

# **SCMF Test Board**

## **Operator's Instruction Manual**

**Cardinal Components, Inc.**

155 Rt 46 West

Wayne, N.J. 07470

(973) 785-1333

[www.cardinalxtal.com](http://www.cardinalxtal.com)

Copyright 2003, Cardinal Components Inc.

## **All Rights Reserved**

All attempts have been made to make the information in this manual complete and accurate. Cardinal Components Inc. is not responsible for any direct or indirect damages or loss of business resulting from inaccuracies or omissions. The specifications within this document are subject to change without notice.

# **SCMF Test Board**

## **Software License Agreement**

**All products (including the SCMF Test Board, CD's software and documentation) are subject to the terms stated below. If you disagree with the terms please return the Product and documentation to Cardinal Components, postage prepaid, within seven days of receipt and Cardinal will provide you with a refund, less freight and normal handling charges.**

1. You may not copy or reproduce all or any part of the Product, except as authorized in item 2 below. Removal, emulation or reverse engineering of all or any part of the Product constitutes an unauthorized modification of the Product and is specifically prohibited. Nothing in this license permits you to derive the source code of the software files that Cardinal has provided to you. Cardinal provides no other warranty to any person, other than the limited warranty provided to the original purchaser of this product.
2. You may make archival copies of the software files. All software files remain Cardinal exclusive property.
3. No license is granted to sell, license, distribute, market or otherwise dispose of any software files or other components of the Product.
4. Cardinal warrants the Product and the media on which the software files are provided to be substantially free from significant defects in material and workmanship under normal use for the period of twelve months from the date of delivery of the Product to you. In the event of a claim under this warranty, Cardinal's sole obligation is to replace or repair, at Cardinal's option, any Product free of charge.
5. Warrants and claims must be made in writing during the warranty period or within seven days of the observed defect, accompanied by evidence of satisfactory to Cardinal. Prior to returning any Product to Cardinal, you must obtain a Return Authorization (RMA) number and shipping instructions from Cardinal. Products returned to Cardinal shall be shipped with freight and insurance paid.

## Table of Contents

### SECTION 1.0 GETTING STARTED

- 1.1 Introduction
- 1.2 Software Installation

### SECTION 2.0 JEDEC Creator

- 2.1 Running the JEDEC Creator Program
  - 2.1.1 Entering PLL Frequencies
  - 2.1.2 Selecting Divider Values
  - 2.1.3 Saving the file to disc

### SECTION 3.0 Using the SCMF Test Board

- 3.1 Introduction
- 3.2 Setting up the SCMF Test Board
  - 3.2.1 Making measurements with the SCMF Test Board
  - 3.2.2 Connecting the I<sup>2</sup>C interface
  - 3.2.3 Reconfiguring an Oscillator
  - 3.2.4 Using the onboard EEPROM

## SECTION 1.0 GETTING STARTED

### 1.1 Introduction

The SCMF Test Board is an assembled and tested PC Board That demonstrates the Multiple Output and Single Output series of reconfigurable oscillators.

The Test Board consists of a circuit board assembly with 6 SMA connectors, which allow frequency measurement of the 6 available outputs. The board can also interface with a microcontroller through the I<sup>2</sup>C connector for reconfiguration of the 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 SCMF Test Board.

Software CD for creating JEDEC files for reconfiguration.

Required Equipment.

Compatible PC running Windows 98SE/ME/2000/XP

Optional Equipment

SC3600 Socket (used to measure and reconfigure the 8 pin Single Output SMT oscillator)

SC3700 Socket (used to measure and reconfigure the 14 pin Multiple Output Smt oscillator)

## 1.2 Software Installation

Insert the enclosed CD. If Setup does not auto start, then run Setup from the CD.

This installation will install the JEDEC Creator program.

## SECTION 2.0 JEDEC Creator

### 2.1 Running the JEDEC Creator Program

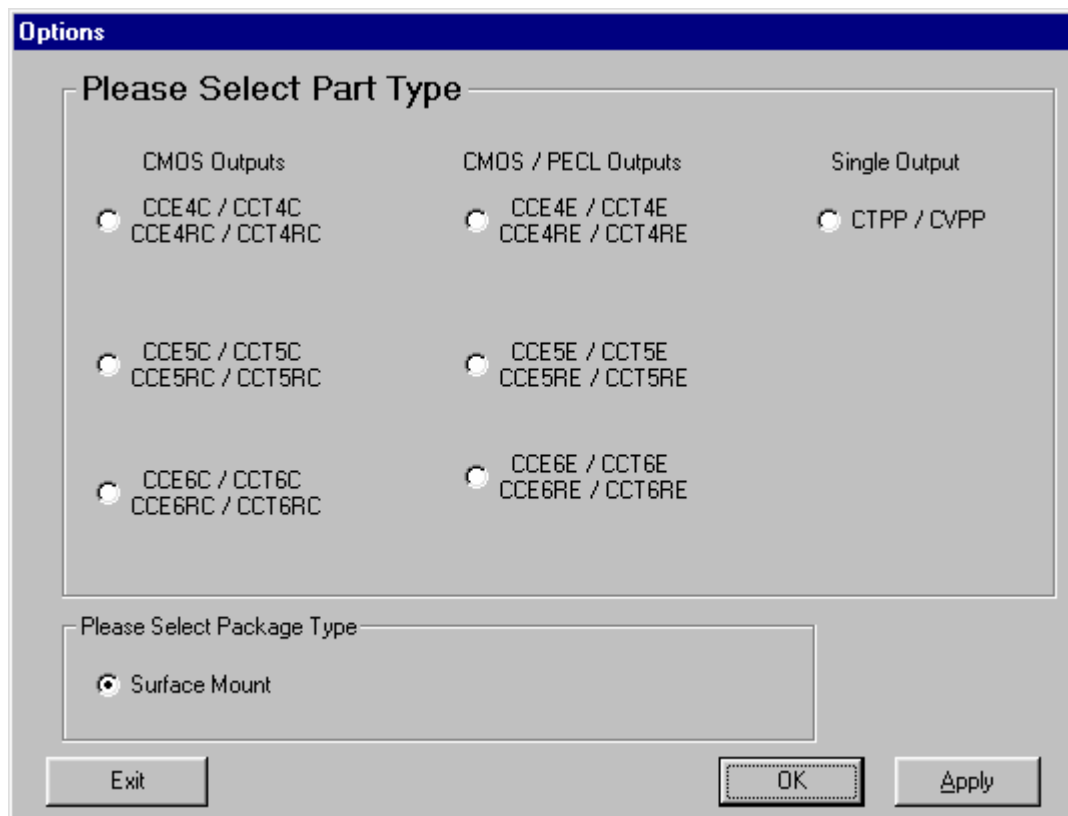
Note: If you do not wish to create JEDEC files you can skip this section and proceed to the Using the SCMF Test Board.

From the desktop, click on the JEDEC Creator Icon.



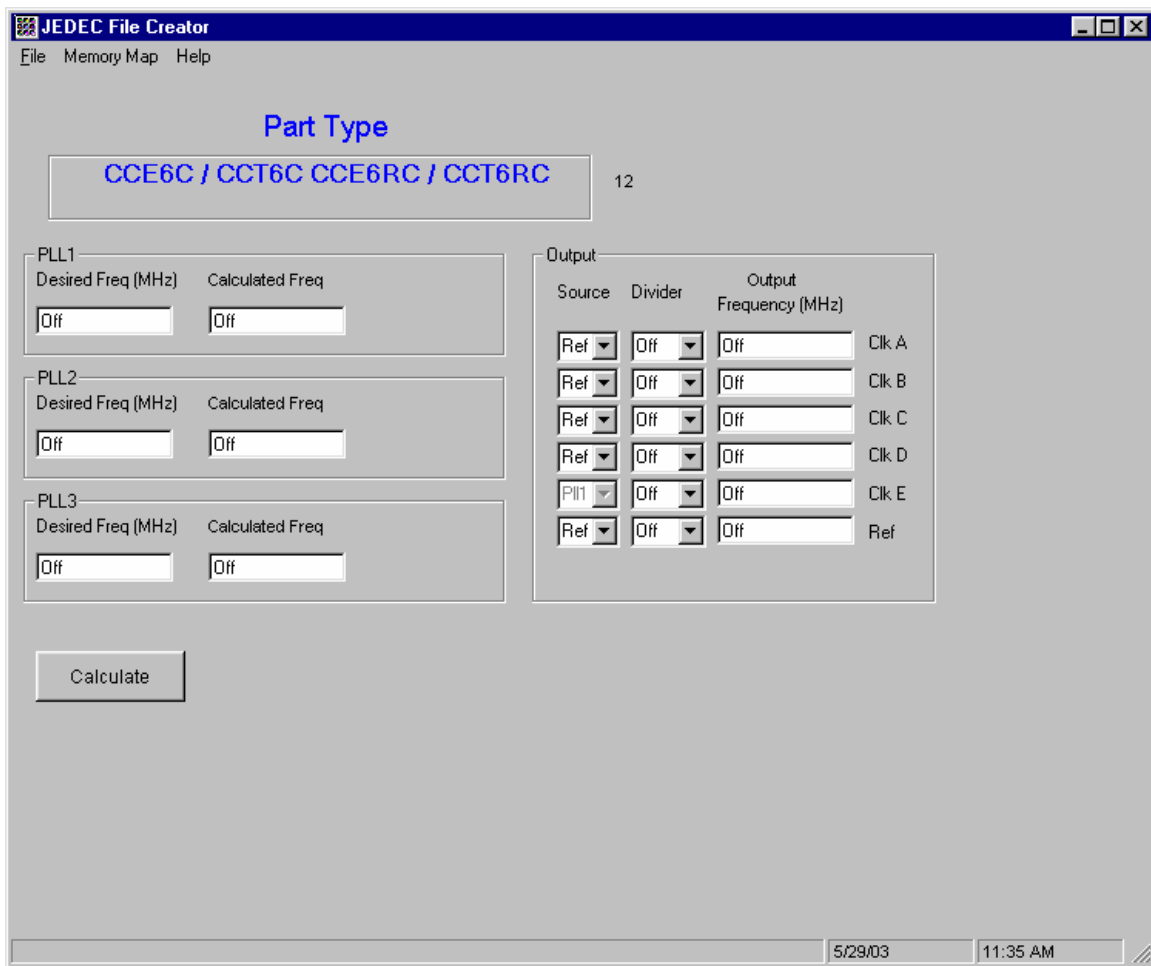
The program can also be run by double clicking JedecCreator.exe from the directory from which it was loaded during installation.

The Options screen should now be visible.

A screenshot of the 'Options' dialog box in the JEDEC Creator program. The dialog has a blue title bar with the word 'Options' in white. It contains two main sections: 'Please Select Part Type' and 'Please Select Package Type'. The 'Please Select Part Type' section has three columns of radio button options. The first column is for 'CMOS Outputs' with options CCE4C / CCT4C / CCE4RC / CCT4RC, CCE5C / CCT5C / CCE5RC / CCT5RC, and CCE6C / CCT6C / CCE6RC / CCT6RC. The second column is for 'CMOS / PECL Outputs' with options CCE4E / CCT4E / CCE4RE / CCT4RE, CCE5E / CCT5E / CCE5RE / CCT5RE, and CCE6E / CCT6E / CCE6RE / CCT6RE. The third column is for 'Single Output' with the option CTPP / CVPP. The 'Please Select Package Type' section has a single radio button option 'Surface Mount'. At the bottom, there are three buttons: 'Exit', 'OK', and 'Apply'.

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

The main screen should now be visible.



The screenshot shows the 'Part Type' configuration window in the JEDEC File Creator software. The window has a title bar with the text 'JEDEC File Creator' and standard window controls. Below the title bar is a menu bar with 'File', 'Memory Map', and 'Help'. The main area is titled 'Part Type' and contains a text box with the value 'CCE6C / CCT6C CCE6RC / CCT6RC' and a small '12' to its right. Below this are three PLL configuration sections (PLL1, PLL2, PLL3) and an 'Output' section. Each PLL section has 'Desired Freq (MHz)' and 'Calculated Freq' fields, both currently set to 'Off'. The 'Output' section is a table with columns for 'Source', 'Divider', 'Output Frequency (MHz)', and a label. The table has five rows for Clk A, Clk B, Clk C, Clk D, and Clk E, and one row for 'Ref'. All 'Source' and 'Divider' fields are set to 'Off', and all 'Output Frequency (MHz)' fields are set to 'Off'. A 'Calculate' button is located at the bottom left. The status bar at the bottom right shows the date '5/29/03' and time '11:35 AM'.

Source	Divider	Output Frequency (MHz)	
Ref	Off	Off	Clk A
Ref	Off	Off	Clk B
Ref	Off	Off	Clk C
Ref	Off	Off	Clk D
Pl11	Off	Off	Clk E
Ref	Off	Off	Ref

### 2.1.1 Entering PLL Frequencies

The first step is to enter a PLL frequency. Allowable PLL frequencies are from 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.



**JEDEC File Creator**  
File Memory Map Help

**Part Type**  
CCE6C / CCT6C CCE6RC / CCT6RC 12

**PLL1**  
Desired Freq (MHz) Calculated Freq  
155.520000 OK

**PLL2**  
Desired Freq (MHz) Calculated Freq  
106.250000 OK

**PLL3**  
Desired Freq (MHz) Calculated Freq  
Off Off

**Output**

Source	Divider	Output Frequency (MHz)	
Ref	Off	Off	Clk A
Ref	Off	Off	Clk B
Ref	Off	Off	Clk C
Ref	Off	Off	Clk D
Pl11	Off	Off	Clk E
Ref	Off	Off	Ref

Calculate

5/29/03 11:36 AM

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 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.

The screenshot shows the JEDEC File Creator application window. The title bar reads "JEDEC File Creator" with standard window controls. The menu bar includes "File", "Memory Map", and "Help".

**Part Type**

CCE6C / CCT6C CCE6RC / CCT6RC 12

**PLL1**

Desired Freq (MHz)	Calculated Freq
155.520000	OK

**PLL2**

Desired Freq (MHz)	Calculated Freq
106.250000	OK

**PLL3**

Desired Freq (MHz)	Calculated Freq
Off	Off

**Output**

Source	Divider	Output Frequency (MHz)	
PLL1	1	155.520000	Clk A
Ref	Off	Off	Clk B
Ref	Off	Off	Clk C
Ref	Off	Off	Clk D
PLL1	Off	Off	Clk E
Ref	Off	Off	Ref

**Calculate**

5/29/03 11:37 AM

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.

**JEDEC File Creator**  
File Memory Map Help

**Part Type**  
CCE6C / CCT6C CCE6RC / CCT6RC 12

**PLL1**  
Desired Freq (MHz) Calculated Freq  
155.520000 OK

**PLL2**  
Desired Freq (MHz) Calculated Freq  
106.250000 OK

**PLL3**  
Desired Freq (MHz) Calculated Freq  
Off Off

**Output**

Source	Divider	Output Frequency (MHz)	
PII1	1	155.520000	Clk A
PII1	4	38.880000	Clk B
PII2	2	53.125000	Clk C
PII2	1	106.250000	Clk D
PII1	Off	Off	Clk E
Ref	Off	Off	Ref

Calculate

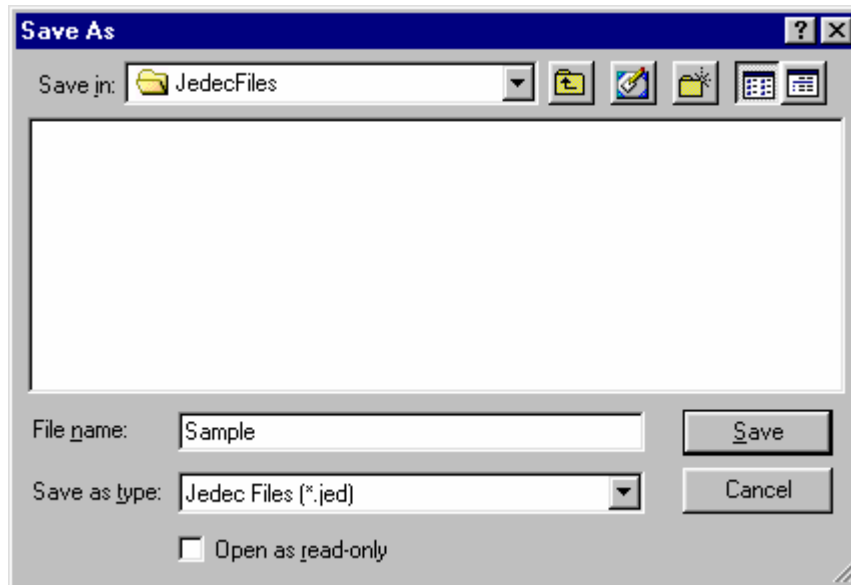
5/29/03 11:39 AM

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 SCMF Test Board.

### 3.1      Introduction

The SCMF Test Board is designed to measure and reconfigure the Multiple Frequency Output and Single Frequency Output family of oscillators from Cardinal Components.

The SCMF Test Board consists of the following basic components.

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

The I<sup>2</sup>C connector, which can be used by a microcontroller for reconfiguring the Multi and Single output oscillators using I<sup>2</sup>C Protocol.

Onboard EEPROM for storing custom configurations for easy reconfiguration of the oscillator.

## 3.2 Setting up the SCMF Test Board

### 3.2.1 Making measurement with the SCMF Test Board

Lets start by setting up the SCMF Test Board for frequency measurement only.

When using the SCMF Test Board as a stand-alone unit, 5 Volts DC must be applied to the board. Attach a cable from the SCMF Test Board 5 Volt input to a 5 Volt DC source. Make sure that JP3 is correct. See Figure 1 for details.

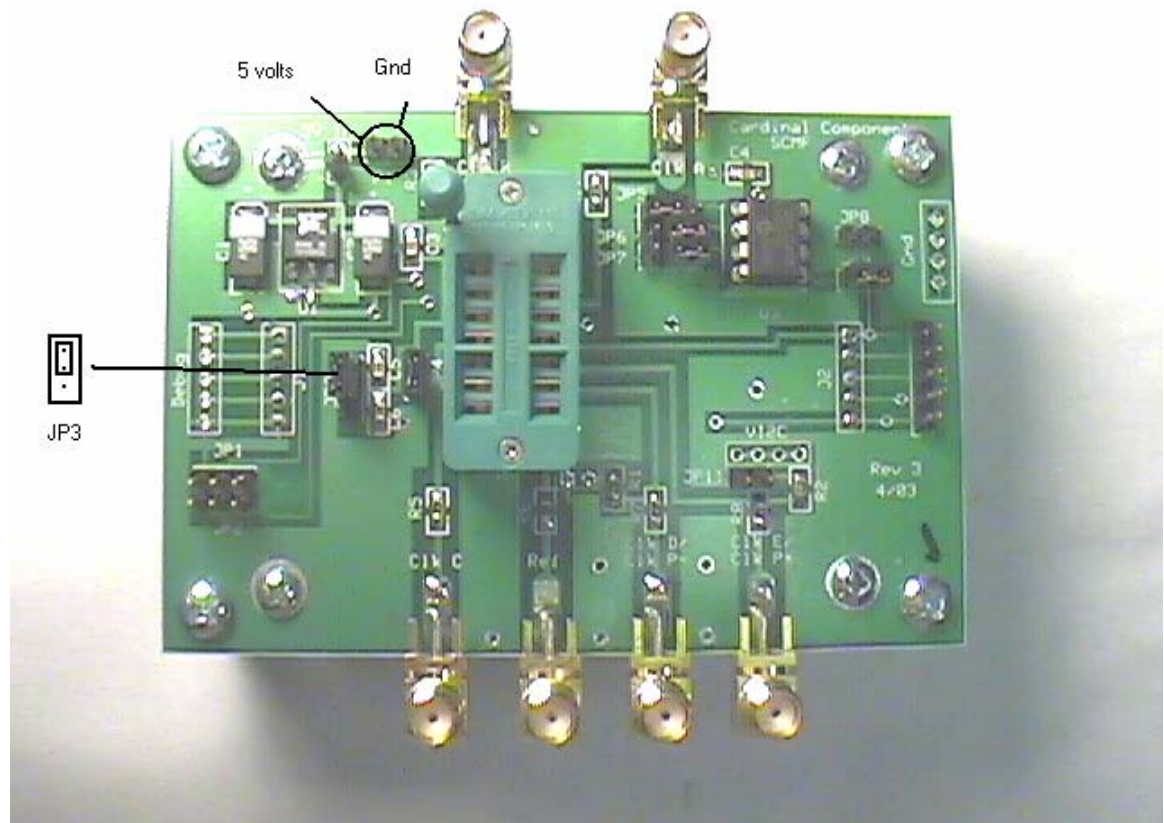


Figure 1

If 5 volts was applied to the board and JP3 is configured correctly, it is time to install a part. Using the SC3600 adaptor socket for measuring a Single Output part or the SC3700 adaptor socket if measuring a Multiple Output part, insert the oscillator and adaptor into the ZIF socket. Marked on the board at the SMA connectors are the Clock outputs. There is also a Ref output. This output will be active only on parts programmed for 6 outputs. If a single output part is used, the output is always on Clk C. Refer to the appropriate datashets for details.



### 3.2.2 Connecting the I<sup>2</sup>C interface

The SCMF Test Board has an I<sup>2</sup>C connection which can be used by a microcontroller for reconfiguration and EEPROM access. The pin outs for this connection are shown in Figure 2.

Please note: If there is a 3.3 volt source available, then the SClk, SData, Gnd and V<sup>I</sup><sub>I</sub><sup>2</sup>C (3.3 volts) can all be connected to the board through the I<sup>2</sup>C connector. If this is the case, a 5 volt source is not needed and jumper J3 must be in position 2 as shown.

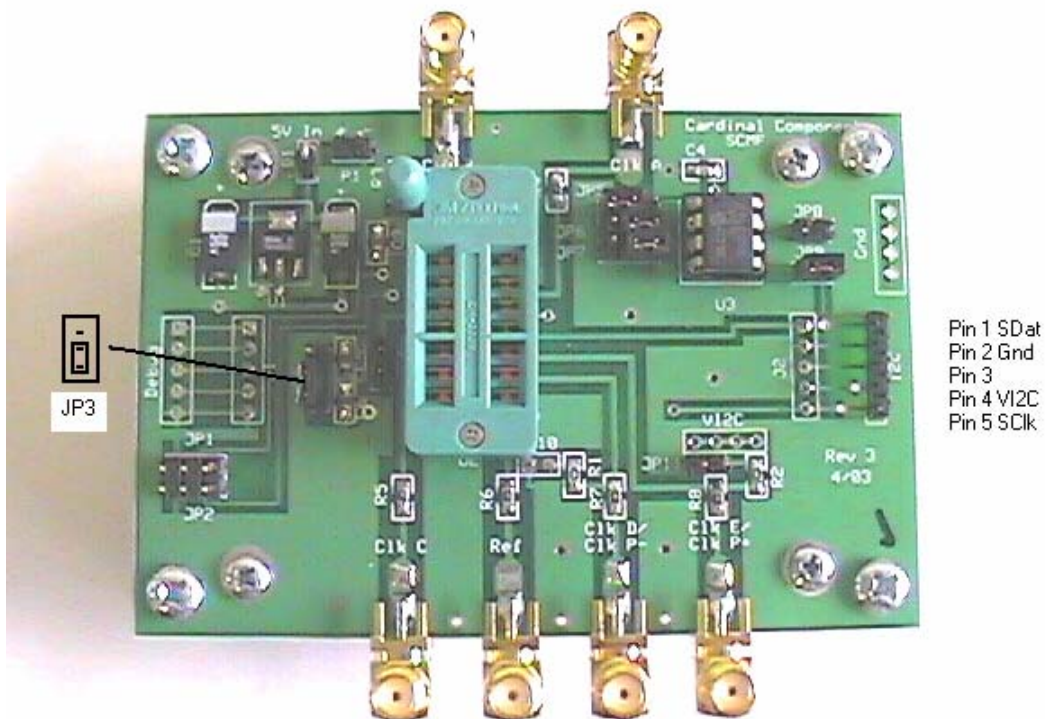


Figure 2

### 3.2.3 Reconfiguring an Oscillator

Using the hex file created by the Jedec Creator program, the memory address and data information can be programmed into the oscillator. See Figure 3 for a typical hex file.

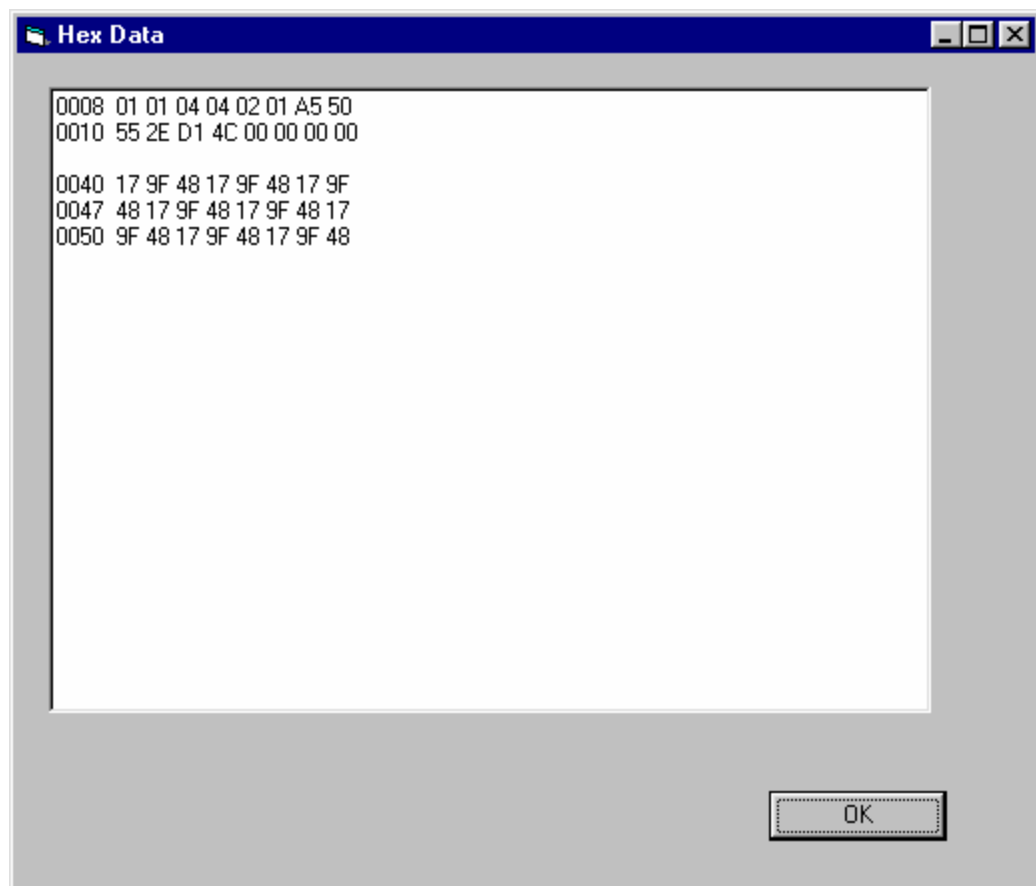


























Figure 3

Reconfiguring the oscillator should be done in 2 blocks. The first block is memory location 08<sub>h</sub> to 17<sub>h</sub> and the second block is memory location 40<sub>h</sub> to 57<sub>h</sub>. Figure 3 shows a typical hex file with address and data values. The address of the oscillator is D2<sub>h</sub>. Communication to the SCMF Test Board uses the standard 2 wire Clk, Data Protocol.

#### 3.2.4 Using the onboard EEPROM

The EEPROM on the SCMF Test Board is a 32K x 8 (256k bit) Serial Electrically Erasable PROM. Writing and Reading to the EEPROM is done in the same way as Writing to the oscillator. The address of the EEPROM is AC<sub>h</sub>, (default) but can be changed by jumpers JP5-JP7 (See EEPROM configuration chart below).

Address	JP5	JP6	JP7
A0			
A2			
A4			
A6			
A8			
AA			
AC			
AE			

EEPROM Configuration Chart

The EEPROM can be used to store multiple configurations. By doing a memory transfer from the EEPROM to the oscillator, reconfiguration of the oscillator can easily be achieved. The SCMF Test Board shows the ease of testing and reconfiguring the Single and Multiple output family of oscillators from Cardinal Components.

Cardinal Components, Inc.  
155 Rt 46 West  
Wayne, N.J. 07470  
(973) 785-1333  
[www.cardinalxtal.com](http://www.cardinalxtal.com)

SCMFdocrev2