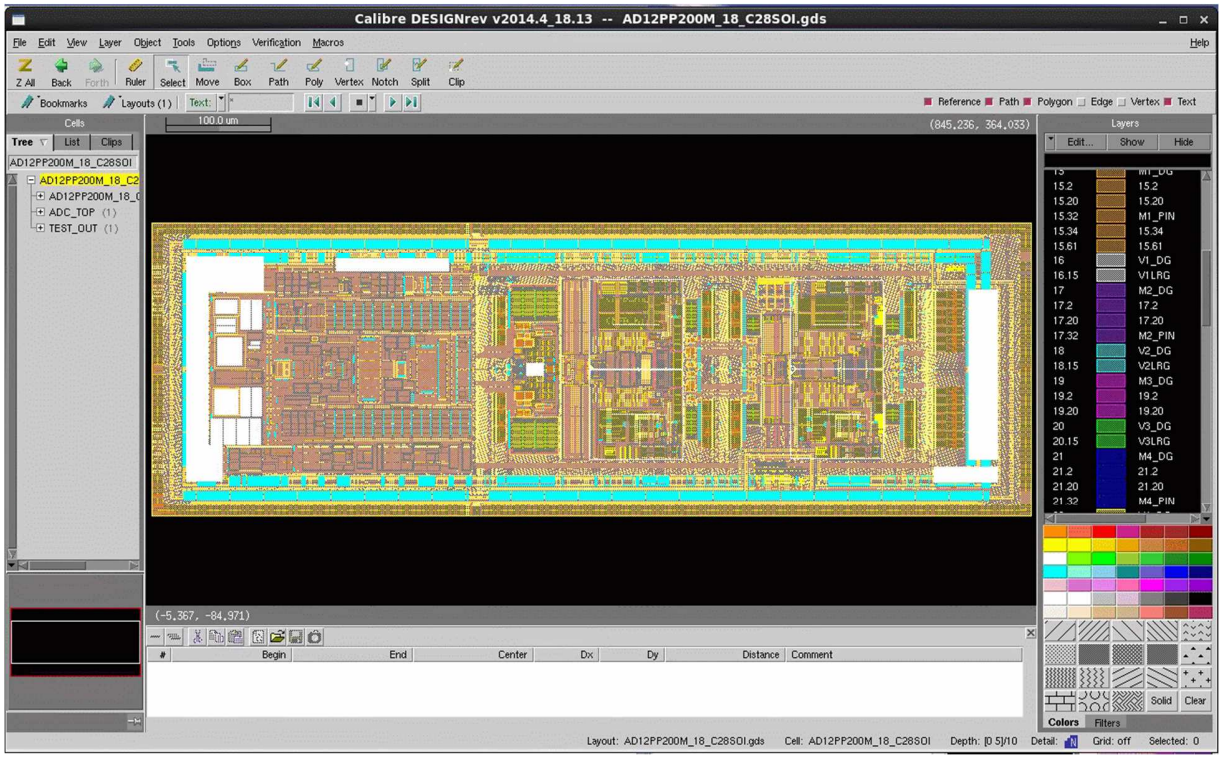
Calibre DESIGNrev features and guidelines

Contents

1. Key features

Calibre DESIGNrev is a powerful layout editor tool for tasks of inspection, integration, assembly and debug on large layout databases. Calibre DESIGNrev runs either in interactive mode or in batch mode.



Calibre DESIGNrev allows:

. Visual inspection of layout databases

. Powerful TCL-based programming for layout manipulation, layout assembly and layout finishing tasks

. Basic edition in interactive mode

. Design verification and debug with integration of Calibre physical verification tools

. Quick extraction of data on layout databases

2. Features description by purpose

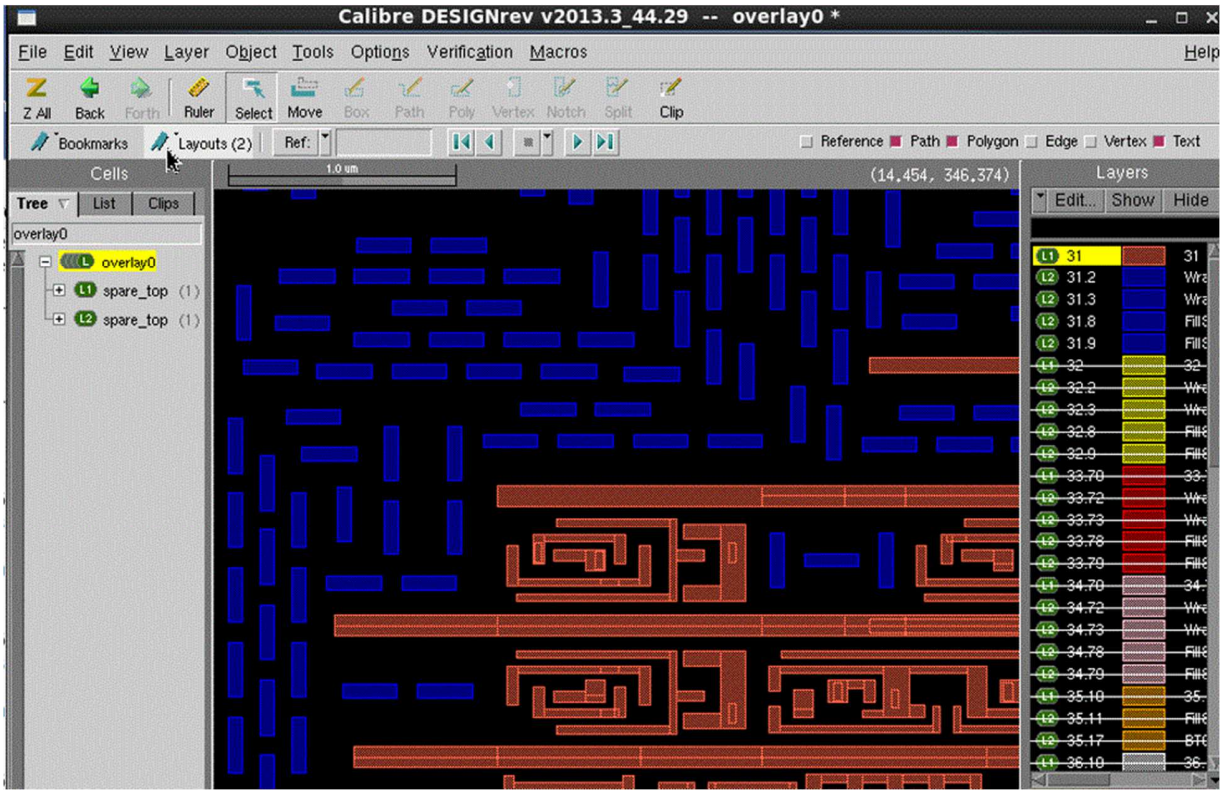
2.1. Features for visual layout inspection

. Fast loading of standalone layout database. No technology file or library creation are needed.

. Capacity for loading large design databases.

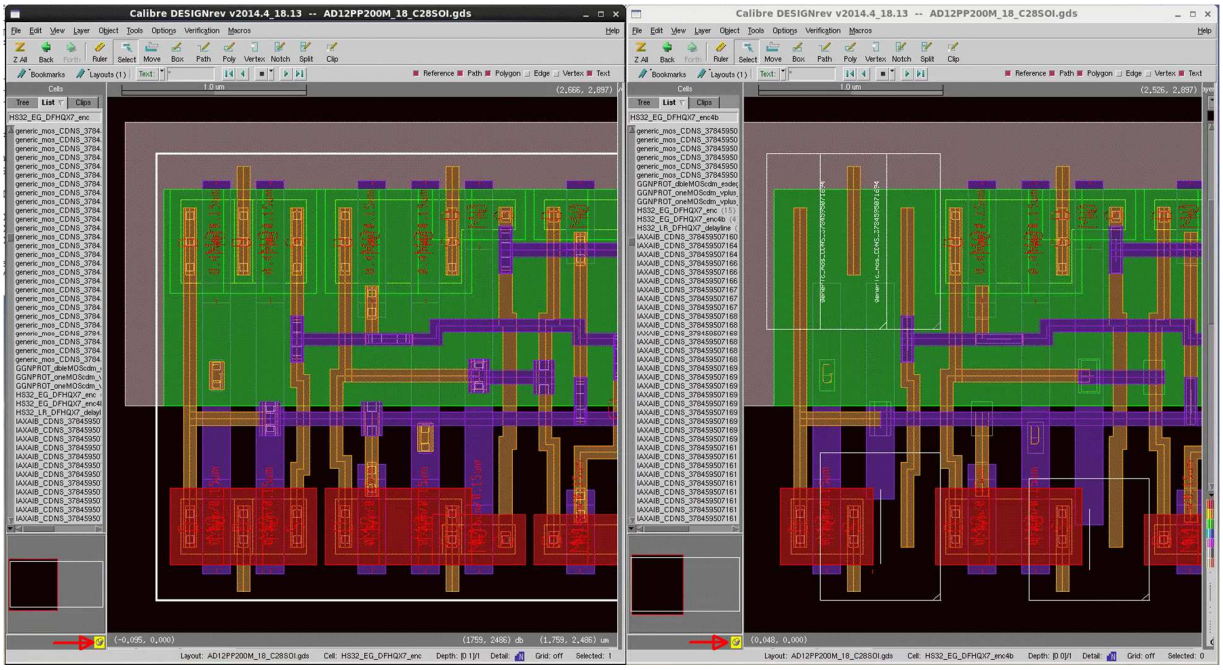
. Overlay of layout databases. Superimposition of layout allows visual comparison of layout files. Full details of layout databases are rendered. Editing commands are accessible.

Either in batch mode: calibredrv -m file1 ... fileN -overlay , or in GUI: File>Overlay.



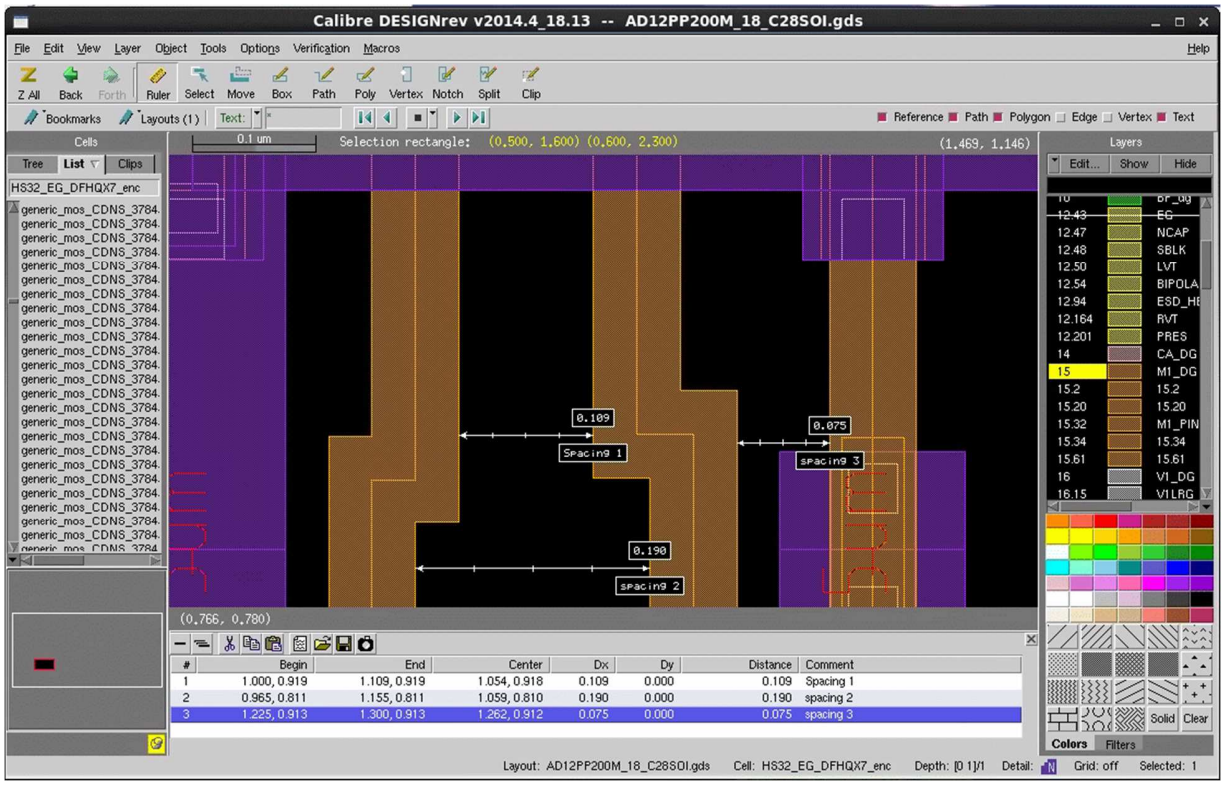
. Synchronized navigation of layout databases. In this mode, 2 or more layout windows are refreshed simultaneously while navigation with panning or zooming is exercised on one of these windows.

In GUI, open first layout, File>Open new window, load second GDS, select pin at bottom of each layout windows. The displays are synchronized for zoom, pan.



. Incremental loading. Calibre DESIGNrev allows selective loading in memory and drawing. This is valuable for focused inspection on parts only of a huge and mostly flat database. Typical application is debug of DRC errors.

. Rulers annotation for screenshots. This is for design documentation activities.



In GUI, View>Show Ruler Palette. In ruler palette at bottom, edit comment field. The comment appear next to the ruler measurement. Ruler palette also allows to save rules in a file, for future restore.

. Fast XOR: This function allows mask-level comparison of two layout databases.

. Creation of custom macros.

2.2 Features for layout manipulation by scripts

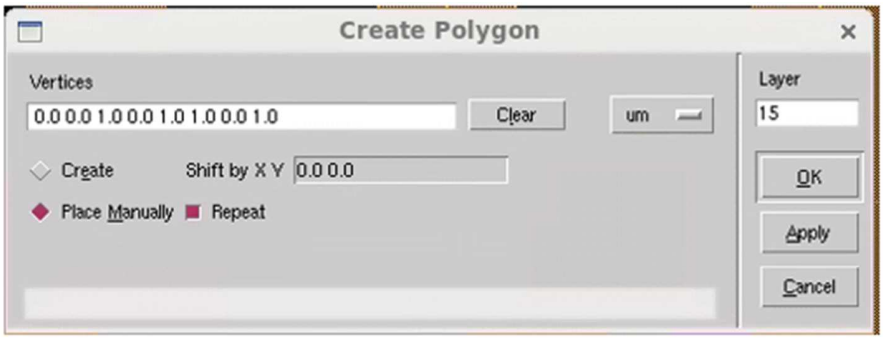
. Layout database assemblies: This feature is suitable to various assembly steps: merge of GDS from place and route and GDS of standard cells, merge of metals fills databases with design databases, … The command "layout filemerge" is rich of options that allow cells manipulation (renaming), layer manipulation. For optimized turn-around time, it is a disk-based operation that merges layout databases without loading them in machine memory

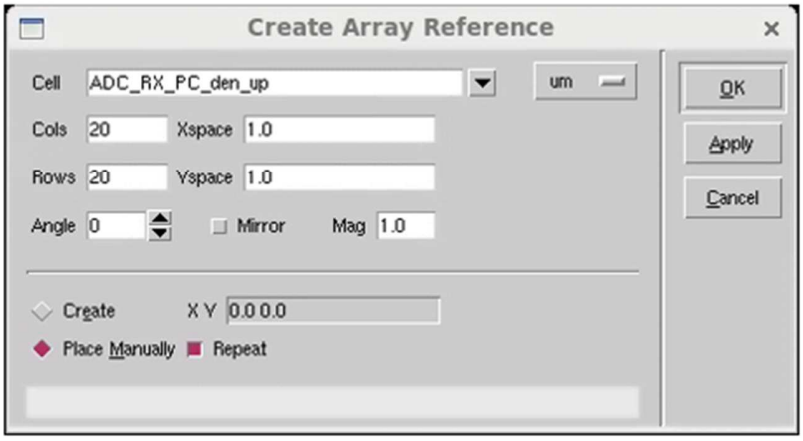
. TCL-based scripting allows layout database processing with a rich set of commands. Applications are, but not limited to: Cells substitution, copy of objects, selective flattening, grid snapping, text modification.

. Layout database processing in batch mode allows not only transformation of design, but also retrieval of information (text, layout hierarchy,..)

2.3 Basic Interactive edition

. Interactive creation, modification or deletion of objects: cells, polygons, path, text, properties.

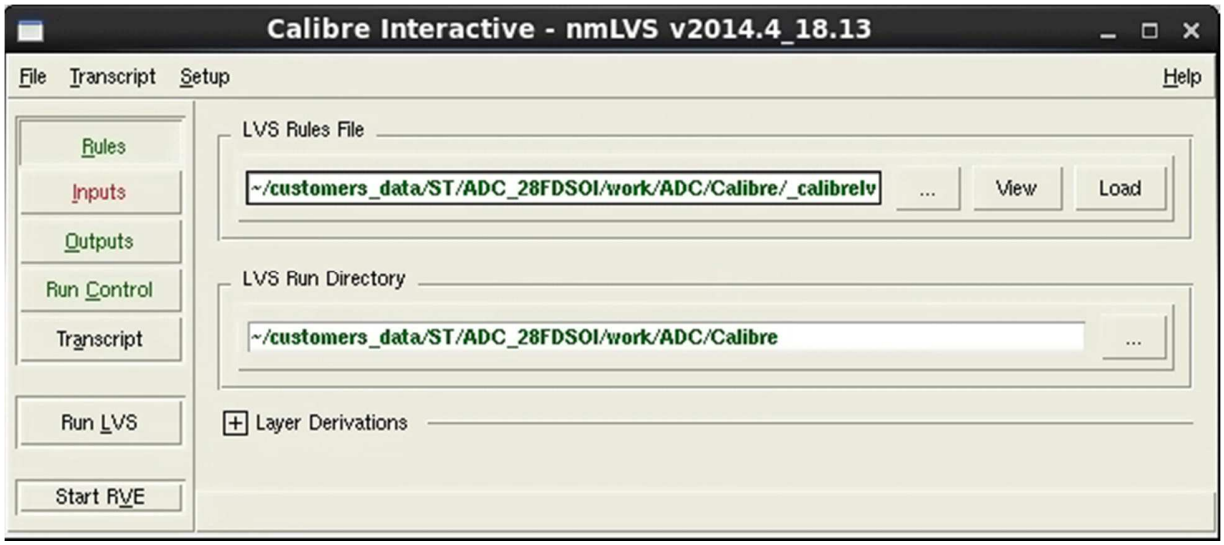




. Use of custom macros

2.4 Design verification

. Calibre Interactive can be launched from Calibre DESIGNrev, it is a cockpit to run Calibre LVS, Calibre DRC, Calibre DFM, Calibre PERC. Batch results inspection and cross-probing to layout are made with Calibre RVE.



. Calibre Realtime offers on-the-fly DRC checking while editing a layout

2.5 Quick findings on layout database

"layout peek" is a batch command that allows finding objects in layout database, for example: topcell, text on a named cell, properties and property values of all cells.

Finding topcell: calibredrv -a layout peek adder_4.gds -topcell

Dumping text of adder_4 : calibredrv -a layout peek adder_4.gds -celltext adder_4

Dumping time of last modification of GDS: calibredrv -a layout peek adder_4.gds -lastmodtime

3 Getting started

3.1 Import/Export Layout database formats

Calibre DESIGNrev imports these formats: GDS, Oasis, OpenAccess, Milkyway, LEF/DEF

Calibre DESIGNrev writes only to these formats: GDS, Oasis.

GDS and Oasis import with menu File>"Open Layout Files…"

MilkyWay, OpenAccess, LEFDEF import with menu File>"Open Database…"

3.2 Operation modes of Calibre DESIGNrev

Interactive Mode: Access to GUI. Invocation is: calibredrv . Although most tasks are performed with menus of the CalibreDESIGNrev window, command options are still available in the shell, ie for

loading a layout database, executing a TCL script at start, restoring clips, loading Calibre RVE database, creating overlays,...

Interactive Shell mode: No GUI. TCL commands given directly to interpreter. Invocation: calibredrv -shell

Batch: Calibredrv <script.tcl>

Batch GUI. Allows pop-up of TK commands within execution of a TCL/TKscript. Invocation: calibredrv <script.tcl> -gui

Command. Execution of a single command. For example, a merge in batch mode of layout databases.

Invocation: calibredrv -a command

3.3 Resources definition

Calibre DESIGNrev stores resource/configuration files in $HOME/.calibredrv_workspace. Alternate path location can be set with environment variable MGC_CWB_CONFIG_DIRS

Calibre DESIGNrev launches Calibre physical operations (XOR, DRC, LVS, RVE) in $HOME/.calibredrv_workspace/tmp. On large databases, disk quota limitations may be faced. Alternate path location can be defined with environment variable MGC_CWB_TMP_DIR

Calibre DESIGNrev incremental loading (local viewing on huge databases) requires creation of a Cache file. By default, creation is at location of layout database. Alternate location can be specified with environment variable MGC_CWB_PCR_PATH

Transparent start-up script: CalibreDESIGNrev loads automatically the file $HOME/.signaext . This file can be populated with "source" of TCL scripts

Layer definitions: stacking, naming, colors, filling. A clone of the virtuoso setup is provided within the kits **(PATH?)**. Loading operation is: Layer>Load Layers Properties. Otherwise, re-generation of only mapping of names on layer numbers is possible with Layer>Load input SVRF Layer Names...

Bindkeys: Calibre DESIGNrev features a set of pre-defined hotkeys for navigation on the layout. For bindkeys equivalent to native bindkeys inVirtuoso, copy ~/.calibre_workspace/keyprefs.template into ~/.calibre_workspace/keyprefs

Calibre DESIGNrev product requires calibreDESIGNrev license feature. Other product licenses are needed when Calibre physical verification tools are run under Calibre DESIGNrev: Calibre RealTime, Calibre DRC,...

3.4 Documentation

. Calibre DESIGNrev Layout Viewer User's Manual for main documentation except scripting

. Calibre DESIGNrev Reference manual for documentation of batch commands

. On-line YouTube "How-to" videos about common tasks using Calibre
https://www.youtube.com/user/ICNanometerDesign

4. Features description

4.1 Loading large databases

Machine memory requirement is approximately 1.5 times the size of unzipped GDS.
Run Calibre DESIGNrev on a machine with enough memory. For finding size of unzipped GDS, use:
gunzip -c <GDS file> | wc -c

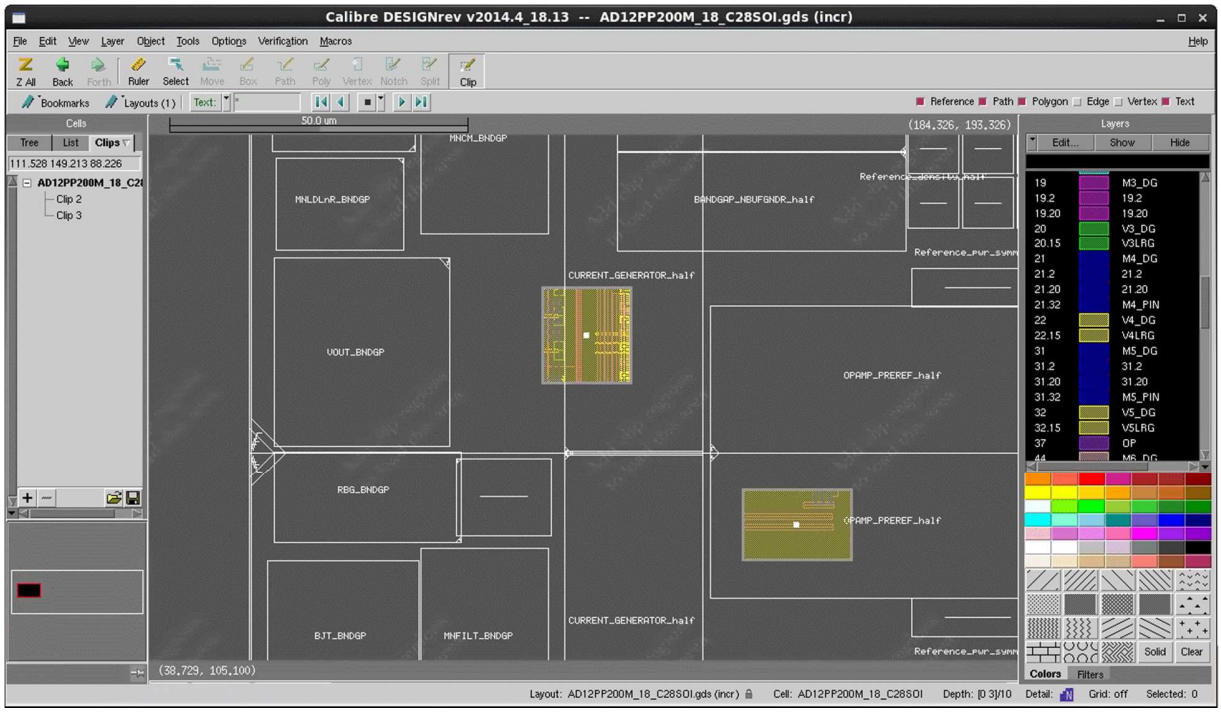
By default, Calibre DESIGNrev is multithreaded and runs on maximum number of threads

Use -I option of bsub to monitor the transcript. Check Instantaneous Disk Access Rate to predict the load time: Total time IDAS times the size of GDS. Network transfer is the runtime bottleneck at loading.

For faster navigation: monitor memory usage bar, enabled with Option>misc preferences>show memory usage. View details should remain "Normal". "High" is slower (blue icon at bottom of Calibre DESIGNrev window). Use <ESC> key to stop screen updates, when necessary.

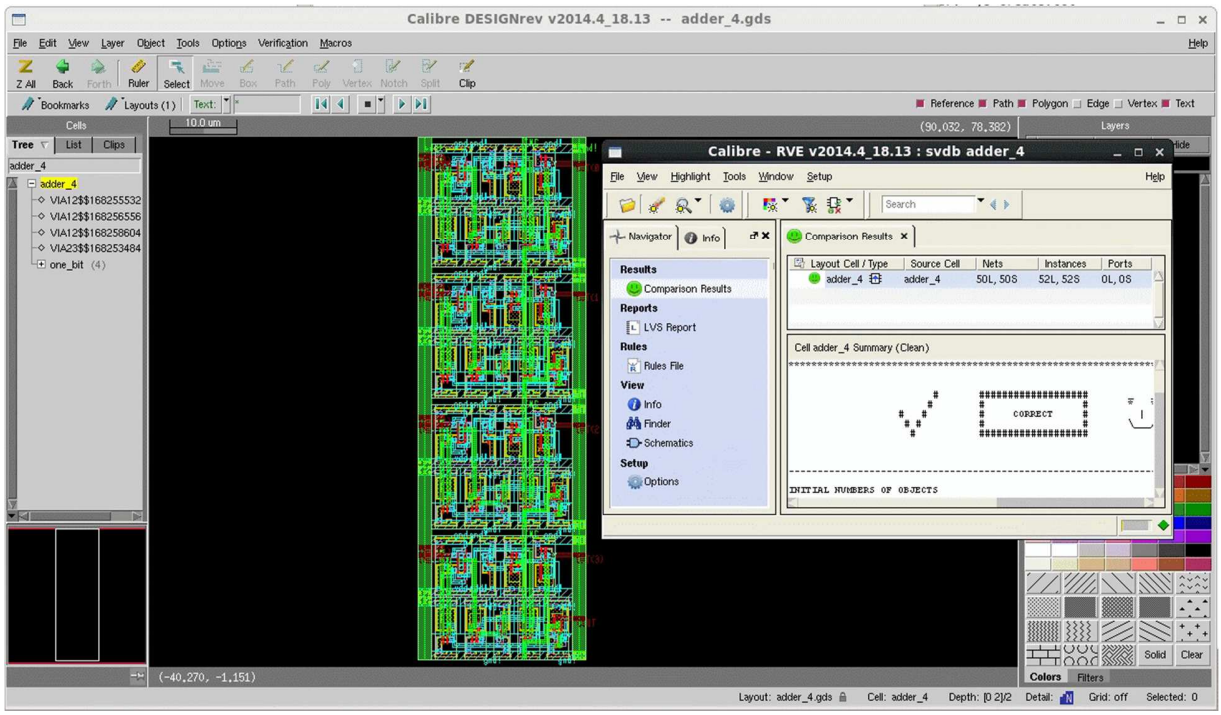
4.2 Incremental loading

Take benefit of incremental loading for viewing small areas of interest on huge or flat layout databases, for example at location of a DRC error. The creation of a layout cache file is needed upfront, in current directory or at location pointed by variable MGC_CWB_PCR_PATH. Invoke: calibredrv -a layout create <GDS_file> -incr . To open the layout in incremental mode, launch Calibre DESIGNrev GUI. File>Open Layout Database. Instead of clicking Open button, click on the adjacent dropdown button and choose "Open incrementally". Or in command line, use calibredrv -m <GDS_file> -incr . At layout loading, the layout window is grey and displays only the hierarchy of cells, without content. User-Defined content viewing is triggered by clips definitions, from Clip action button. A clip menu is populated in left window, in order to manipulate clips, ie save/restore them. Alternatively, a halo of layout objects is automatically created around errors selected from Calibre RVE result database.



4.3 Interface to Calibre RVE

Calibre RVE result database can be loaded at Calibre DESIGNrev GUI invokation (option -rve) or later in menu Verification>Start RVE.



Alternatively, it is possible to launch DESIGNrev after standalone RVE session started, and link the

RVE session to DESIGNrev. In RVE menu, Setup>Design Tools>, select "Layout Design Tool" "Mentor Graphics (DESIGNrev/WORKbench)", click "Connection" sub-menu. Populate "Host Name" in case it is not localhost. Socket Number is 9189.

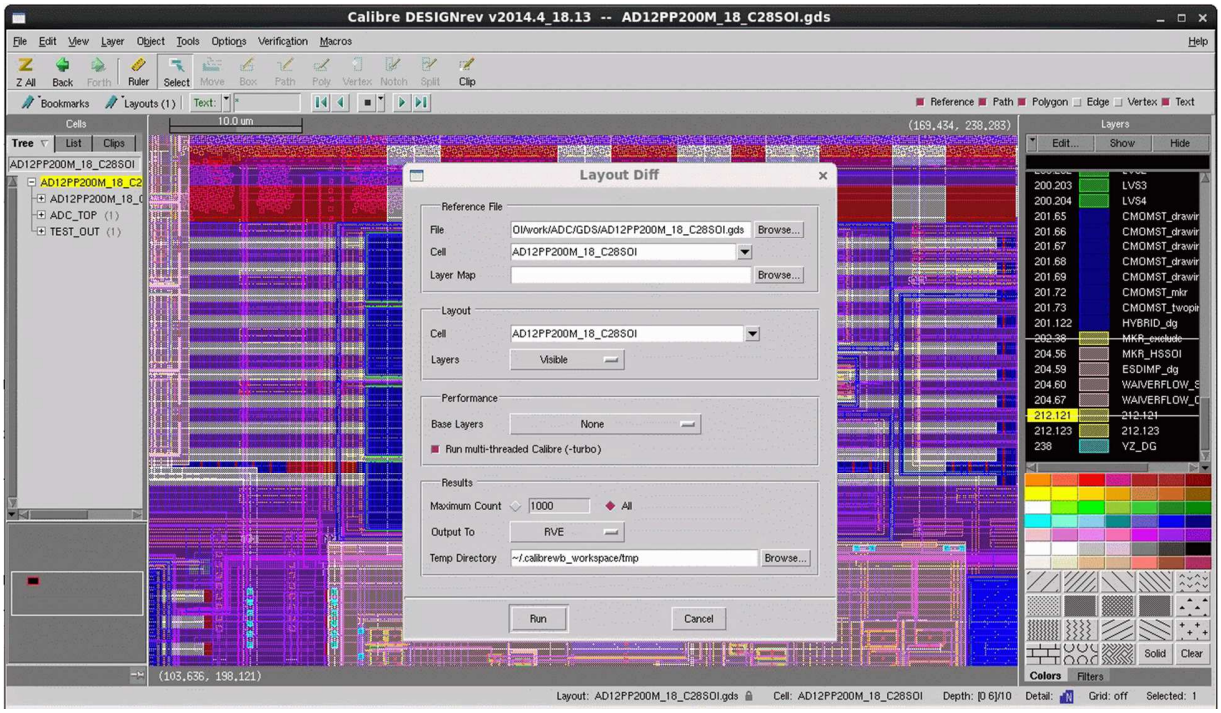
Setting of Highlights from RVE: The control of highlights of RVE results is in RVE, not DESIGNrev. RVE menu Setp>Highlighting has numerous options. For instance: "Highlight DRC results in context" to report a DRC error in the cell it belongs to, not the topcell. "Show Properties" to display property names and values in the layout editor.

For a complete documentation on Calibre RVE settings, please refer to "Calibre Interactive and Calibre RVE User's Manual" - calibre_inter_user.pdf.

4.4 Fast XOR

Fast-XOR allows comparison of shapes of two layout databases. For instance, to check that two versions of a layout are identical.

In GUI, Tools> Layout diff...



Alternative access for Fast-XOR

1 The fast-XOR may be launched also from Calibre Interactive for DRC.

2. Batch mode: in command line, use "dbdiff -write_xor_rules" in command line. A Calibre DRC deck is created. Calibre H-DRC to run with option -fx

Beware that Fast-XOR requires a couple of Calibre DRC-H licenses. Fast-XOR is a mask-level

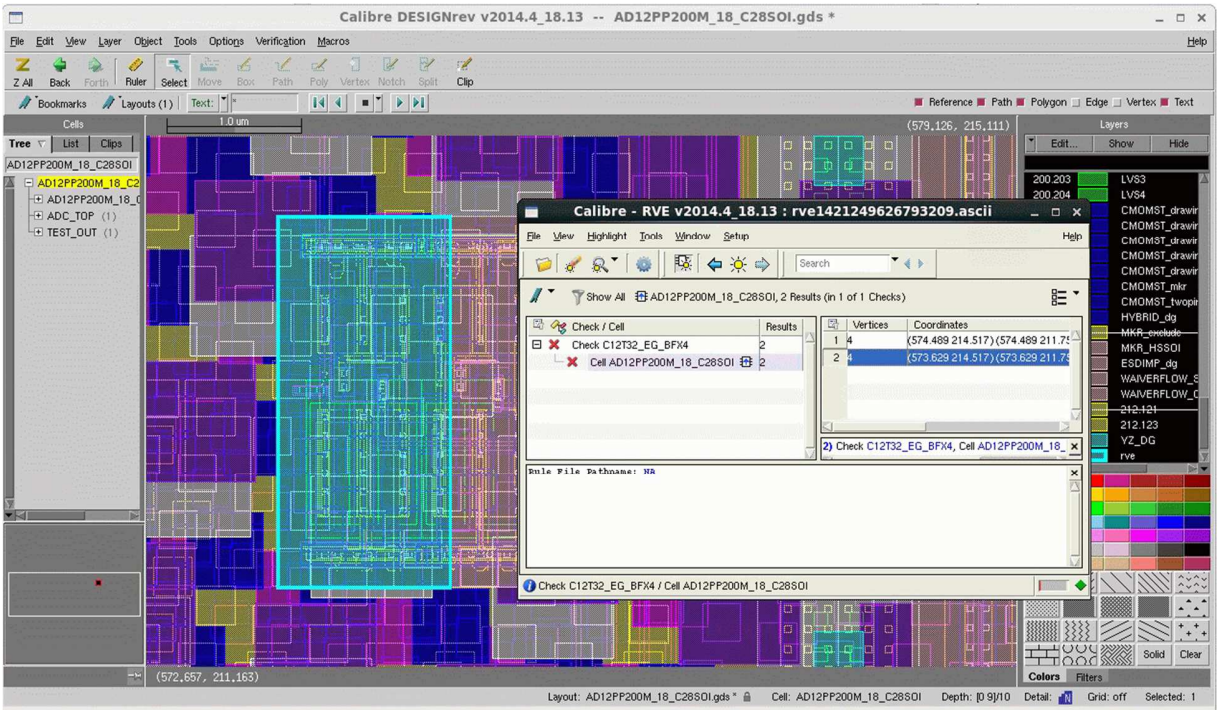
comparison of databases. After a fast-cell-by-cell comparison of the design, differences are exported to Calibre DRC for hierarchical XOR on each layers. Fast XOR is ideal when design hierarchies are similar and shapes differences are not huge. Otherwise, please use regular dbdiff utility. dbdiff compares shapes, properties, instances and text of both GDS. This cell-by-cell comparison are more difficult to interpret than Fast XOR

For a complete documentation Calibre Fast XOR, refer to "Calibre Verification User's Manual" chapter 8 Fast XOR Layout comparision (calibr_ver_user.pdf)

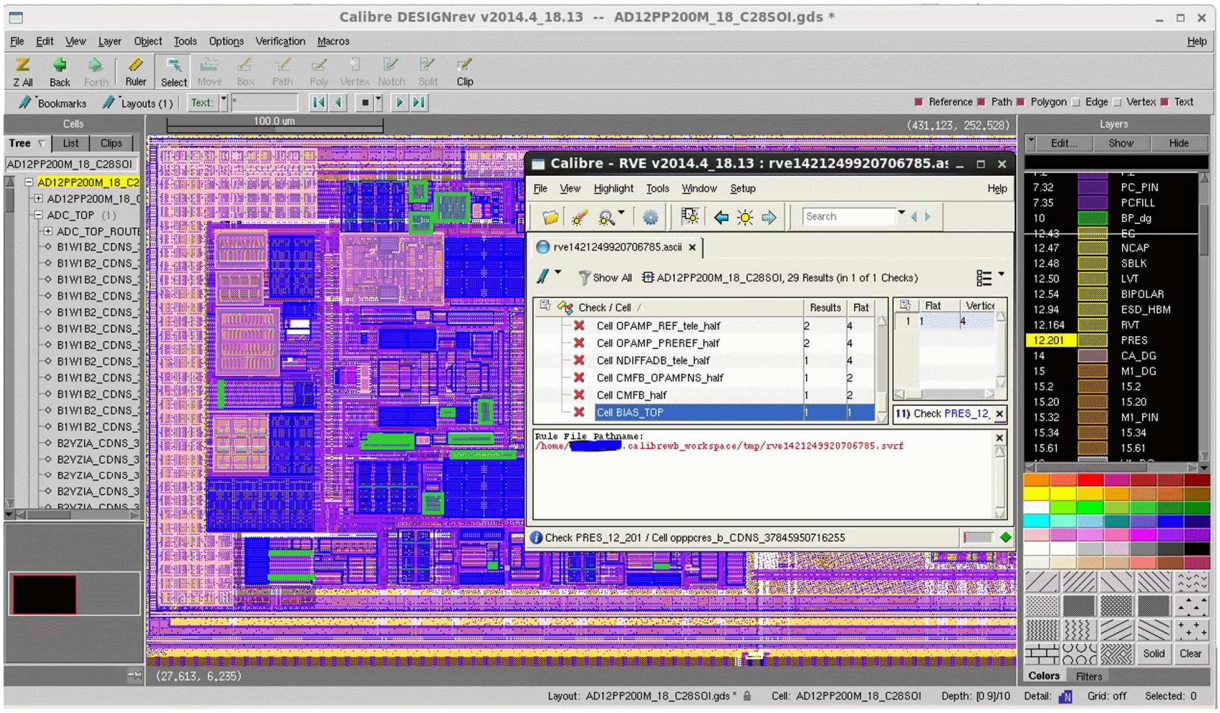
For a complete documentation of DBdiff, Refer to "Calibre Verification User's Manual", chapter 19 Layout comparision with DBdiff

4.5 Scan with RVE

Tools>Scan with RVE is a way to spot objects on a layout database, and step through findings. Scan Reference with RVE allows to spot references of a user defined cell name within the viewed cell. Calibre RVE lists all objects found, selecting them in RVE provides their highlights with zoom on the layout view of Calibre DESIGNrev.

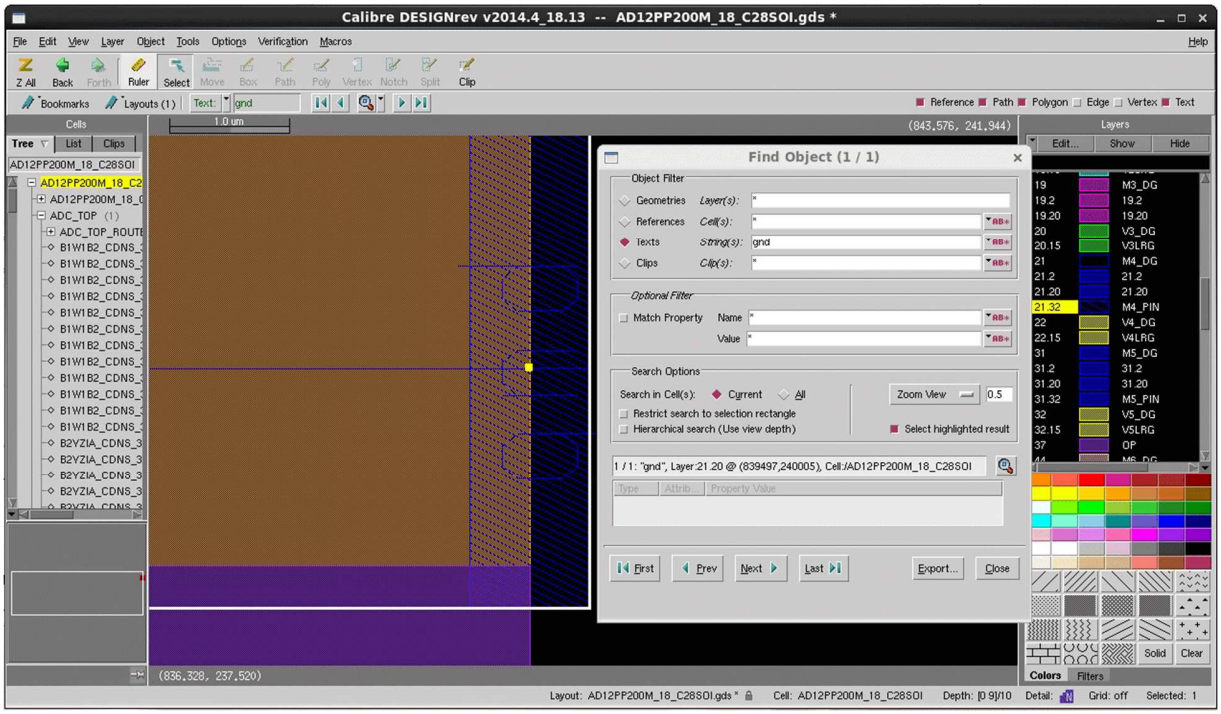


Tools>Scan Layer with RVE (hierarchical or flat) allows to spot all objects on the currently selected selected layer(s). The operation is similar to a Calibre (H)DRC OR operation on the layer(s) and highlight all. This feature is helpful for spotting small objects.



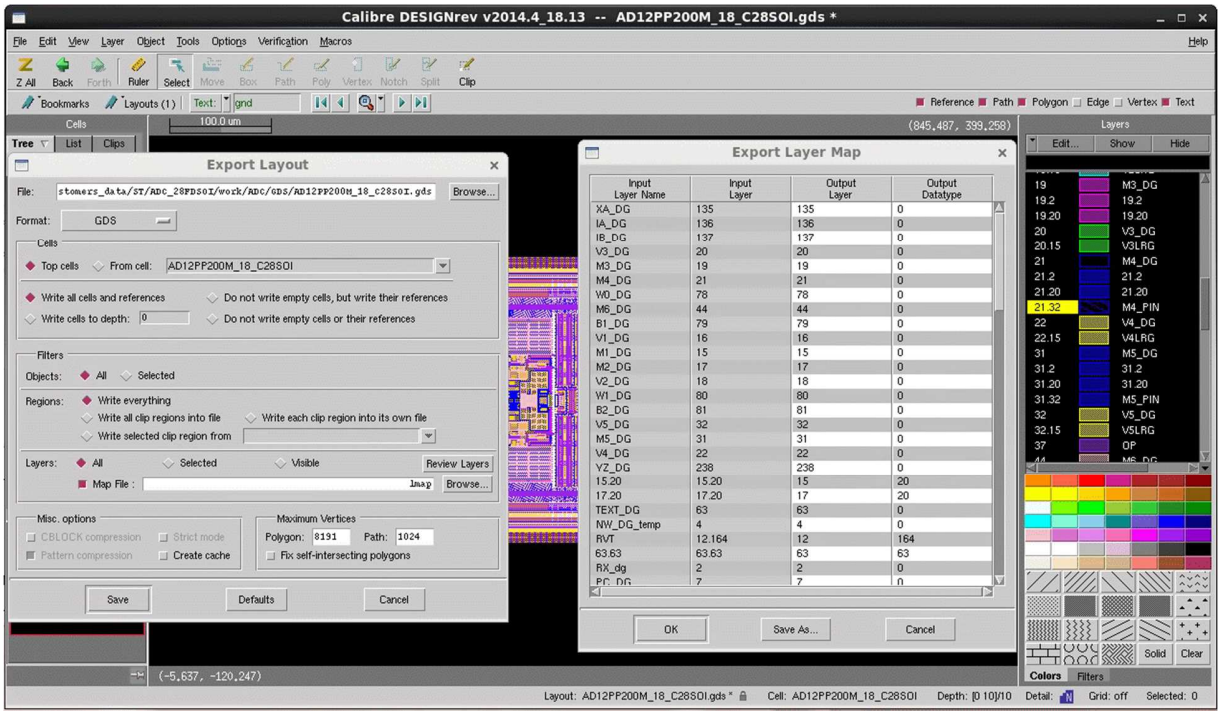
4.6 Find Object

The menu Object>Find Object… allows to spot geometries, references or text on the viewed cell. Wildcards may apply. The search may occur on current cell or its hierarchy (entire or subset). User may select to zoom on found objects.



4.7 Export cell

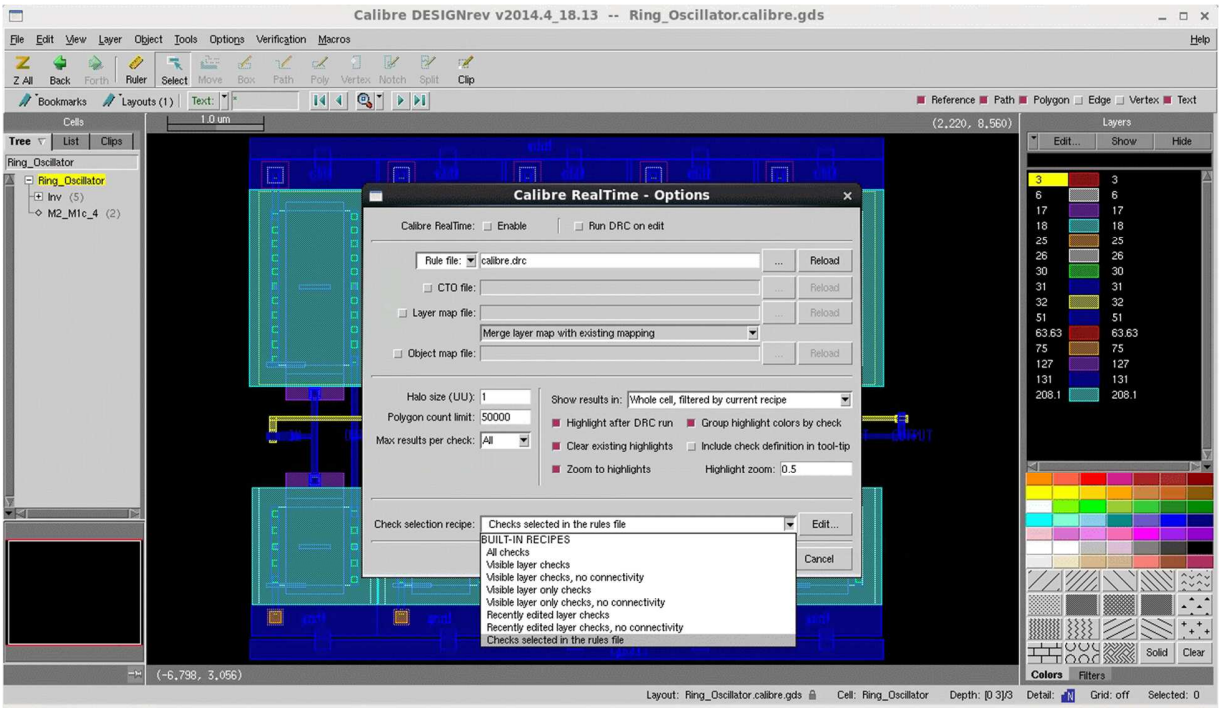
The menu File>Export Layout allows primarily to output a layout database in GDS or Oasis format. It is also possible to output shapes in RDB format - Result DataBase format of Calibre RVE.
Top cell is user-defined. Hierarchy depth and management of empty cell are controllable. A layer mapping is possible. Selection of layers is possible (among mask and RVE highlights, or filter by active layer).



4.8 Calibre RealTime support

Calibre RealTime delivers on-the-fly DRC verification, using Calibre DRC deck, for much improved layout implementation productivity, especially at meeting multiple-patterning constraints. Calibre RealTime runs in flat mode on less than 3 million shapes (50K for instantaneous results). A Calibre RealTime product license is needed, and products version 2012.3 or later.

In Calibre DESIGNrev menu: Tools>RealTime Options, enable RealTime and specify path variable **xxxxxxx** to DRC deck. A Calibre RealTime banner appears in DESIGNrev, enabling access to DRC recipe selection and tools options. "DRC on edit" is a mode for DRC check right after each change of a shape of the layout. It works seemlessly in Calibre DESIGNrev. Default mode is to apply DRC on demand with button (Run DRC) or F12.



After Calibre RealTime is setup, a new bar comes up in Calibre DESIGNrev, for browsing of DRC errors

5. Layout assembly

5.1 Generic remarks

- GDS, OASIS, and mixed formats supported as input
- GDS and OASIS supported as output (but GDS output requires all inputs to be GDS)
- Zipped db (gds.gz or oas.gz) supported as input and/or output
- Temporary files may be created (e.g. when working with zipped db), set directory using the following option (defaults to MGC_CWB_TMP_DIR variable if exists, current directory otherwise)
  -tmp ./

5.2 Merge FEOL/BEOL tiling & EMETRO with db

Description

- Merge SmartFill-created FEOL/BEOL tiling & EMETro with db
- Create a super topcell which instanciates all original topcells

Command

- Shell/script:

```
layout filemerge -createtop TOP \
```

```
  -in input.gds \

  –in tiling_FEOL.gds –in tiling_BEOL.gds –in emetro_FEOL.gds
–in emetro_BEOL.gds \

  -out output.gds
```

- Batch:
```
calibredrv –a layout filemerge ...
```

5.3 Top level assembly flow

Description

- Merge blocks with TOP hierarchy db
- Rename cells having same name but different content (optionally ignore text and/or properties when checking content)
- Remove unreferenced cells (2014.4 QR or later release required)

Command

- Shell/script:
```
layout filemerge –mode rename -smartdiff [-ignoretext] [-
ignoreproperty] –topcell TOP –verbose \

  -in TOP_empty.gds \

  –in block1.gds –in block2.gds [-in ...] \

  -out TOP_full.gds
```

- Batch:
```
calibredrv –a layout filemerge ...
```

5.4 Library update

Description

- Replace cells by their new version if any (if a cell exists in multiple libraries, keep version from last library, unless specific library specified)
- Remove unreferenced cells (2014.4 QR or later release required)

Command

- Shell/script:
```
layout filemerge –mode overwrite [-preserve lib1.gds cell1 –
preserve ...] –topcell TOP –verbose \

  -in TOP.gds \

  –in lib1.gds –in lib2.gds [-in ...] \

  -out TOP_updated.gds
```

- Batch:
```
calibredrv –a layout filemerge ...
```

5.5 Export a subset of layers from db

Description

- Export only a set of layers (or all layers but a certain set) from db
- Optionally remove empty cells
- Note: x.y stands for layer x datatype y; x stand for layer x datatype 0 (and not any datatype)

Command

- Shell/script:
```
layout filemerge –include_layer | -exclude_layer 31.1 31.2 255
... [-noemptycells 1] \

  -in input.gds \

  -out output.gds
```
- Batch:
```
calibredrv –a layout filemerge ...
```

5.6 Build layout from subset of multiple dbs

Description

- Select subset of layers in multiple dbs and merge them
- Optionally increment some layer numbers
- Optionally remove empty cells
- Optionally create a super topcell which instanciates all original topcells
- Note: x.y stands for layer x datatype y; x stand for layer x datatype 0 (and not any datatype)

Command

- Shell/script:
```
layout filemerge [-noemptycells 1] [-createtop TOP] \

  -infile {–name input1.gds [-layer_bump 100] –include_layer
...} [-infile ...] \

  -infile {–name input2.gds [-layer_bump 200] –exclude_layer
...} [-infile ...] \

  -out output.gds
```
- Batch:
```
calibredrv –a layout filemerge ...
```

5.7 Removal of overlapping fill shapes after an ECO

Layout filtershape is a power batch command that allows removal of shapes in a layout, ie fill shapes, after an ECO on layout database. This is a 2 steps approach

- Perform a XOR between original and modified layout
- Create a batch script that for each layer performs a removal of shapes that are in the RDB:

```
layout filtershapes -in post_ECO.gds -filterfile XOR.rdb -
maplayers { { -filter XOR_L31_D0 - filllayers { 31.3 31.2 } -
halo 0.2 } } -out out.gds
```

6. Macros

Calibre DESIGNrev supports macros programmed in TCL and based on a powerful set of API. Macros can be accessed from the Macro menu or additional custom menu. Some macros are native in the tool, and additional macros are available from the kit. The additional macros are loaded thanks to a startup file wbinit.tcl of the design kit, containing: **source /path/to/DK/DRV_utilities_mx.tcl** of the design kit. When equivalent batch script exists, location is directory: **/path/to/DK/batch**

6.1 Native macros for Layout review (Macros Pulldown menu)

CALCULATE AREA

Description

Calculates the total area of the selected objets, in addition to the area of the selected objets for each layer. Areas are in square microns.

Interactive Usage

(1)Use regular Select capabilities to select one or more objects. Objects may be located on different layers. Shapes are rectangles, polygons or paths.
(2) From the toolbar, select Macros>Calculate area. Area values are displayed in a pop-up window.

GRID CHECK

Description

Checks to see if objects are on grid.

Interactive Usage

(1) View the cell to be checked.
(2) From the Toolbar, select Macros> GRID CHECK
(3) In the pop-up menu, select grid size value, output layer for shapes in error, select if check in cell only or also in whole hierarchy under.

WRITE HIERARCHY

Description

Writes a cell's hierarchy to either the transcript or a separate file.

Interactive Usage

(1) Open a layout

(2) From the toolbar menu, select Macros>WRITE HIERARCHY

(3) Fill fields of pop-up menu: Name of the topcell (pre-populated with current cell in view), write full paths or not, output to transcript or a file, optionally file name.

6.2 Additional macros for Layout review

MARK POLYGONS

UNMARK POLYGONS

Description

Places a visible “marker” (a square white box) on a vertex of all polygons on the selected layers. The marker will maintain the same size regardless of the zoom level. This is useful for locating polygons that are difficult to see when the view is zoomed out.

The MARK POLYGONS macro places the markers on the polygons, and UNMARK POLYGONS removes the markers.

The marker layer in not part of the layout database. If the layout is saved when markers are visible, the markers will not be written to the output database.

When changing the view between different cells, marked polygons should be unmarked before changing the view. This macro is designed to work only in the context of the cell being viewed. If the view is changed to a new cell, the polygon markers will still be visible but will not make sense in the context of the new cell view.

The marker is placed on each polygon as follows. The coordinate pairs of the polygon vertices are searched for the minimum value of X. All coordinate pairs with this value of X are searched, and the pair with the lowest value of Y is selected for the marker placement. If the polygon is a rectangle, this will cause the marker to be placed at the lower left corner.

Interactive Usage

A layout must be loaded and displayed in the current window.

To mark polygons:

(1) In the layer palette, select the layer(s) on which the polygons are to be marked.

(2) Click Macros > MARK POLYGONS

(3) The markers will appear on each polygon on the specified layer(s).

To remove polygon markers:

(1) In the layer palette, select the layer(s) for which the markers are to be removed.

(2) Click Macros > UNMARK POLYGONS

(3) The markers will be removed on each polygon on the specified layer(s).

PRINT TOP_LEVEL TEXT

Description

Dumps the text present in the cell under display to the Calibre DESIGNrev shell window

Interactive Usage.

(1) Open the cell of interest

(2) From the toolbar, select Utilities>Print top-level text

GET POINT INFO

Description

Displays properties of shapes under the cursor.

Interactive usage

(1) Open a cell of interest for viewing.

(2) Select any object use by use left mouse to click on any object.

(3) From the toolbar, select Utilities>Get point info

(4) It will show you the basic object info include the object type and object hierarchy.

GET CELL INFO

Description

Display the name of the leaf cell at user-defined location, along with the full path from Topcell of the design.

Interactive Usage

(1) Open a cell of interest.

(2) Position the cursor and click

(3) From the toolbar, select Utilities>Get cell info.

CCTT

Description

Dumps the leaf cell name and path at designated location

Batch Usage

The script cctt.tcl can be used to display leaf cell information
% calibredrv cctt.tcl <input-gds> <dbu-coord-file>
<dbu-coord-file> contains one or more coordinates (1 per line) in database unit

6.3 Native macros for Layout edit (Macros Pulldown menu)

CUT REGION

Description
Cuts a selection region to a user-specified layout file. Only the polygons that are fully within the selected region are kept. Shapes cutting a boundary are not included. Output layout file contains a flat cell, in GDS format.

Interactive Usage
(1) View the cell for edition
(2) Make sure the depth of visible hierarchy is in line what you expects for depth in the final result
(3) Draw a selection rectangle on area of interest - ie From toolbar menu, select Select and draw rectangle
(4) from toolbar menu, Select Macros> CUT REGION (5) in pop-up menu, enter the name of output file.

DEBUG TCL SCRIPT

Description
Runs and Debugs a TCL script for execution under tool RamDebugger

Interactive Usage
(1) Start CalibreDRV.
(2) Optionally, load a layout database - depending on input requirements of the script
(3) From Toolbar menu, select Macros>DEBUG TCL SCRIPT
(4) Provide file name of TCL script in pop-up window.
(5) Start execution and debug using menus in RamDebugger window.

EXECUTE TCL SCRIPT

Description
Selects a TCL script for execution. Note that passing arguments to script is not supported.

Interactive Usage
(1) Start CalibreDRV.
(2) Optionally, load a layout database - depending on input requirements of the script
(3) From Toolbar menu, select Macros>EXECUTE TCL SCRIPT

(4) provide file name of TCL script in pop-up window, click Open.

EXTERNAL

Description
Performs EXTERNAL spacing checks on a user-defined layer. The scope of the macro is the current cell, not the cells down the hierarchy. Calibre flat DRC runs transparently. Calibre RVE is not involved. The DRC rule is {e1 = EXTERNAL [in_layer] < spacing_value; EXPAND EDGE e1 BY 0.01} DRC CHECK MAP MY_RESULT out_layer

Interactive Usage
(1) Open a layout
(2) Alternatively, draw a selection rectangle, or select shapes on layer of interest, or select nothing.
(3) On toolbar menu, select Macros>EXTERNAL
(4) In pop-up menu, define the layer of interest (by its number), the spacing value, the output error layer. you may select a check on (whole) cell, select Rectangle or selected objects.
(5) Click Run
(6) Error edges are loaded automatically

Custom macros for Layout edition (Macros Pulldown menu)

6.4 Additional macros for Layout edit (Macros Pulldown menu)

EXPAND CELL

Description
Performs a “flattening” of a cell down the number of hierarchical levels (the “depth”) specified by the user. Specifying a depth of zero results in no changes to the cell. Specifying a depth that exceeds the number of hierarchical levels in the cell causes the cell to be completely flattened to polygons. Sub-cells that are flattened in the process of using EXPAND CELL remain unaffected in other (different) cells in the layout where they are placed.
EXPAND CELL is not recommended for flattening a large layout database as the run time will be excessive. Calibre-DRC will perform much better for such an application.

Interactive Usage
A layout must be loaded and displayed in the current window.
(1) From the toolbar, select Macros > Expand Cell
(2) In the pop-up menu, specify the (case-sensitive) name of the cell to expand.
(3) Specify the depth of the expansion.
(4) Click “Run”. The cell will be expanded.

Batch Mode Usage
The script expand_cell.tcl can be used to run this macro from the command line.
% calibredrv expand_cell.tcl <input-gds-file> <cell-name> <depth> <output-gds-file>

EXPLODE AREF

Description
Converts an array reference (AREF) into a set of single cell references (SREF's).
Interactive Usage
A layout must be loaded and displayed in the current window.

(1) View the cell containing the reference to be expanded.
(2) The hierarchy depth of the current view must be set to zero in order to see the cell references (pressing "0" on the keyboard will set the view depth to zero).
(3) Select the array reference to convert by dragging a selection rectangle (left mouse button) around the array.
(4) From the toolbar, select Macros > Explode Aref.
(5) A pop-up message will appear reporting the name of the cell detected in an array inside the selection rectangle. Click Run to proceed.
(6) The array reference will transform into a collection of individual cell references.

EXTRACT MULTI CELLS

Description
Extracts a set of cells, as defined by a list in a text file, into their own individual GDS files.
This macro requires the user to specify a plain text file containing a list of cells to extract from the layout. The text file should contain one (case-sensitve) cell name per line.
The new GDS files for the extracted cells may be placed in an existing directory, or the user can instruct the macro to create a new directory to hold these files.
Interactive Usage
A layout must be loaded and displayed in the current window.

(1) From the toolbar, select Macros > Extract Multi Cells.
(2) A file browser will pop up. Browse to the text file containing the list of cells to extract, and click Open.
(3) A pop-up menu will appear. Select the directory option to either place the new GDS files in an existing directory or to create a new directory. Click Run.
(4) A file browser will pop up. Browse and select/define the directory to contain the new GDS files.
(5) The cells will be extracted from the layout and their GDS files will be placed in the appropriate directory.

Batch Mode Usage
The script extract_multi_cells.tcl can be used to run this macro from the command line.
% calibredrv extract_multi_cells.tcl <input-gds-file> <cell-list-file> <output-directory>

MOVE CELL ORIGIN

Description
Relocates the origin of a cell to a new (x,y) location specified by the user.
When using this macro, it may be useful to mark the location of the cell origin before and after it is relocated. This can be accomplished in the CalibreDRV window by selecting from the toolbar View > GoTo (or use the hotkey ctrl-period). A pop-up menu will request a coordinate pair and a view

"width". Enter 0 (zero) for X and Y. Enter the width of the window view you desire. Click on the Set Marker switch and Click OK. The location of the origin (0,0) will be marked on the screen. After the MOVE CELL ORIGIN macro executes, the marker will automatically move to the new origin's location.

Interactive Usage

A layout must be loaded and displayed in the current window.

(1) From the toolbar, select Macros > Move Cell Origin.
(2) If desired, display the cell and mark the origin as described above.
(3) A pop-up menu will appear. Enter the name of the cell in which the origin will be moved, as well as the X and Y coordinates of the location of the new origin. Click Run. The cell origin will be moved to the new location.

Batch Mode Usage

The script move_cell_origin.tcl can be used to run this macro from the command line.

```
% calibredrv move_cell_origin.tcl <input-gds> <cell-name> <x> <y> <output-gds>
```

PREFIX CELL

Description

Renames the cells in a layout database by placing a user-specified prefix before each cell name. A switch is provided to control whether or not to rename the top cell.

Interactive Usage

A layout must be loaded and displayed in the current window.

(1) From the toolbar, select Macros > Prefix Cell
(2) A pop-up menu will appear. Enter the character string to be used as the prefix.
(3) A button is provided to select whether or not to prefix the top cell name. The button will initially appear ON (meaning to prefix the top cell name). Click this button OFF if the top cell name is not to be prefixed.
(4) Click Run. All cells will be renamed with the specified prefix.

Batch Mode Usage

The script prefix_cell.tcl can be used to run this macro from the command line.

```
% calibredrv prefix_cell.tcl <input-gds-file> <prefix> <output-gds-file>
```

SUFFIX CELL

Description

Renames the cells in a layout database by placing a user-specified suffix before each cell name. A switch is provided to control whether or not to rename the top cell.

Interactive Usage

A layout must be loaded and displayed in the current window.

(1) From the toolbar, select Macros > Suffix Cell
(2) A pop-up menu will appear. Enter the character string to be used as the suffix.
(3) A button is provided to select whether or not to suffix the top cell name. The button will initially appear ON (meaning to prefix the top cell name). Click this button OFF if the top cell name is not to be suffixed.
(4) Click Run. All cells will be renamed with the specified suffix.

Batch Mode Usage

The script suffix_cell.tcl can be used to run this macro from the command line.

```
% calibredrv suffix_cell.tcl <input-gds-file> <suffix> <output-gds-file>
```

REMOVE EMPTY CELLS

Description
Removes all empty cells and references to them from the layout. An empty cell is any cell that does not contain any polygons, path, text objects, or references.
REMOVE EMPTY CELLS can be used to “clean up” a layout in which data has been removed, leaving in place empty cells.
The DRV command File > Save As can also remove empty cells by not selecting the “Keep Empty Cells” option, but it leaves references to the empty cells intact. If this layout is re-opened, the references to the (now undefined) cells are detected and the DRV tool re-creates the empty cells. This macro eliminates this behavior by removing the reference to the empty cells.
If a cell only contains references to empty cells, it will also be deleted by this macro. Such a cell will become an empty cell when those references are deleted, causing it to be deleted as well.
For very large databases with a large number of empty cells, the run time for this macro can be excessive.
Interactive Usage
An active layout must be open in order to use this macro.
(1) From the toolbar, select Macros > Remove Empty Cells. Click Run.
(2) The empty cells and all references to them will be removed.
Batch Usage

The script remove_empty_cells.tcl can be used to run this macro from the command line.
% calibredrv remove_empty_cells.tcl <input-gds> <output-gds>

REPLACE CELL

Description
Replaces a cell in a layout database with a different cell from another layout database. The replacing cell may have a different name or the same name as the cell it replaces.
One must use caution if the replacing cell contains underlying hierarchy. Any cells in the underlying hierarchy that have a matching cell name in the original layout database will replace those matching cells as well. Warnings will be issued in the transcript window for each replacing cell that overwrites an existing cell of the same name. Therefore, the best practice is to view the transcript window after running REPLACE CELL.

Interactive Usage
An active layout must be open in order to use this macro.
(3) From the toolbar, select Macros > Replace Cell
(4) A pop-up menu will appear. Enter the name of the cell to replace and the name of the new cell that will replace it (same name is allowed). Click Run.
(5) A file browser will pop up. Use it to select the layout database containing the new cell. Click Open.
(6) The original cell will be replaced with the new cell.
(7) View the transcript window to make sure no unintended cell replacements have occurred due to underlying hierarchy in the replacing cell.

Batch Mode Usage
The script replace_cell.tcl can be used to run this macro from the command line.
% calibredrv replace_cell.tcl <input-gds> <cell-to-replace> <input-new-gds> <new-cell> <output-gds>

Rotate topcell by 90

Description
Rotates the top level cell by an angle of 90 counterclockwise.
Interactive Usage
An active layout must be open in order to use this macro.
(1) From the toolbar, select Macros > Rotate Top Cell
(2) Choose the angle or rotation – 90, 180, or 270. Click Run.
(3) The top level cell will be rotated by the specified amount.
Batch Mode Usage
The script rotate_top_cell.tcl can be used to run this macro from the command line.
% calibredrv rotate_top_cell.tcl <input-gds> <rotation-angle> <output-gds>

COPY CELL

Description

Copies a cell to another cell with a different name.

The specified cell is copied to another cell with a name specified by the user. The new cell will contain all of the underlying hierarchy of the original cell, with the sub-cells retaining their original names.

Interactive Usage

A layout must be loaded and displayed in the current window.

(1) From the toolbar, select Macros > Copy Cell

(2) A pop-up menu will appear. Enter the name of the cell to copy and the name of the new cell in the menu's entry boxes.

(3) Click Run. The copy of the cell with the new name will appear in the layout database. The new cell will not be placed in any other cells – placement must be done by the user.

LAYER MAP

Description

Creates a file containing the Calibre SVRF rules file statements to map the layers contained in a layout database, and also create rule check statements to copy the layers to a GDS output database.

Creation of the LAYER MAP statements, and the corresponding COPY rule checks and DRC CHECK MAP statements for Calibre rules files can be a tedious process. This macro automatically writes this section of the SVRF file based on the layers detected in the layout database.

For example, if the layout database contains layer number 3, datatype 5, the output from the LAYER MAP macro will contain four lines of the form

LAYER MAP 3 DATATYPE 5 10000

LAYER L3_D5 10000

Copy_l3_d5 { COPY L3_D5 }

DRC CHECK MAP copy_l3_d5 3 5

Interactive Usage

A layout must be loaded and displayed in the current window.

(1) From the toolbar, select Macros > Layer Map

(2) A file browser will pop up. Browse and select/define a text file to contain the output SVRF rules file statements. Click Save and the macro will execute.

POLYGON TEXT

Description

Creates a new cell containing text in the form of polygons suitable for placement on a layout. Layer number(s) and the character size are specified by the user.

A new layer will be created if the any of the requested layer numbers do not exist on the open layout.

Interactive Usage

An active layout must be open to use this macro. .

(1) From the toolbar, select Macros > Polygon Text.

(2) A pop-up menu will appear. Enter the name of the new cell to contain the polygon text, the layers number(s) to place the polygons on, the text string to be created, and the size (height in microns) for the text polygons. Click OK.

(3) The new cell will be created. This cell will not be placed in the layout, but is available for placement using Object > Create Reference.

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