

# **SCUSB Evaluation Kit**

## **Operator's Instruction Manual**

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# **SCUSB Evaluation Kit**

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## SECTION 1.0 GETTING STARTED

### 1.1 Introduction

The SCUSB evaluation kit is an assembled and tested PC Board That demonstrates the Multiple Output and Single Output series of reconfigurable oscillators.

The evaluation kit consists of a circuit board assembly with 6 SMA connectors, which allow probing and frequency measurement of the 6 available outputs. Also included with the evaluation kit is a smaller daughter board, which connects to a PC via a USB port. Using these 2 boards together allows communication and reconfiguration of all of the reconfigurable series oscillators. The kit can also be configured to interface with a microcontroller through the I<sup>2</sup>C connector for stand-alone operation.

The Windows® 98SE/ME/2000/XP compatible software provides a user-friendly interface to demonstrate the features of the Multiple Output oscillators.

With optional adaptor sockets, the 14 pin SMT multiple output and the 8 pin SMT single output oscillators can be reconfigured.

Equipment supplied with the SCUSB Evaluation Kit.

Test board with attached communications daughter board.

USB cable

Software CD for use on a PC (including all necessary USB drivers)

## Required Equipment.

Compatible PC running Windows 98SE/ME/2000/XP  
Minimum screen resolution 1024 x 768  
Available USB Port

## Optional Equipment

SC3600 Socket (used to reconfigure the 8 pin Single Output SMT oscillator)  
SC3700 Socket (used to reconfigure the 14 pin Multiple Output Smt  
Oscillator)

### 1.2 Software Installation

Insert the enclosed CD into the CD Rom drive. Run the Setup file and install to the directory of your choice.

This installation will install the SCUSB reconfig software and also will load the JEDEC Creator program.

## SECTION 2.0 JEDEC Creator

### 2.1 Running the JEDEC Creator Program

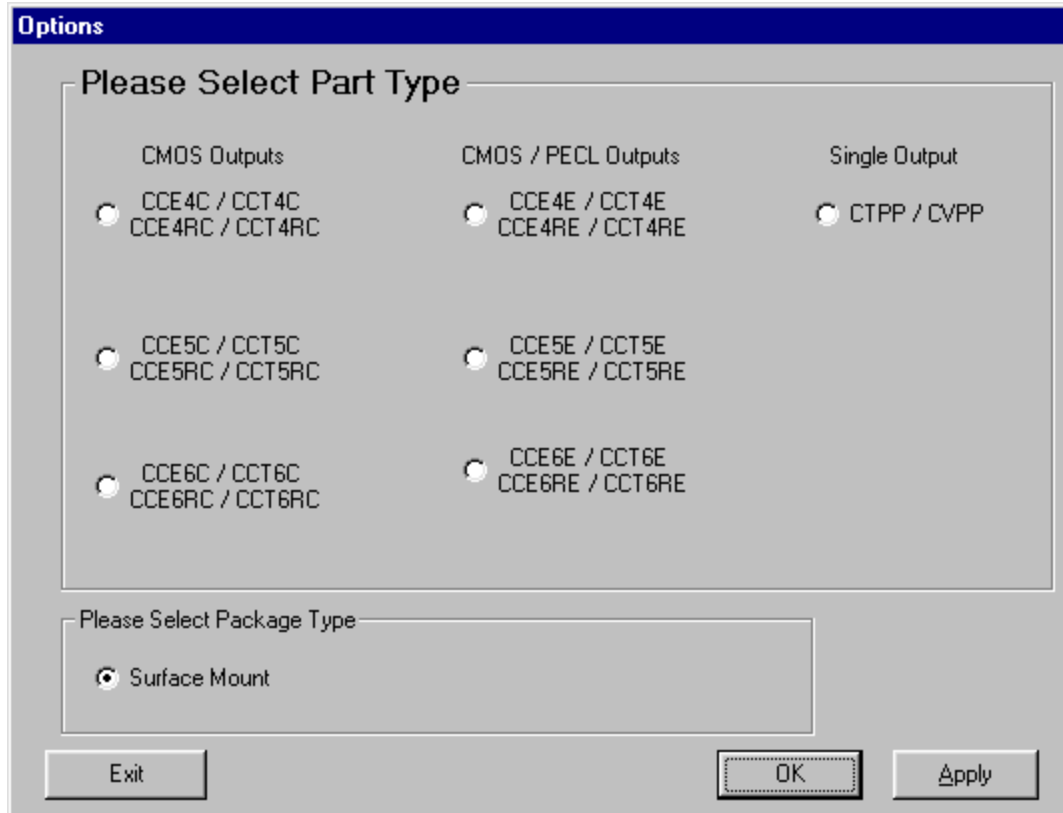
Note: If you do not wish to create JEDEC files you can skip this section and proceed to the Using the SCUSB Evaluation Board.

From the desktop, click on the JEDEC Creator Icon.



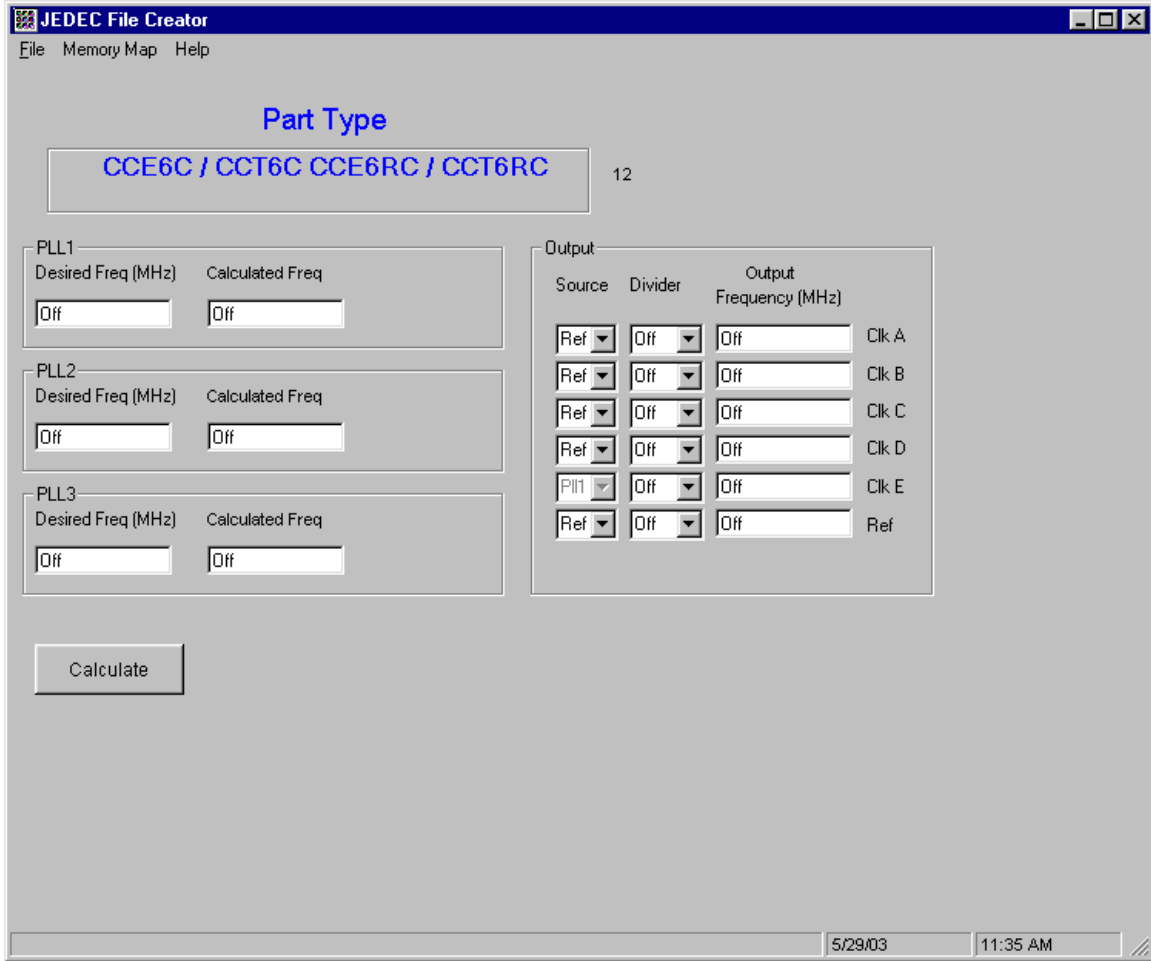
The program can also be run by double clicking JedecCreator.exe from the directory from which it was loaded during installation.

The Options screen should now be visible.



Please select the type of part to be programmed and package type. Select OK when ready.

The main screen should now be visible.



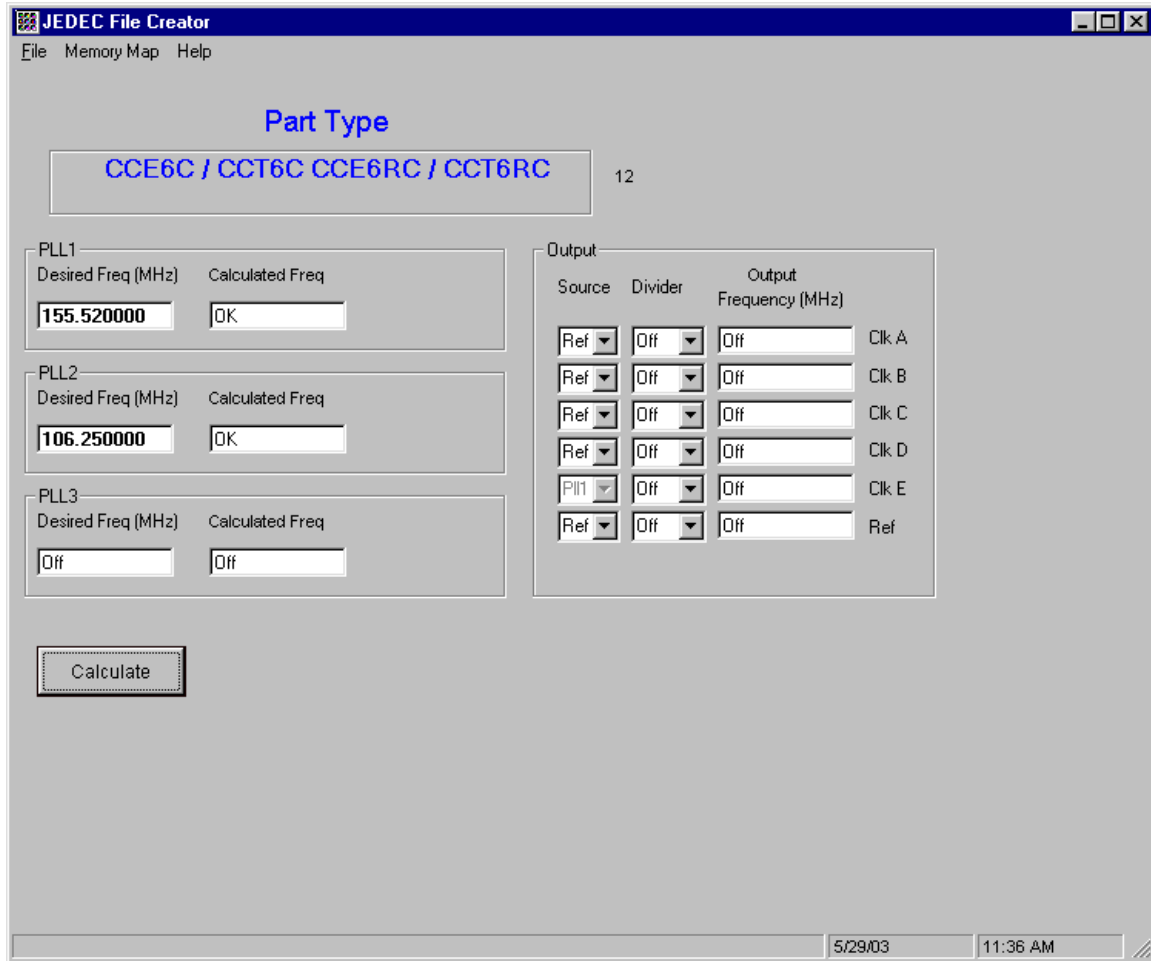
### 2.1.1 Entering PLL Frequencies

The first step is to enter a PLL frequency. Allowable PLL frequencies are 100 MHz to 400 MHz.



Note: The calculation of a PLL frequency is very complex. Not all frequencies have solutions. If a PLL frequency cannot be calculated, an error message will be displayed.

Suppose we need output frequencies of 155.52 MHz, 38.88 MHz, 53.125 MHz and 106.25 MHz. Since 155.52 MHz can be divided by 4 to get 38.88 MHz and 106.25 can be divided by 2 to get 53.125, we will be using 155.52 and 106.25 as our PLL frequencies. We can now enter PLL 1 as 155.52 and PLL 2 as 106.25. Enter these frequencies into the PLL1 and PLL2 box and hit the Calculate button. Notice that as we enter new numbers the Calculate button turns green indicating that we have made some changes. The screen should look like this.



The OK in the Calculated Freq box indicates that the program has found acceptable values for the PLL frequency and we can proceed to the next step.

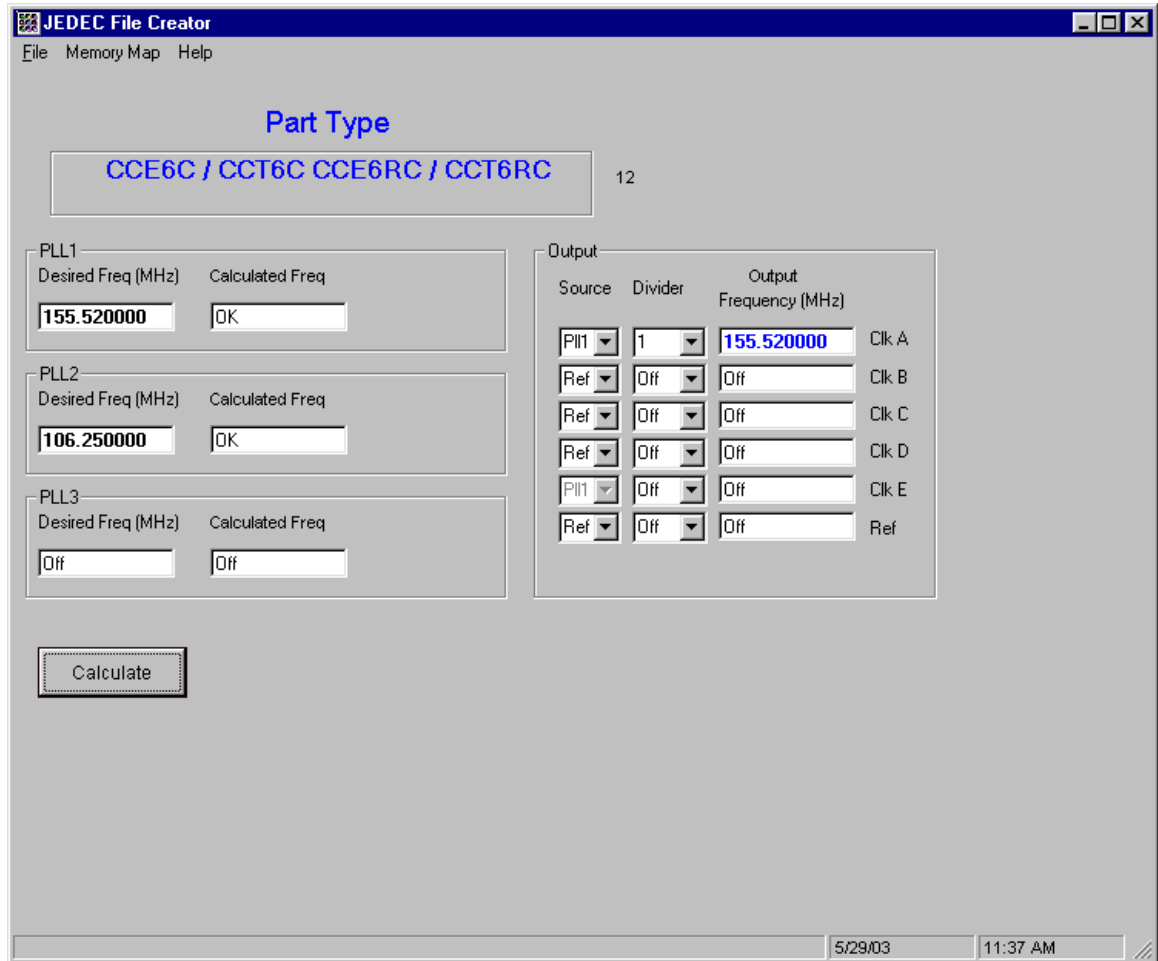
### 2.1.2 Selecting Divider Values

One of our desired output frequencies is 155.52 MHz. Lets setup that frequency for Output A.

Under source for Clk A, click on the drop down box. A choice of possible source frequencies are Ref, PLL1, PLL2, PLL3. The Ref or Reference frequency can be used as a source instead of a PLL frequency. The Ref frequency is determined at startup when the part

was selected. If you look at the Main Screen, you will see a number next to the Part Type. This is the Ref Frequency in MHz for this setup.

Lets select PLL1 as the source for Clk A. Next lets select a divider for Clk A. Since we want 155.52 as an output, our divider will be 1. You can select divider values from 1 to 127. Click on the Calculate button and the screen should look like this.



You have just setup Clk A for 155.52 MHz.

Lets setup Clk B. Since we want 38.88 MHz as Clk B, click source B dropdown box and select PLL1. Click Divider B dropdown

box and select 4. Click the Calculate button. You have just setup Clk B for 38.88 MHz.

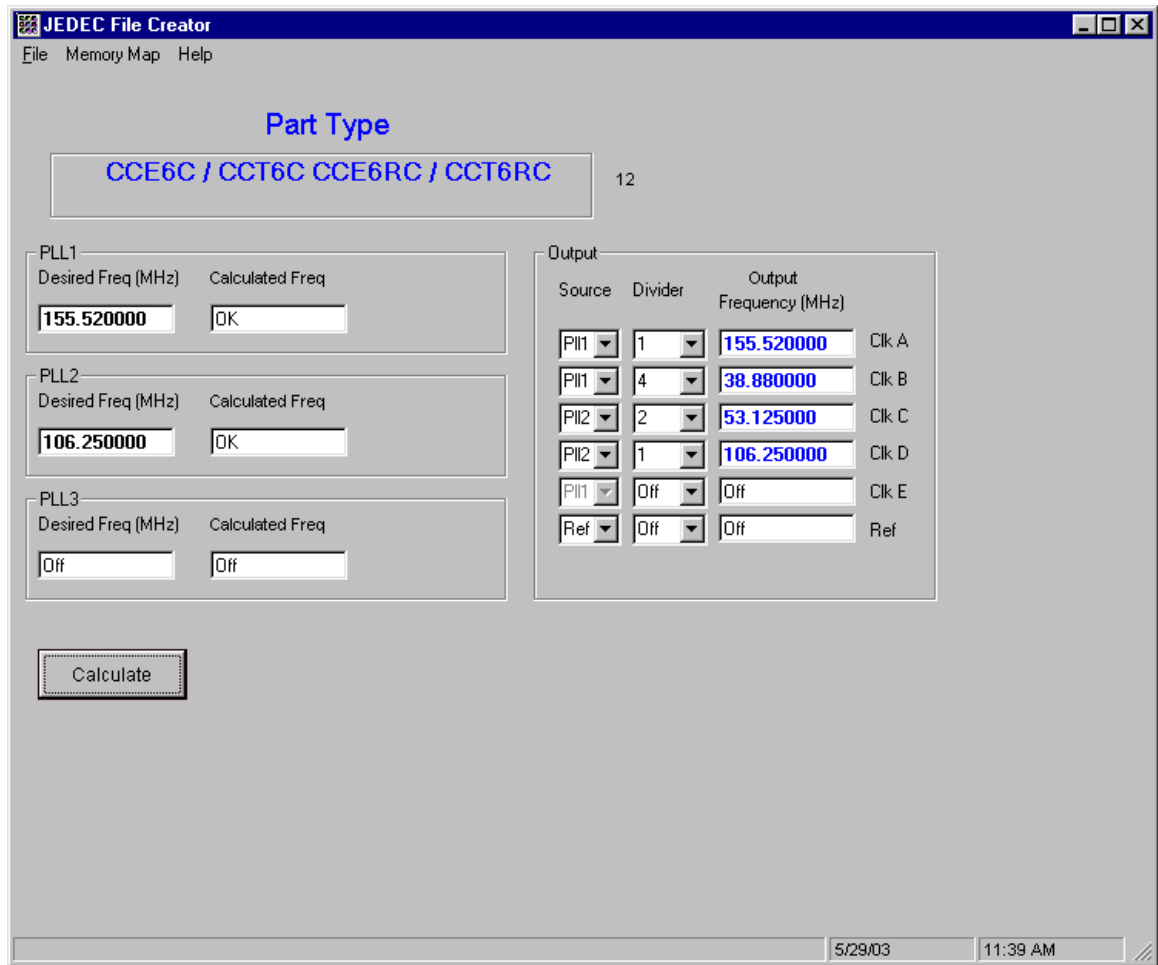
Lets setup Clk C and Clk D.

Click source C dropdown box and select PLL2. Click Divider C dropdown box and select 2.

Click source D dropdown box and select PLL2. Click Divider D dropdown box and select 1.

Click the Calculate button.

The screen should look like this.

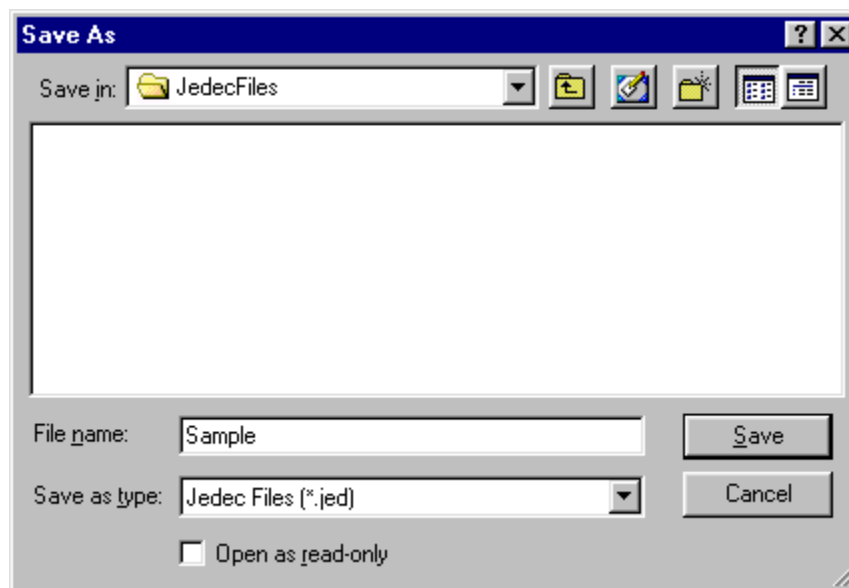


You are now ready to create the JEDEC file.

### 2.1.3 Saving the file to disc.

If all looks good it is time to save the file to disc.

From the File dropdown box, select Save As.



Enter a file name and click on the Save Button

The JEDEC file is now created.

## SECTION 3.0 Using the SCUSB Evaluation Kit.

### 3.1 Introduction

The SCUSB Evaluation Board is designed to illustrate how to reconfigure the Multiple Frequency Output and Single Frequency Output family of oscillators from Cardinal Components.

The SCUSB Evaluation Board consists of 3 basic components.

The daughter board, which is responsible for USB communications to the PC and converting to I<sup>2</sup>C Protocol used by the oscillator and the onboard EEPROM.

The onboard EEPROM, which can store up to 100 different JEDEC configurations that can easily be transferred to the reconfigurable oscillator.

The 6 test SMA connectors, which can be used for frequency measurement.

## 3.2 Running the Reconfiguration Program

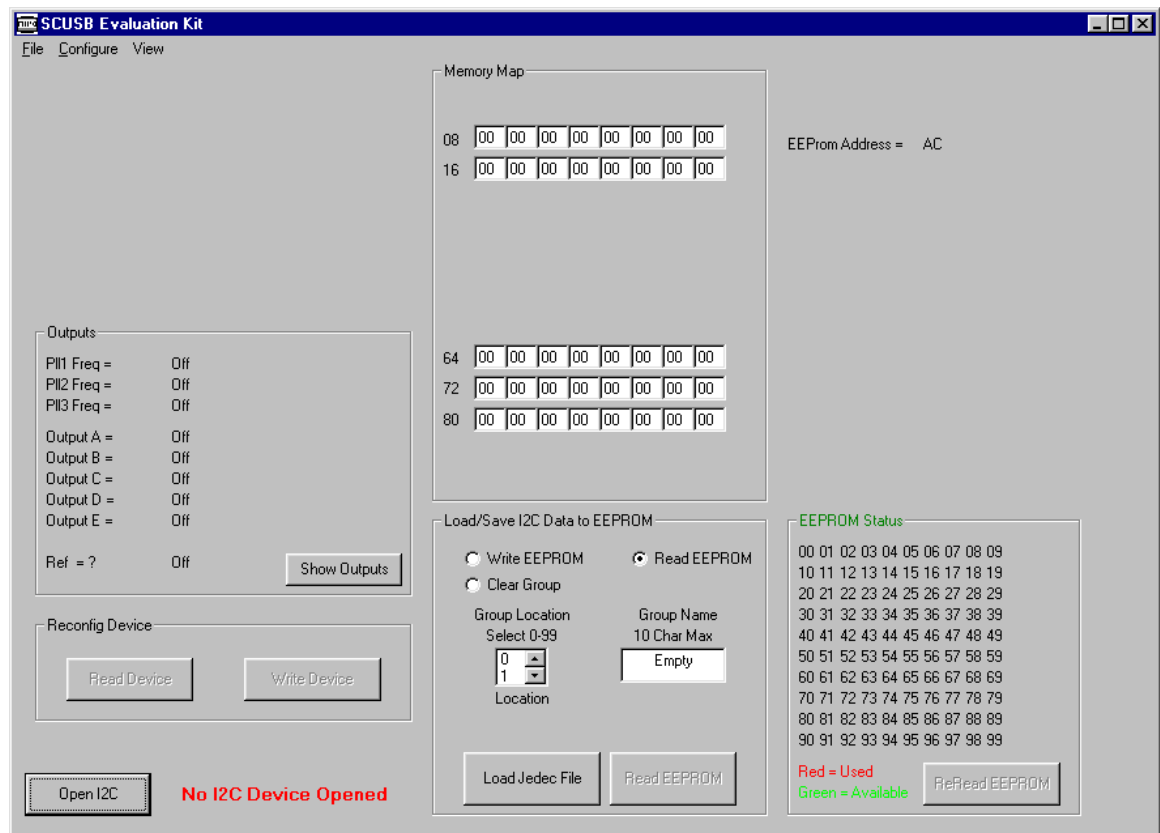
Lets start by running the SCUSB Evaluation Reconfiguring Program.

From the desktop click on the MIPO icon.



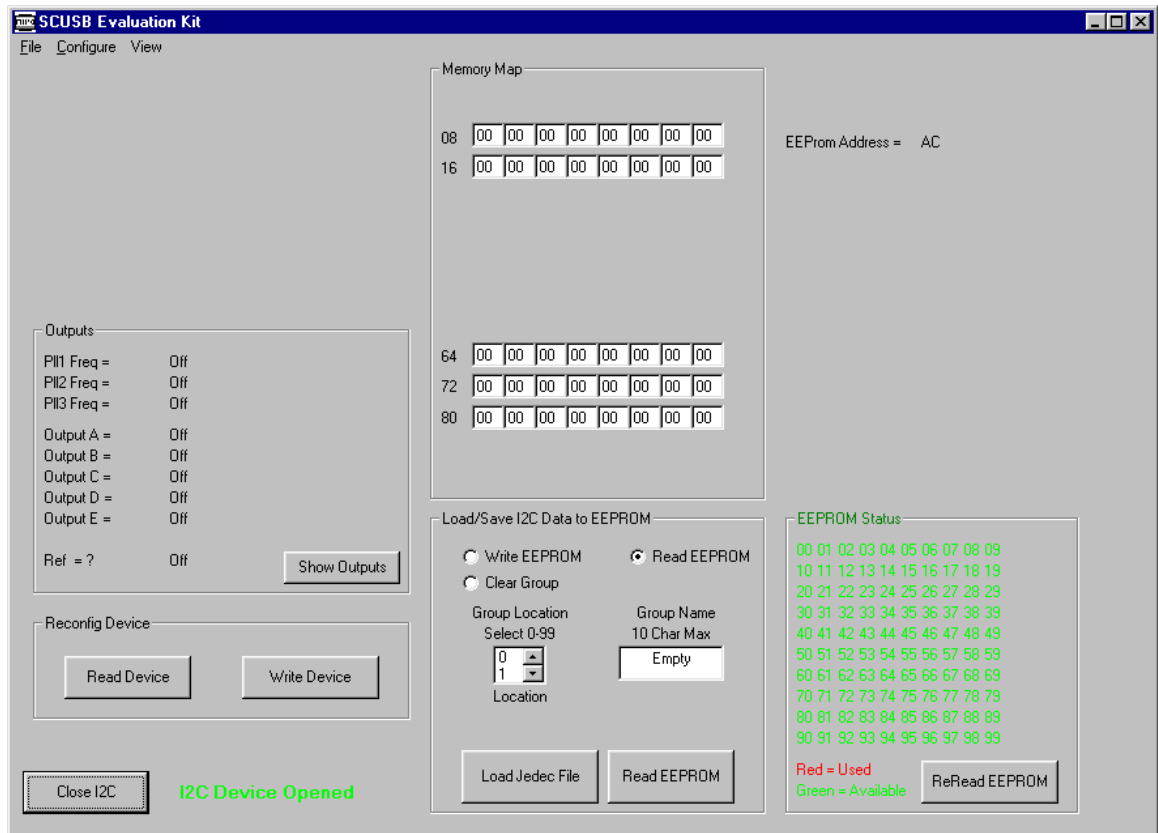
Make sure that the SCUSB board is plugged into the USB Port on your PC.

The startup screen should look like this.



Click on the Open I<sup>2</sup>C button.

If the USB drivers were installed correctly, the screen should look like this.

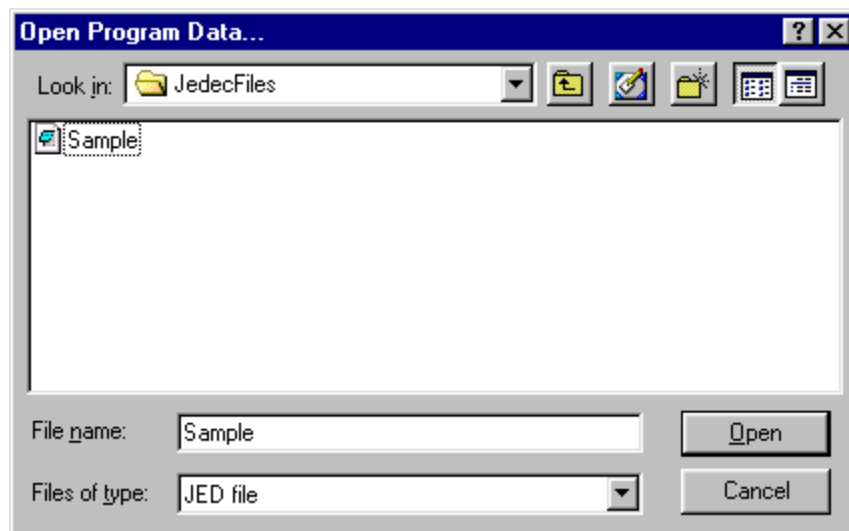


Notice the I<sup>2</sup>C Device Opened text at the bottom left of the screen.

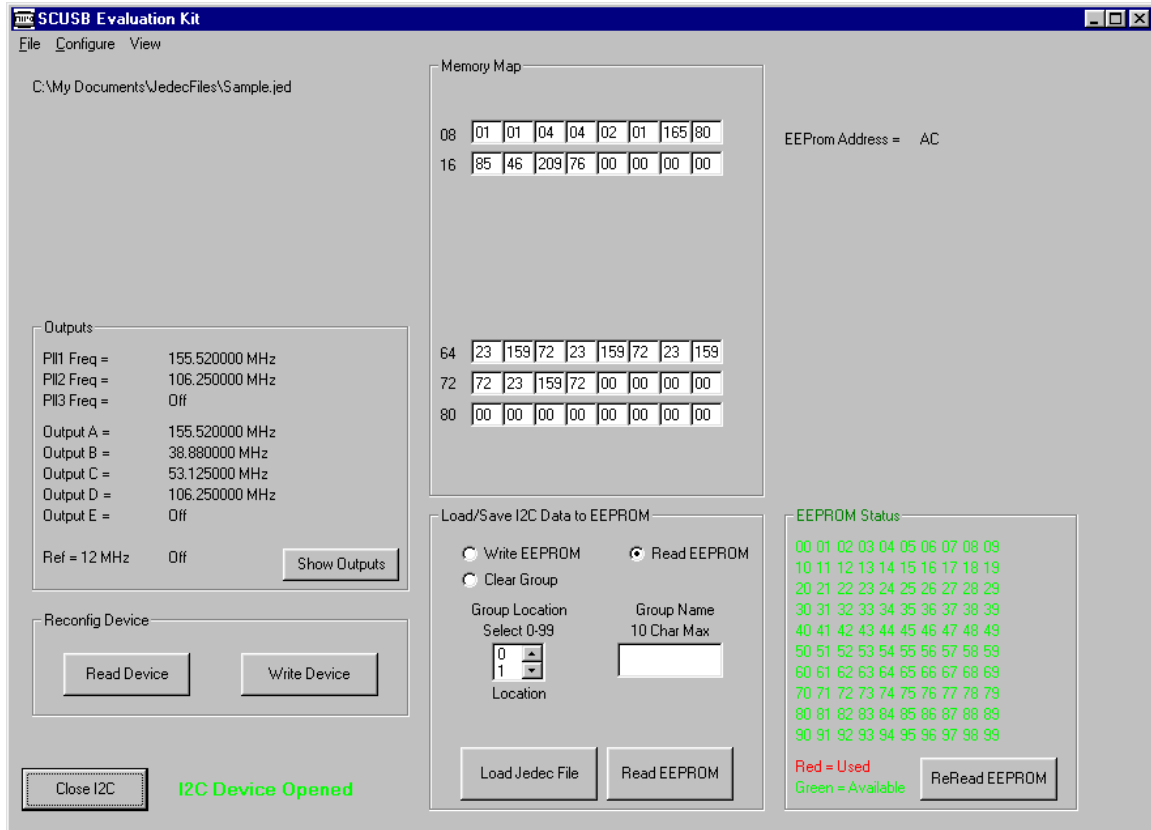
This means that we have a connection to the Eval board and it is ready to use.



Lets load a JEDEC file. We will use the example file called Sample.  
Click the Load Jedec File button.  
A dialog box will open. Select the file to load then click Open.



The screen should look like this.

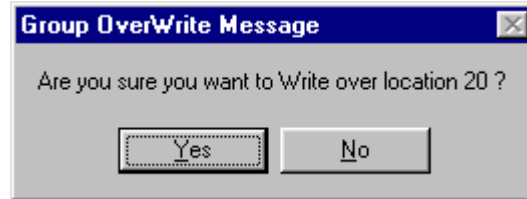


The screen shows us a few things that should be noted. The first thing is that the Output section displays the 2 PLL frequencies we created and the 4 output clocks we also created. Also shown in the center of the screen is the memory map for the JEDEC file.

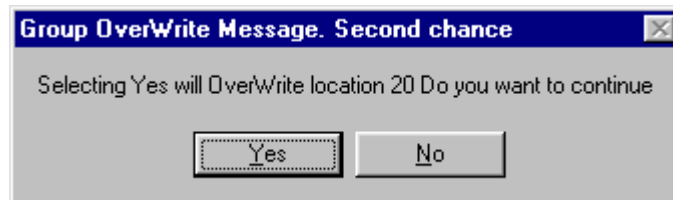
### 3.2.1 Writing a group to EEPROM

First either click on one of the green numbers under the EEPROM Status box, or from the group location dropdown box, select a number from 0 to 99. This is the location that will be used to store the Sample file data. Next, in the Group Name box, enter a name that you would like to call this setup. We will use Sample for our example. Lets choose group 20. Click on the green 20 in the EEPROM Status box. As you can see, the Group Location dropdown box changes to 20. Now lets click on the Group Name box and type in Sample. Next click the Write EEPROM Option button. The Write EEPROM button should be visible. Click the Write EEPROM button.

A Dialog box pops up asking if you want to OverWrite the existing group name and number.

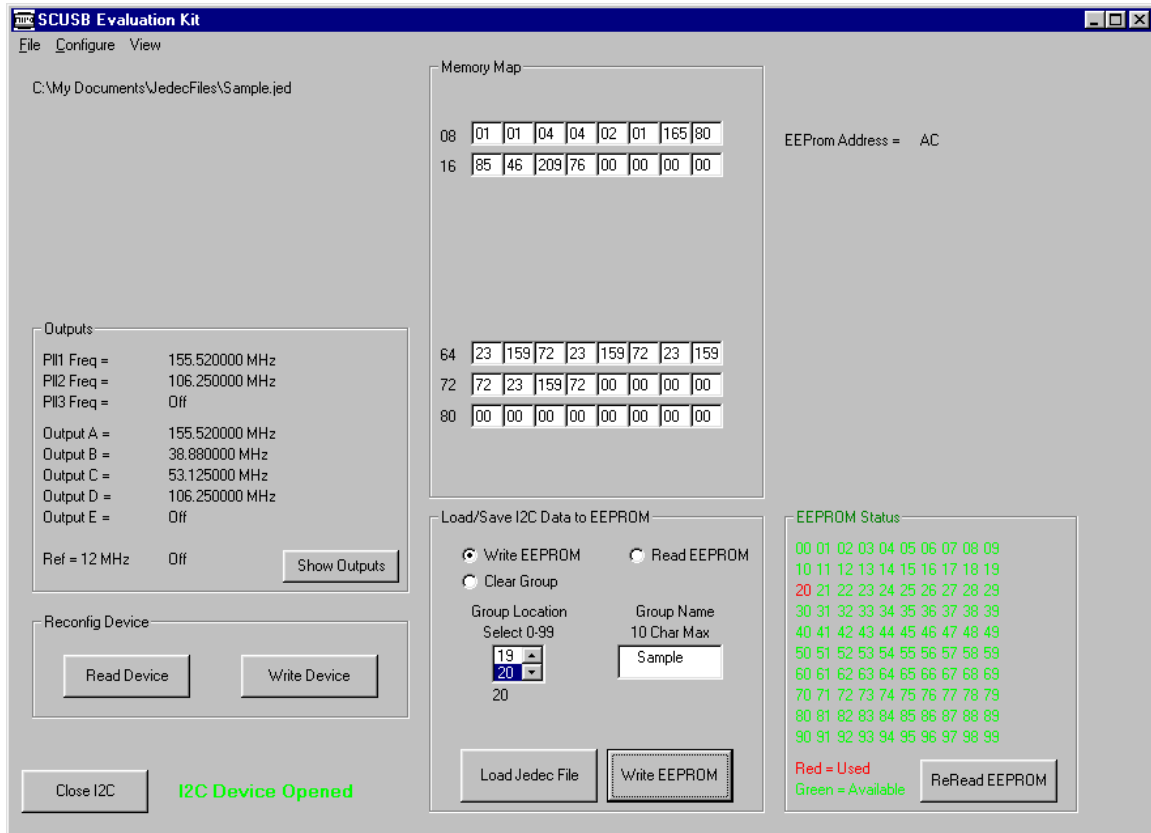


Selecting Yes will prompt another Dialog Box. This gives you a second chance to choose to OverWrite. Once the program writes to the EEPROM, there is no going back.



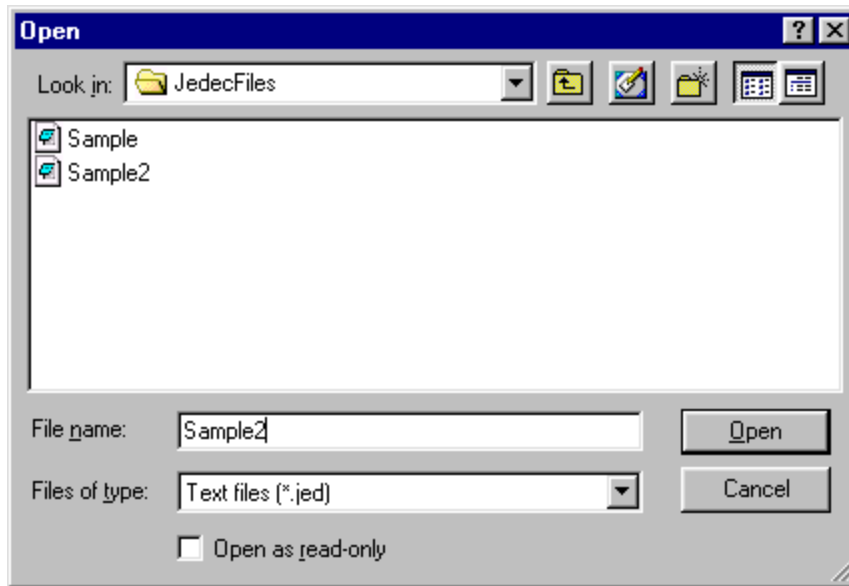
In a few seconds the EEPROM will be programmed and the number 20 will change from green to red, indicating that that location is in use.

If all went well, the screen should look like this.

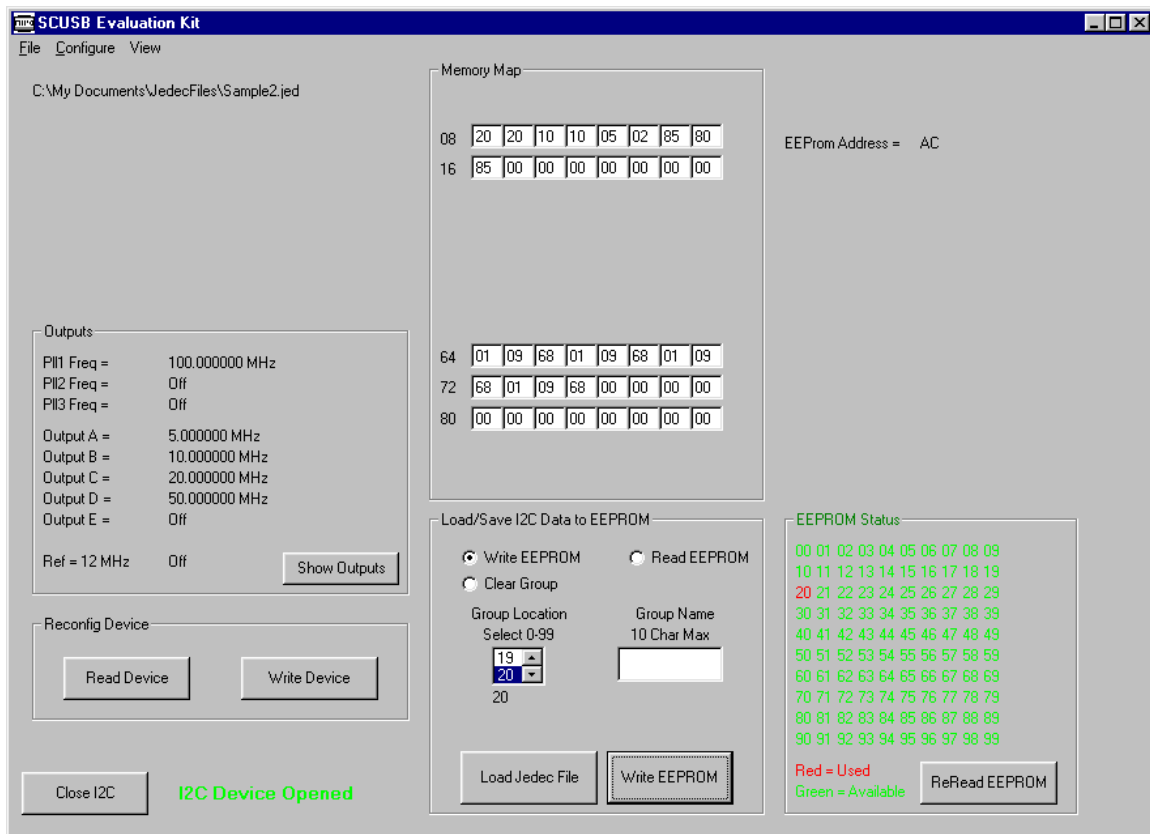


Lets create another sample JEDEC file to show the ease of reconfiguring. This file will contain a PLL of 100 MHz and 4 output clocks. 5 MHz, 10 MHz, 20 MHz, and 50 MHz. We can use the JEDEC Creator program to do this. Follow the steps for creating a JEDEC file and create the new JEDEC and call it Sample2.

Click the Load Jedec File button.



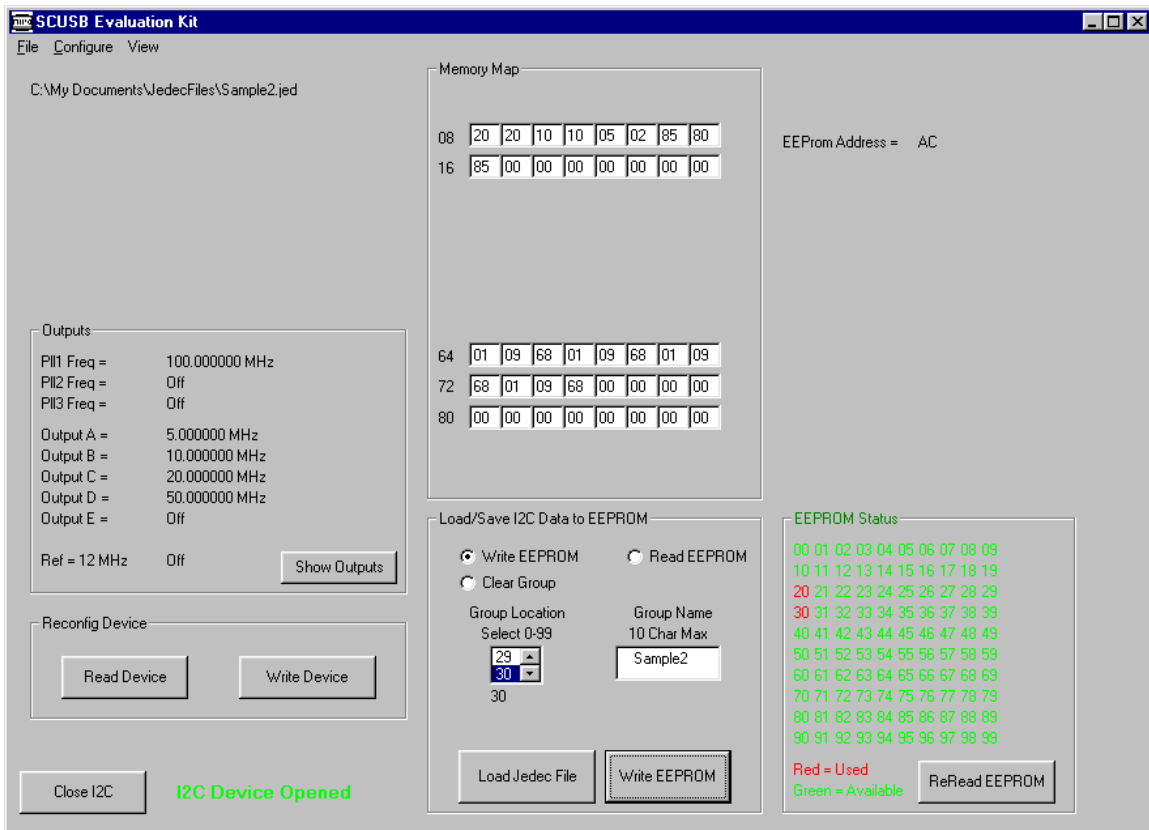
Select Sample2 and click Open.



Lets save this configuration to location 30.

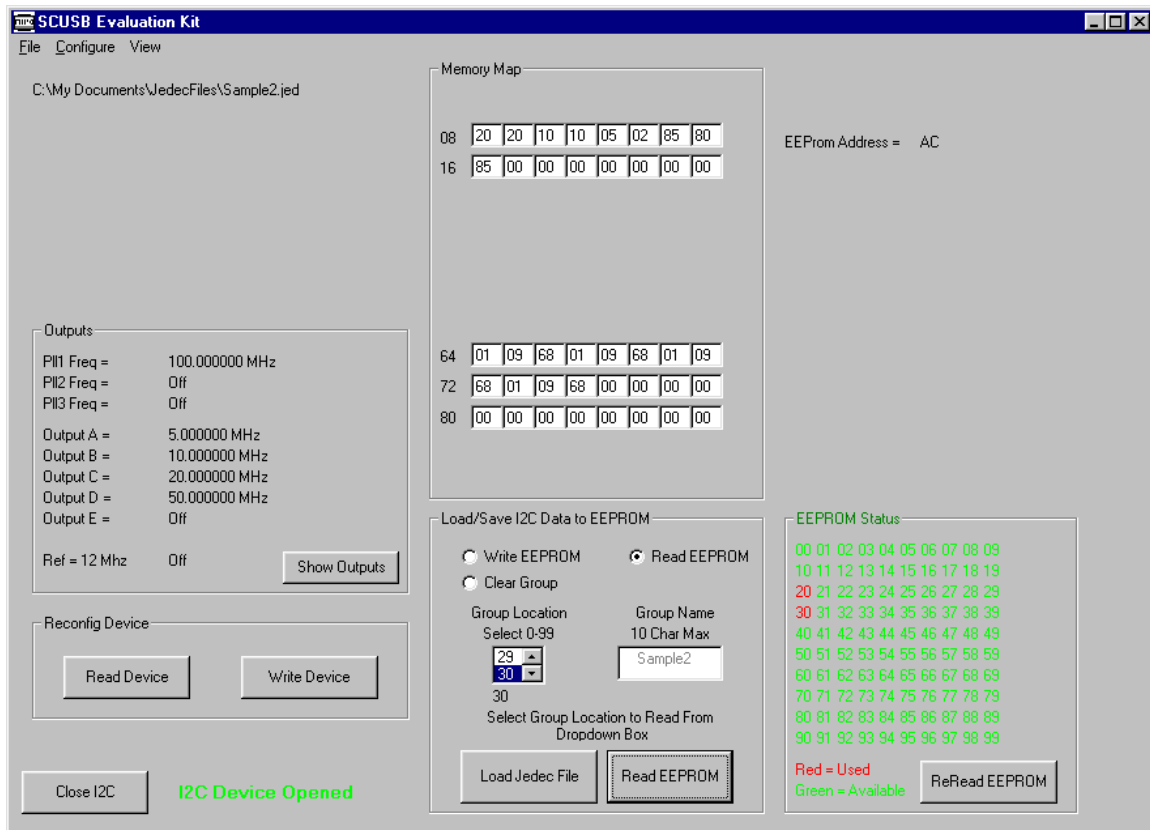
Just as before we will click on the green 30.  
 Enter a name in the Group Name Box. (Sample2)  
 Click the Write EEPROM Option button.  
 Click Write EEPROM.

The Sample2 configuration is now loaded into the EEPROM at location 30.



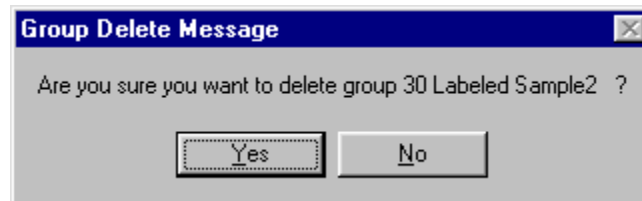
### 3.2.2 Reading a group from EEPROM

Reading a group from EEPROM is a simple process. Click on a number from the EEPROM Status box that is shown in red. Select the Read EEPROM option button. The Read EEPROM button should be visible. Click on the Read EEPROM button and the new values should be displayed in the Outputs box. Also the Memory Map should show the new values and the group name should appear in the Group Name text box. If there are no numbers shown in red, make sure the I<sup>2</sup>C device is open or that the EEPROM is not blank.



### 3.2.3 Clearing a group from EEPROM

Clearing a group from the EEPROM is the same procedure as Writing or Reading. First click on the group number that you want to clear. A Dialog box appears asking if you really want to clear that Group Location and Group Name.



Clicking yes, will clear that Group and return the Group Number back to green indicating that it is empty.



### 3.2.4 Reconfiguring an Oscillator

Select the data you want to configure the oscillator to by either clicking on the Load Jedec File button and selecting a Jedec File from the list or click the Read EEPROM option button and select a group from the EEPROM Status box.

Check the Outputs box and make sure that the correct values are shown. Insert an oscillator in the test socket and click the Write Device button. After the blue status bar completes, click the Read Device button and verify that the part was reconfigured correctly.

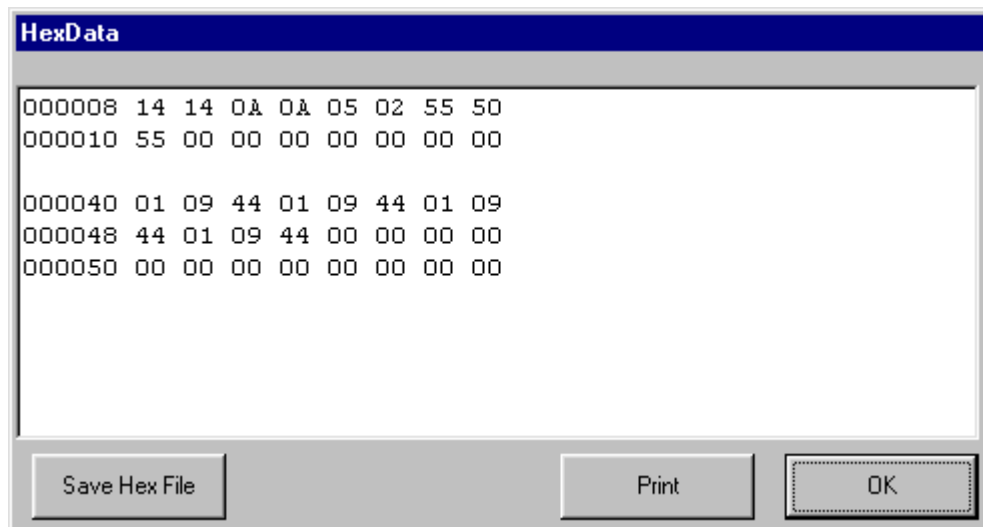
If all the Outputs read Off, check that the part is inserted into the socket properly. Also make sure that the SCUSB board is powered. If the green light is lit on the daughter board then power is applied and the communications should be OK. If a problem still exists, unplug the Eval Board and reconnect. Click the Close I2C button and then click the Open I2C button and see if that solves the problem.

### 3.3 Memory Map

#### 3.3.1 Viewing the Hex File

When a data file is loaded into the memory map, either from a JEDEC file or the EEPROM, a hex file is created. This file is the actual data file that is used for reconfiguring or writing to the EEPROM. This file can be used by a micro controller to reconfigure the oscillator in a circuit. To view the Hex file, click on view, then click view Hex file.

This is a typical Hex File.



Click Save Hex File to save the file to disc.

Click Print to print the file to your printer.

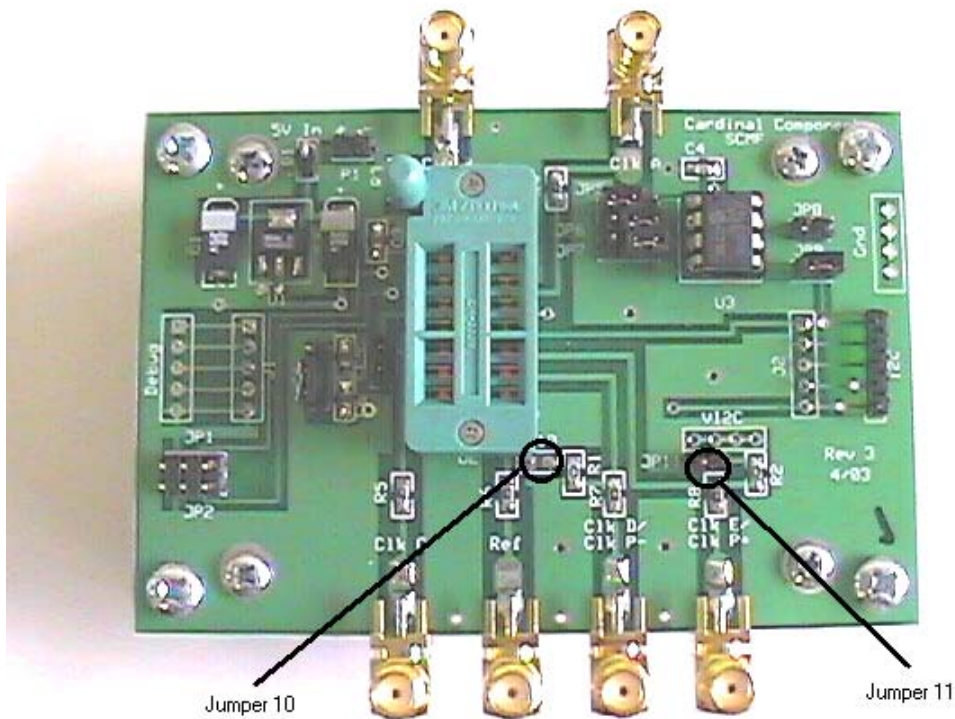
Click OK to close the window.

#### 3.3.2 Saving the Hex File

The Hex file can also be saved by clicking the view button and selecting Save Hex File.

## 4.0 Testing Oscillator Outputs

Testing the different output frequencies can be done with a frequency counter. Set the counter for a 1 Meg Ohm input impedance and probe the desired output SMA connector. If a PECL part is being tested, set the counter for 50 Ohm impedance or install jumpers 10 and 11. (See Photo)



Jumper 10

Jumper 11

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