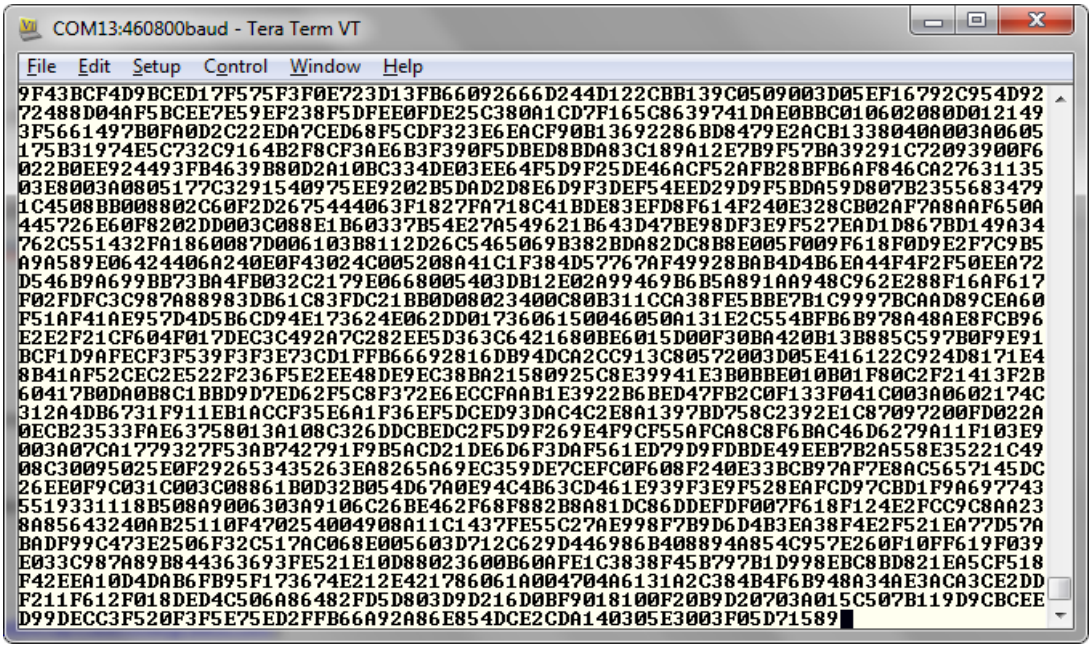
1. Connect MAXREFDES46# board to PC.
2. Program the board with special firmware "MAXREFDES46_Histogram_FFT_test.hex" for histogram and FFT test from." \MAXREFDES46#\Release\RD46V01_00\RD46_PIC32_V01_00\RELEASE_21082014 \Performance test software\Hex files\Histogram_FFT_test". Use the appropriate .hex file based on the sample rate you which to use, 5ksps or 20ksps.
3. Connect analog input 0 to ground.
4. Connect Mini USB cable to J3 connector and open tera term utility.
5. Select COM port and set below configuration for serial port.
   Baud rate: 460800
   Parity: None
   Data bits: 8
   Stop bits: 1



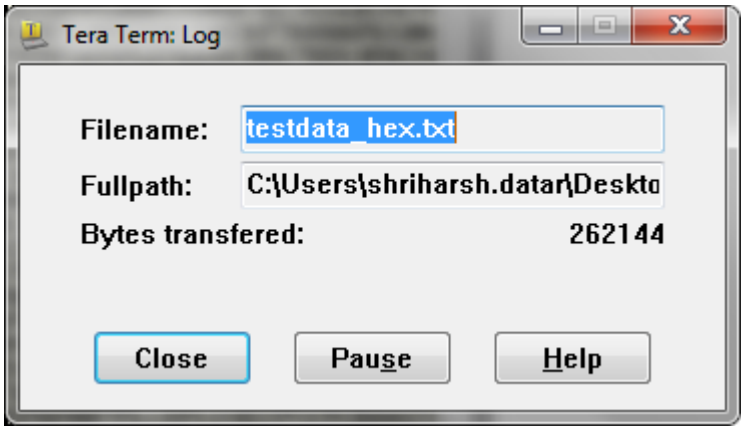
6. Create log file for collecting 64K samples required histogram computation. Store log file at "C:\designs\maxim\RD46V01_00\rd46_pic32_v01_00\release_21082014\Performance test software\Histogram_FFT_test_utility" location.



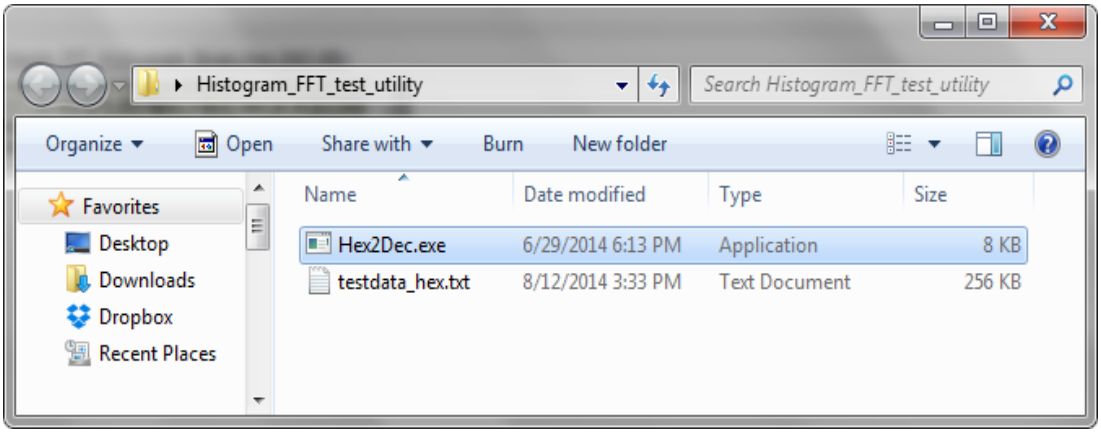
7. Configure the following window as shown and press Save to start logging.
8. Press the SW1 button on the board to start the FFT/Histogram test. LED D8 will light during sample collection and LED D8 will switch OFF when it completes.
9. Hex dump will be seen on the tera term window as follows.

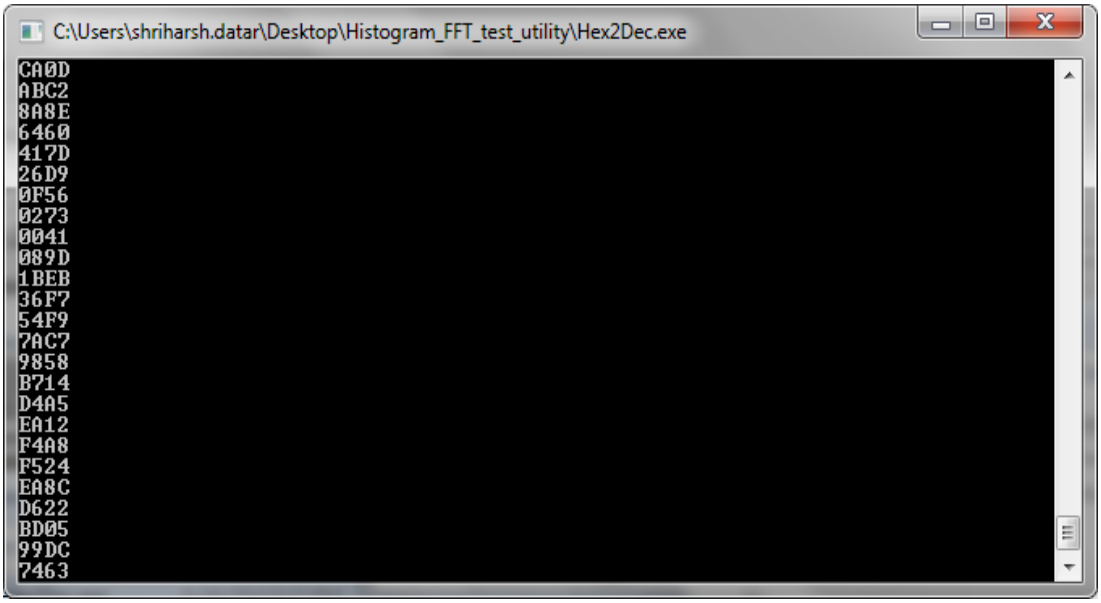


10. Go to logging window and press close to stop logging.



11. Run "Hex2Dec.exe" to generate the .csv file.





12. "tesdata.csv" will be generated to the same path.

The ADC sample data is now available in CSV format for further calculation and verification.

3. FFT test

   The MAXREFDES46# board is tested for different system performance parameters like SNR, SINAD, SFDR, and THD. The above mentioned parameters are calculated using FFT analysis of ADC samples collected for analog input.

   ADC sampling is very critical and a small mismatch would result in failure of the test. Therefore, a special code is programmed for FFT with all debug prints and conversions disabled. Raw ADC values in hexadecimal digits for 64K readings are out on debug port console.

   Steps to capture FFT data:

   All above steps mentioned in the DC Histogram test remains the same, except for step 3. In this test, please connect a ±10V, 250Hz sine wave input to J8 from the SYS2722 source. All other steps remain the same.

   The ADC sample data is now available in the CSV format for further SNR, SFDR, SINAD and THD verification.

4. Trademarks

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