CR-5000

SD Rambus Design Module

Contents

Contents

Introduction

This text is an operation manual for CR-5000 / System Designer optional software, "SD Rambus design module". The following items required for operation are described in this text.

- Product overview

- Setting items and instructions before installation

- Rambus circuit template selection dialog

- Composition chart of attached circuit data and specification of attached symbol.

"SD Rambus design module" is a newly released product for CR-5000 / System Designer Rev.5.0.

Rambus is a registered trademark of Rambus Inc.

Chapter 1   Product Overview

CR-5000 / System Designer optional software, "SD Rambus design module" a tool to provide circuit template for Rambus circuit design.

This product consists of the following functions.

- Circuit template library that is equipped with multiple circuit templates.
- Dedicated dialog: You can simply operate the process from selecting circuit template to outputting to your editing circuit data. As this dialog has a schematic viewer, you can check circuit composition visibly.

Related products functions are available as integrated properties with PCB pattern design of CR-5000 / Board Designer are provided by using this product.

This product supports Rambus circuit design and PCB pattern design in cooperation with related products.

Detailed operation of CR-5000 / System Designer is not mentioned in this text.

Related product:

CR-5000/Board Designer optional software "BD Rambus design module" is equipped with the following.

- A function to display guide message at appropriate time on pattern design CAD:
  Active Layoutguide for Rambus (ALG)

- DRC function based on Rambus rule after pattern design:
  Intelligent Layoutchecker for Rambus (ILC)
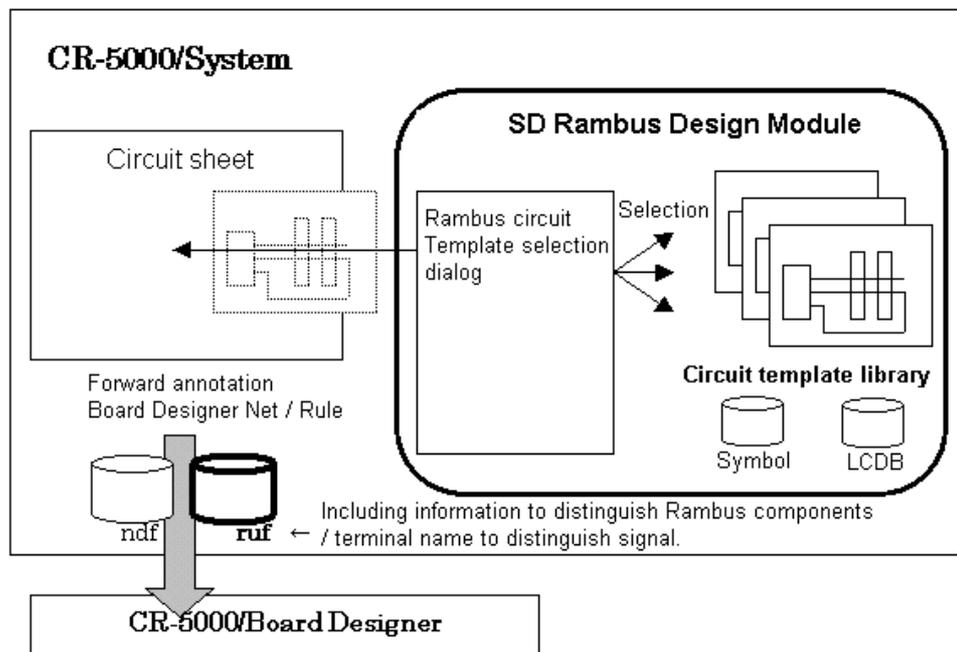
Chapter 2   Setting items and instructions

This chapter describes how to set required items and instructions before starting SD Rambus design module.

2.1   Setting items

2.1.1   Setting symbol search path

After "SD Rambus design module" installation, add the following paths to the end of existing symbol search paths table. Installer sets environment variable, "$ZDSTPLROOT" automatically.

$ZDSTPLROOT/c_rambus/smb

For additional setting, use data resource editor.

Example: Add to table number 11.

2-2
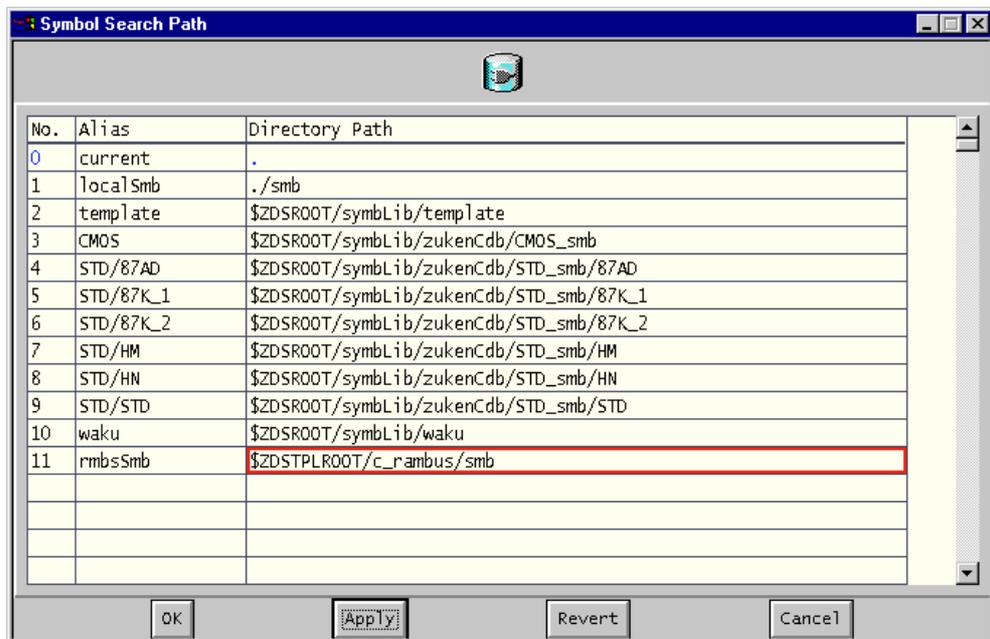
2.2   Preparation

2.2.1   Symbol/LCDB

Setup your original symbol library or LCDB referring to symbol / LCDB given by template. It is convenient to use symbol shape as it is, because which allow you to perform simple editing in template circuit data.
Since cpd file for optional product " Component Designer" is stored in addition to symbols, users having this product can easily setup symbol / LCDB

2.3 Instructions

2.3.1 Symbol search path in localized environment

For symbol search path in local environment, $ZDSTPLROOT/c_rambus/smb must be set in local as well as 2.1.1.

2.3.2 Font size in localized environment

Font size of properties displayed in the schematic viewer of "Rambus circuit template selection" dialog is dependent on system setting "$ZDSROOT/info/data.rsc".
When circuit data where template circuit is outputted has "landata.rsc" in local, output is dependent on the local setting "landata.rsc". If system and local differ from each other in font size setting, display on schematic viewer and actual circuit differ from each other as well.

2.3.3 ASIC components in template circuit

Since ASIC components used in template circuit given by "SD Rambus design module" are dummies, make sure to replace them with real components after inserting template circuit in your editing circuit data.

2.3.4 Variables of discrete components

Variables of discrete components used in circuit data given by SD Rambus design module apply to the chapter, Appendix A Rambus Design Example of "Rambus PCB layout guide - base / concurrent version 1.01(J)"

2.3.5   Signal name (Net name)

Connected nests among components in template circuit given by "SD Rambus deign module" are not named here (except bus net). Because, in case of Rambus multiple channel, some problems may happen if nets are named in template circuit.

2.3.6   Placement group

When outputting from "Rambus circuit template selection" dialog, if you did not specify components group name, default value is automatically assigned to property group name of each component.

2.3.7   Reference

Each component of template circuit given by "SD Rambus design module" has no reference value.

Chapter 3   Rambus Circuit Template Selection Dialog

This chapter describes about Rambus circuit template selection dialog.

3.1   Start

You can start "Rambus circuit template selection" dialog from a circuit sheet.
Select [Utility]-[Rambus design module]-[Select circuit template] from the pull
down menu of a circuit data.
Then, the following dialog appears.

3.2 GUI

This section describes each part of "Rambus circuit template selection" dialog.
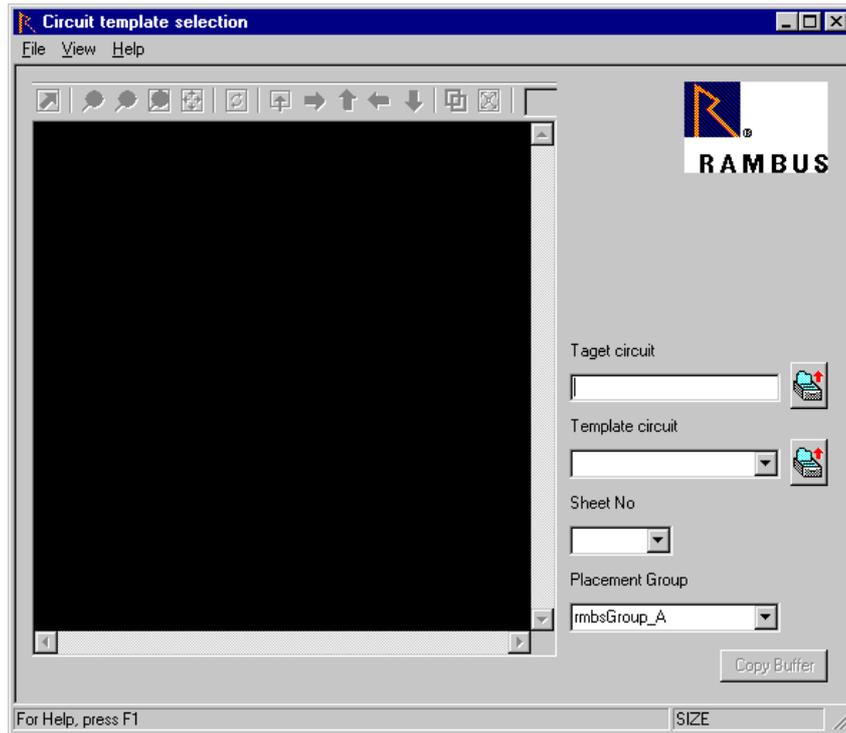
Figure 3.1 Rambus circuit template selection dialog - Chart 1.

3.2.1   Target circuit

Specify circuit directory (.cir) path to output template circuit.
Circuit directory path in which "Rambus circuit template selection" dialog starts
is specified as default. To change this, enter the path directly in the input field.
You can use browser by clicking button next to the input field.

3.2.2   Template circuit

Specify template circuit name from selector. Operate selector with button.

You can select one template circuit from template circuit list. Contents of your
selected template circuit are displayed in the schematic viewer. And also,

message to explain your selected circuit is displayed in status bar.
There is no default display in initial screen when starting the dialog.

If you click selector button, the following standard 4-circuit names are listed.

When "-rmbs_18m1" is selected:
Message: This is a circuit template that has a piece of 18M bit RDRAM
When "-rmbs_18m2" is selected:
Message: This is a circuit template that has 2 pieces of 18M bit RDRAM.
When "-rmbs_64m1" is selected:
Message: This is a circuit template that has a piece of 64M bit RDRAM.
When "-rmbs_64m2" is selected:
Message: This is a circuit template that has 2 pieces of 64M bit RDRAM.

3.2.3   Sheet No.

Specify sheet number of a template circuit selected in "template circuit".
First sheet number (001) is specified as default. You can switch sheet number
by selector button. Switched contents are applied to schematic viewer.
There is no default display in initial screen when starting the dialog.

3.2.4   Placement group (Option)

Specify value of "Components group" which is a property assigned to each
component that composes your selected template circuit. This value is applied
when you perform "Buffer output" to a circuit.
Default display is "rmbsGroup_A" in initial screen when starting the dialog.
If "Components group", which is a property of each component that composes
existing circuit in which data is outputted, has some values, those values are
listed in initial screen when starting the dialog and you can select one of them.
This value is effective when components placement is examined in CR-5000/
Board Designer.

3.2.5   Copy Buffer

This is a button to output your selected template circuit displayed in the schematic viewer to buffer. Once you perform buffer output, data is stored in buffer until a circuit sheet in which data is outputted is closed.
To place a template circuit stored in buffer in a circuit sheet, select [Edit]-[Paste] from the pull down menu in a circuit sheet or enter [Ctrl]+[v] key. Drag the template circuit to the place you want to fix and click.

3.2.6   Schematic viewer

Schematic viewer has the following buttons.

(1)   (2) (3) (4) (5)   (6)   (7) (8) (9)(10)(11)(12)(13)

Figure 3.2 Rambus circuit template selection dialog - Chart 2.

(1) Select
This is used for selecting displayed object.

(2) Zoom in
Zoom in on central point of display at a uniform rate.

(3) Zoom out
Zoom out on central point of display at a uniform rate.

(4) Zoom area
Zoom in on your selected area.

(5) Entire sheet
Display entire circuit.

(6) Redraw
Redraw present displayed contents.

(7) Dynamic pan
Pan to the second clicked place from the first clicked place.

(8) Pan rightward
Display moves rightward.

(9) Pan upward
Display moves upward.

(10) Pan leftward.

Display moves leftward.

(11) Pan downward

Display moves downward.

(12) Centering

Displays selected object (component or net) in the center. This is cooperated with "Select" button.

(13) Adjust

Display is adjusted according to the size of selected object (component or net). This is cooperated with "Select" button.

3.2.7   Resource registration

Using "resource registration" dialog, you can add your created Rambus circuit data to template. You can add it to "Template circuit" list in "Rambus circuit template selection" dialog with resource registration. You can also register messages to display on status bar. Japanese font can be used.

To start "Resource registration" dialog, specify unregistered circuit directory in "Input circuit" of "Rambus circuit template selection" dialog. Display a message dialog "Not registered in resource. Please register".
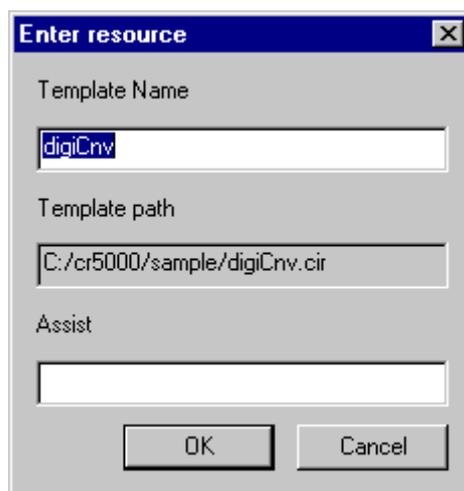
Figure 3.3 Rambus circuit template selection dialog - Chart 3

Registered resource is saved in $HOME/cr5000/ds/rbtemp.rsc file as user resource.

Chapter 4   Resource File

Resource of SD Rambus design module is used to set the following items in "Rambus circuit template selection" dialog.

"Template circuit"

Setting contents:

- Circuit names listed in "Template circuit"
- Circuit directory (.cir) path.
- Messages to display on status bar. (Simple description about template circuit, etc.)

There are 2 types of resource files in SD Rambus design support module.
One is system resource file and the other is user resource file.
Each file location is as follows.

System resource file:$ZDSROOT/info/eng/rbtemp.rsc
User resource file:$HOME/cr5000/ds/rbtemp.rsc

System resource file is renewed in every installation.
User resource file is not provided in initial installation. If it exists in installation, it is not renewed.

4.1　Setting and creating user resource file

When you add your created Rambus circuit to template, you can create user resource file by entering above-mentioned setting in "Resource registration" dialog of "Rambus circuit template selection" dialog.

4.2   Precaution for setting user resource file

Make sure not to duplicate circuit name. The following circuit names are used in system resource file.

- rmbs_18m1
- rmbs_18m2
- rmbs_64m1
- rmbs_64m2

Chapter 5   Operation

This chapter describes operation process using "Rambus circuit template" dialog.

5.1   Introduction

Make sure if you completed chapter 2 "Setting items and instructions".

Then, open new or existing circuit data.

5.2   Starting "Rambus circuit template selection" dialog

Select [Utility] - [Rambus design support] - [Circuit template selection] from the pull down menu in a circuit sheet. Then, initial screen of "Rambus circuit template selection" dialog appears.

"Target circuit" displays path of circuit directory (.cir) from which the dialog started. "Template circuit" does not display anything until template circuit name is selected.

"Sheet number" also does not display anything until template circuit name is selected.

"Components group" displays default value "rmbsGroup_A".

5.3 Selecting template circuit

Select template circuit name from selector of "Template circuit".

The following chart shows when "rmbs_18m1" is selected.
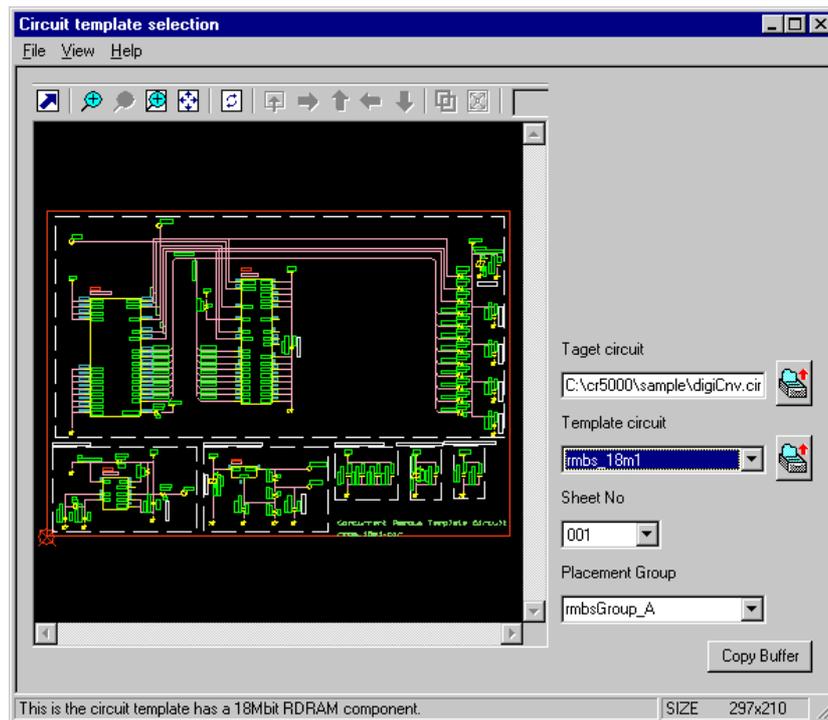
5.4   Selecting placement group (option)

When you perform buffer output, specified value in "Placement group" is assigned to all components that compose template circuit.
This value is effective when components placement is examined in CR-5000 / Board Designer.
Although "Placement group" displays default value, circuit from which "Rambus circuit template selection" dialog started (= "Target circuit") includes existing "Placement group" value. So you can select value from existing value. You can also input value with keyboard directly.

5.5   Copy buffer

Click "Copy buffer" button after selecting template circuit.

Output template circuit to buffer of circuit displayed in "Target circuit".

5.6   Pasting template circuit

Return to circuit data from which "Rambus circuit template" started and move to circuit data you want to place template circuit.
To place template circuit stored in buffer in a circuit sheet, select [Edit]-[Paste] from the pull down menu of the circuit sheet or enter [Ctrl]+[v] key. Drag the template circuit to the place you want to fix and click it.

5.7   Saving circuit data

Edit peripheral circuit of ASIC components including Rambus controller and save each circuit data.

Make sure if correct values are input in the following 3 components property "Rambus components category". For the details, refer to "Chapter 7. Properties"

5.8   Forward annotation

Forward annotation to CR-5000 / Board Designer is the same as normal operation.

Select **[Utility]-[Forward annotation]-[Board Designer Net / Rule]** form the pull down menu of a circuit sheet.

Store netlist (.ndf) and rule file (.ruf) in ext directory under circuit directory (.cir)

5.9 Using cases

5.9.1 Multiple channel

You can choose one of the following 2 ways: using template circuit stored in buffer more than one time or copying template circuit already placed in a circuit data. In the latter case, copy Rambus circuit turning "Retain references" OFF in your editing circuit sheet. At this point, change bus net names in a circuit sheet to which you want to paste a template circuit using the pull down menu [Utility]-[Net utility]-[Generate bus name][1], so that they will be different from bus net names in a circuit sheet from which you copied the template circuit.

Assign copied references of each component to corresponding each component by selecting [Utility]-[Generate reference] from the pull down menu in a circuit sheet.

5.9.2 Circuit template created by each user

As this is limited to Concurrent Rambus circuit, a template circuit created by user must has different name from default given name and be created under $ZDSTPLROOT/template/c_rambus through "Resource registration" dialog.

Name Symbol file for template circuit not to be duplicated and place it in your original path or default "$ZDSTPLROOT/template/c_rambus/smb"

Make sure to back up both user's creating template circuit and symbol or LCDB.

1.It does not work for signal line of bus branch connected to pin without IO property value.

Chapter 6 Properties

This chapter describes about properties used in SD Rambus design module and related properties.

6.1   Properties for Rambus components and symbols

The following property is information to distinguish between Rambus components and general components.

Property name: rmbsType
Displayed text: Rambus components category
Selection value: RMBS_CONTROLLER / RMBS_DRAM / RMBS_CLKGEN
RMBS_CONTROLEER: Recognized as ASIC components including Rambus controller.
RMBS_DRAM: Recognized as Rambus memory, RDRAM components.
RMBS_CLKGEN: Recognized as clock generator components.

These values are applied to rule file (.ruf) in forward annotation and available in CR-5000 / Board Designer Rambus design support module.

6.2   Properties for placement group

This is one of general properties to distinguish components group.

Property name: compGroup
Displayed text: Placement group
Selected value: none (optional)

It works when components placement is examined in CR-5000/Board Designer.

6.3   Pin name for Rambus signal

This is a general property and has value for distinguishing Rambus signal (pin name).

Property name: pinLable
Displayed text: Pin name
Selected value: None (optional). Values for distinguishing Rambus signal (pin names) are as follows.
BD0, BD1, BD2, BD3, BD4, BD5, BD7, BD8
BEN, BDTL, RXCLK, TXCLK, VREF, VREF2, SIN, SOUT

They are available in CR-5000 / Board Designer Rambus design support module.

Chapter 7   Template Circuit Composition Chart

This chapter describes about template circuit given by SD Rambus design module.

7.1   Overview

2 types of Rambus circuit template that have single channel and no socket are given 2 each (Total 4). These are automatically stored in the following directory when installing.

$ZDSTPLROOT/template/c_rambus

7.2   4 template circuit

RDRAM	Number	Template circuit name	Circuit data directory
18M bit	1	rmbs_18m1	rmbs_18m1.cir
18M bit	2	rmbs_18m2	rmbs_18m2.cir
64M bit	1	rmbs_64m1	rmbs_64m1.cir
64M bit	2	rmbs_64m2	rmbs_64m2.cir

7.3   rmbs_18m1

The following chart is a template circuit where 1 Rambus memory (18M bit RDRAM) is used.
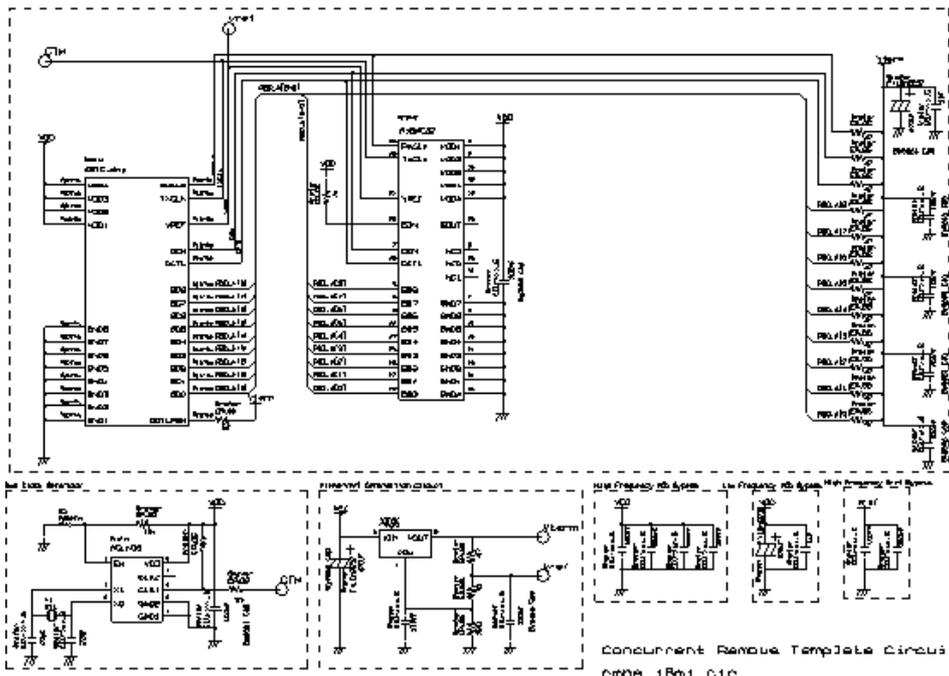
7.4   rmbs_18m2

The following chart is a template circuit where 2 Rambus memory (18M bit RDRAM) are used.

Concurrent Rambus Template Circuit
rmbs_18m2.cir
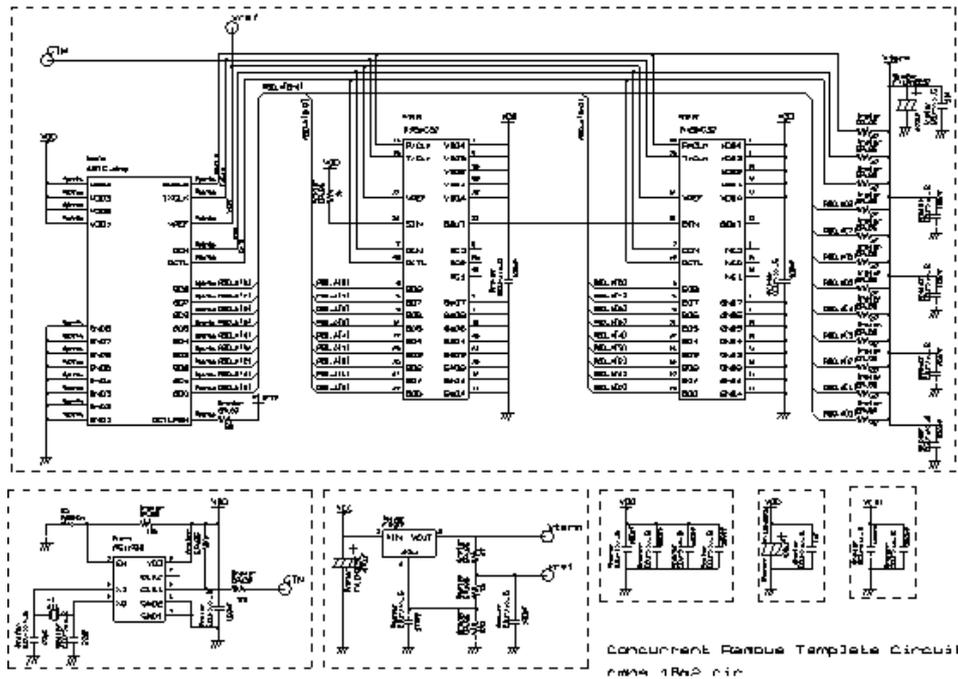
7.5   rmbs_64m1

The following chart is a template circuit where 1 Rambus memory (64M bit RDRAM) is used.

Concurrent Rambus Template Circuit
rmbs_64m1.cir
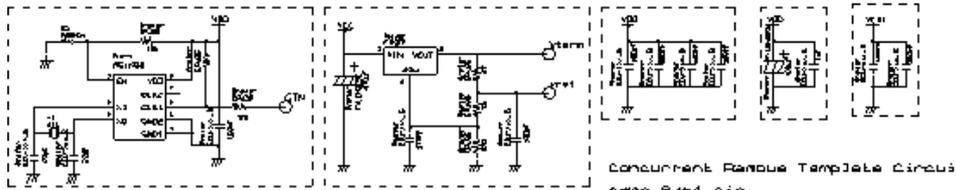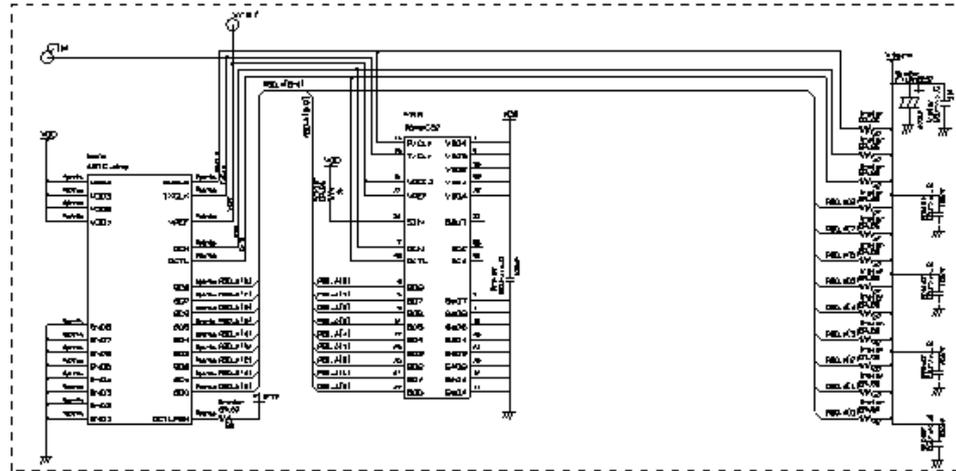
# 7.6   rmbs_64m2

The following chart is a template circuit where 2 Rambus memory (64M bit RDRAM) are used.


Concurrent Rambus Template Circuit
rmbs_64m2.cir
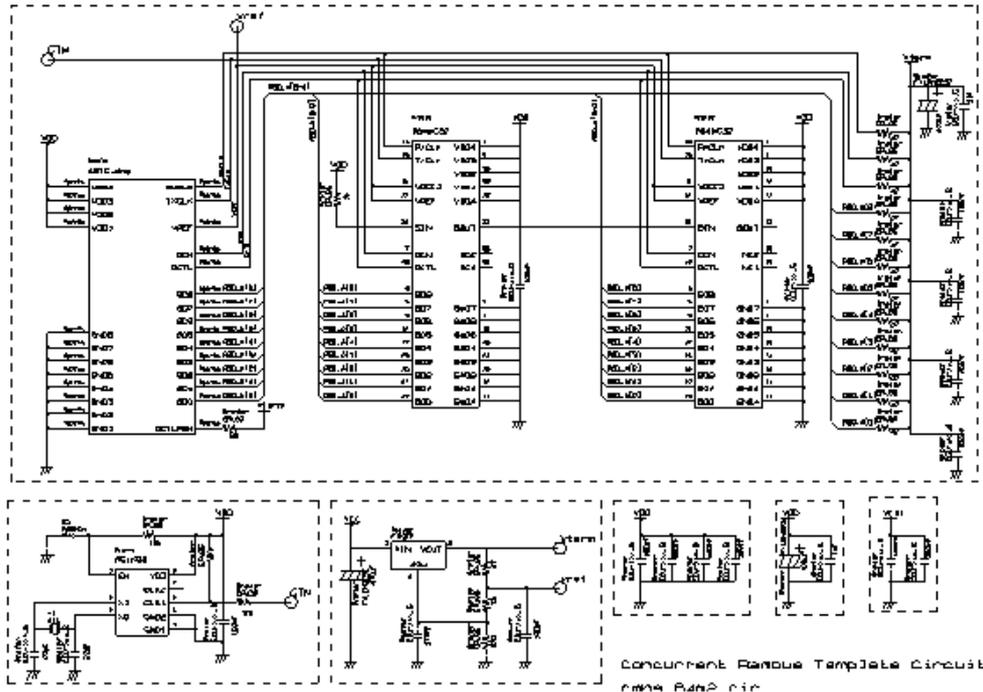
Chapter 8   Provided Symbols/LCDB

8.1   Overview

This chapter describes about symbols and LCDB given by SD Rambus design support module. These symbols are used in template circuit given by SD Rambus design support module. Among components used in template circuit, RDRAM, regulator and clock generator have symbols and LCDB. AXIC (*), resistor and capacitor have only symbol shape as dummy.

	LCDB	**Symbol**
ASIC ([a]Rambus controller)		O
RDRAM (Rambus memory)	O	O
Clock generator	O	O
Regulator	O	O
Resistor		O
Capacitor		O
Crystal oscillator		O

a.Since Rambus controller is incorporated in user's customized IC by provided IP, it is not prepared as template circuit component. It only has symbols as components dummy.

8.2   Stored place

Symbols and LDCB given by SD Rambus design support module are stored in the following path when installing.

Symbols stored path:
%ZDSTPLROOT%template\c_rambus smb\

LCDB stored path:
%ZDSTPLROOT%template\c_rambus\rambusCdb\

8.2.1   ASIC (Rambus controller)

This section describes about ASIC dummy symbol's shape, pin placement and fixed point of each property values. Standard color of CR-5000 / System Designer is used here.
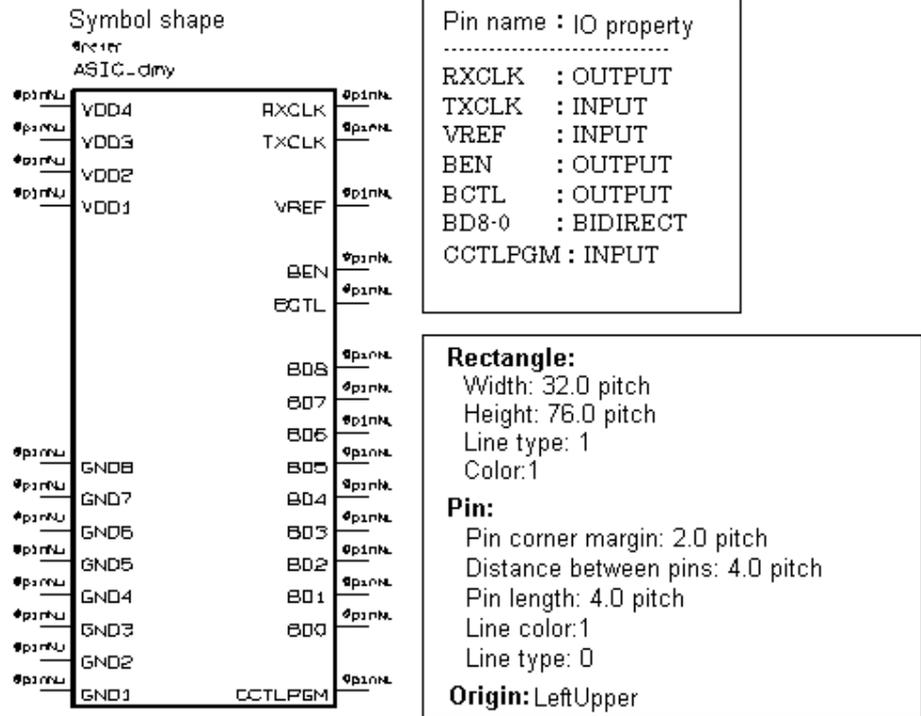
Symbol property viewer definition:

	fontNo	X-axis	Y-axis	Fixed point	Angle	Color	Display
Part name	3	4.0	4.0	LowerLeft	0	7	ON
Reference	2	4.0	7.0	LowerLeft	0	14	ON
Entity	1	15.0	-20.0	LowerLeft	90.0	6	OFF
author	1	16.0	-20.0	LowerLeft	90.0	5	OFF

Property viewer for the left side pins:

	fontNo	X-axis	Y-axis	Fixed point	Angle	Color	Display
Pin label	3	5.0	4.0	CenterLeft	0	7	ON
Pin number	2	4	8	LowerRight	0	14	ON

Property viewer for the right side pins:

	fontNo	X-axis	Y-axis	Fixed point	Angle	Color	Display
Pin label	3	5.0	4.0	CenterRight	0	7	ON
Pin number	2	4	8	LowerLeft	0	14	ON

8.2.2   RDRAM (Rambus memory)

This section describes about RDRAM symbol's shape, pin placement and fixed point of each property value. Standard color of CR-5000/System Designer is used here.

Symbol shape
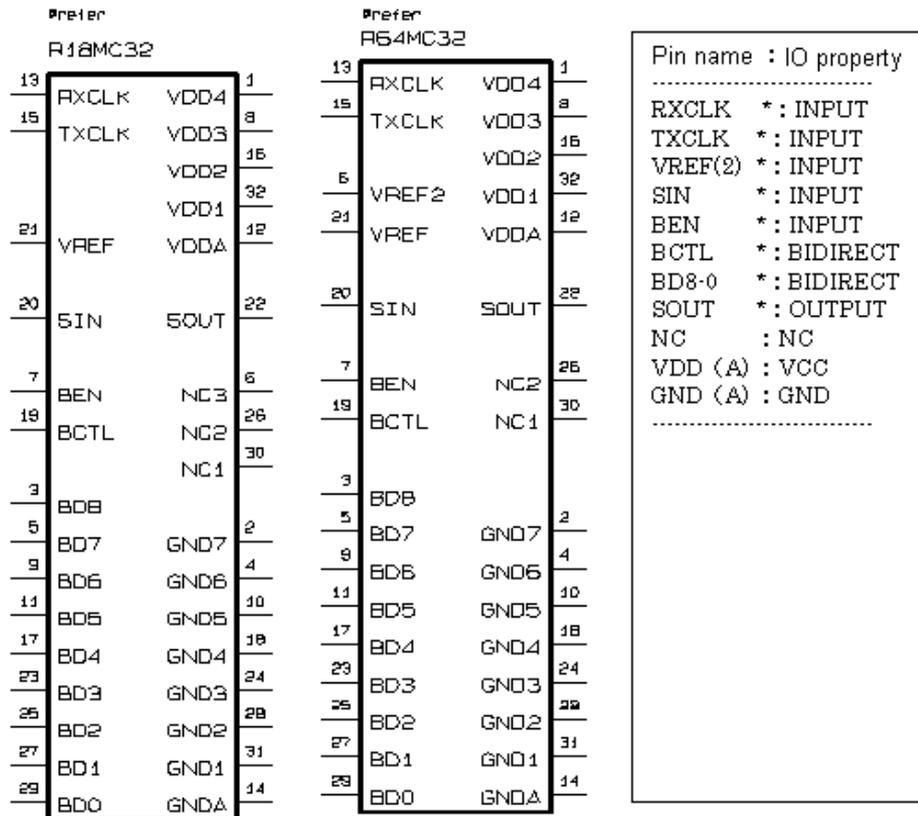
Left chart is 18M bit and right chart is 64M bit.

Rectangle:
  Width: 24.0 pitch
  Height: 80.0 pitch
  Line type: 1
  Color:1
Pin:
  Pin corner margin: 2.0 pitch
  Distance between pins: 4.0 pitch
  Pin length: 4.0 pitch
  Line color:1
  Line type: 0
Origin: LeftUpper

Pin names with *mark
must be fixed as pins
to distinguish Rambus signal.
This must be applied
to user's creating symbols.

Symbol property viewer definition / Property viewer for the left side pins
/ Property viewer for the right side pins are the same as those in "8.2.1. ASIC controller".

8.2.3   Clock generator

This section describes about clock generator's symbol shape, pin placement and fixed point of each property value. Standard color of CR-5000 / System Designer is used here.

Symbol shape


```
 reter
 ACLKG8
  1          8
 ─┤EN    VDD├─
           7
        CLK2├─
           5
  3        5
 ─┤X1   CLK1├─
  2        6
 ─┤XO   GND2├─
           4
        GND1├─
```

Pin name : IO property

EN   : INPUT
X1(0)   : INPUT
CLK1(2) : OUTPUT
VCC   : VCC
GND   : GND

Rectangle:
  Width: 16.0 pitch
  Height: 20.0 pitch
  Line type: 1
  Color:1
Pin:
  Pin corner margin: 2.0 pitch
  Distance between pins: 4.0 pitch
  Pin length: 4.0 pitch
  Line color:1
  Line type: 0
Origin: LeftUpper
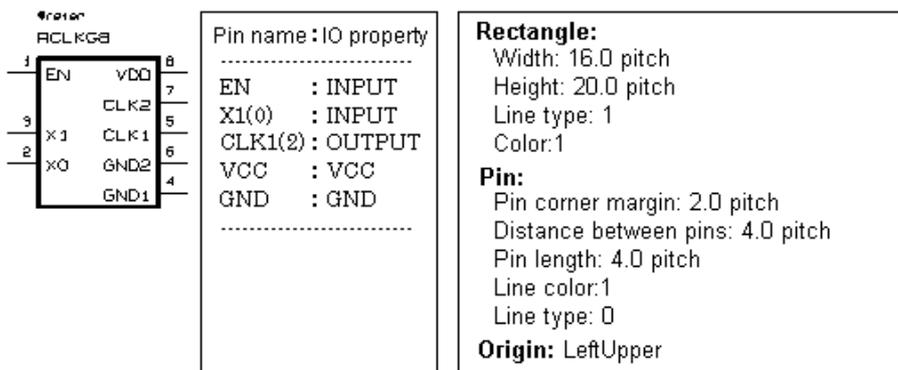
Symbol property viewer definition / Property viewer for the left side pins
/ Property viewer for the right side pins are the same as those in "8.2.1. ASIC controller".

8.2.4   Regulator

This section describes about 3 terminals regulator's symbol shape, pin placement and fixed point of each property value.

Symbol shape

Pin name: IO property

VIN   : INPUT
VOUT   : OUTPUT
ADJ   : BIDIRECT

Rectangle:
Width: 16.0 pitch
Height: 8.0 pitch
Line type: 1
Color:1

Pin:
Pin corner margin: 2.0 pitch
Distance between pins: 4.0 pitch
Pin length: 4.0 pitch
Line color:1
Line type: 0

Origin: LeftUpper

Symbol property viewer definition:

	fontNo	X-axis	Y-axis	Fixed point	Angle	Color	Display
Part name	3	4.0	4.0	LowerLeft	0	7	ON
Reference	2	4.0	7.0	LowerLeft	0	14	ON
Entity	1	14.0	-8.0	LowerLeft	0	6	OFF
author	1	14.0	-10.0	LowerLeft	0	5	OFF

Property viewer for the left side pins /Property viewer for the right side pins are the same as those in "8.2.1. ASIC controller"

Chapter 9   Examples Of .ruf File Output

This chapter shows examples of .ruf output with or without Rambus components category on a circuit data.

Output from a circuit data without Rambus components category

```
(Japanese_coding: sjis)
(design xxxx.cir
   (header)
   (rule
       (net        "NetName" ..... )
       (netlistAttribute .... )
       (assign ...... )
)
```

Output from a circuit data with Rambus components category

```
(Japanese_coding: sjis)
(design xxxx.cir
   (header)
   (rule
       (net        "NetName" .. )
       (netlistAttribute .... )

       (assign
           (comp "ICxxx" " PartName.")
           (part "Rambus
           (property "rmbsType" " Property-value"))
           (comp "ICxxx"
           (part "R18MC32")
           (property "rmbsType" "RMBS_RDRAM"))
           (comp "ICxxx"
           (part " EP20K100TC144-1")
           (property "rmbsType" " RMBS_CONTROLLER "))
       )
```