SIEMENS Calibre® nmLVS™ Reconnaissance Quick Reference

Software Version 2024.1

Overview

Calibre nmLVS Recon performs the following checks in a stand-alone mode outside of sign-off LVS runs:

- Isolate text shorts (LVS Isolate Shorts)
- Detect shorts through high-resistance layers (LVS Softchk)
- Perform electrical rule checks (ERC)

These check modes reduce runtime, memory, and results debugging complexity versus normal LVS batch runs.

Calibre nmLVS Recon runs can be performed using a regular LVS circuit extraction rule file or on data in an existing Mask SVDB Directory. Single- and multi-threaded run modes are supported.

Requirements

In addition to the usual licenses used for LVS, a Calibre nmLVS Recon license is required.

The Mask SVDB Directory RECON keyword is needed for certain ERC flows. The SI keyword can be useful for short isolation flows.

Multithreaded Run Options

All Calibre nmLVS Recon run modes support the usual LVS multithreaded command line options:

```
-turbo [[number_of_processors] [-turbo_all]
  [-hyper [-pathchk] [-remote]]
  [{{-remote host,host,...} | {-remotefile filename} |
    {-remotecommand filename count}}
    [-remotedata [-recoverremote | -recoveroff]]
  ]
]
```

These options are defined in the *Calibre Verification User's Manual* and the *Calibre Administrator's Guide*.

All of the multithreaded options are supported when a rule file is specified on the command line. When -svdb mode is used, the -turbo options are supported but -hyper is not. You should typically specify -turbo.

Specify -hyper for primary hosts having at least four CPUs. If using remote distribution, this option performs best when there are at least 16 remote CPUs.

```
calibre -recon [recon args] -turbo -hyper [remote args]
```

Calibre nmLVS Recon SI

Calibre nmLVS Recon Short Isolation uses this command line:

```
calibre -recon -si[={ALL | IO | PG | DB | tcl_script}]
  {{[-hcell hcell_filename] rules
    [-tvfarg tvf_argument [-tvf_prerun prerun_file]]} |
   {-svdb svdb_dir [top_cell]}} [mt_options]
```

The *mt_options* are discussed previously under "Multithreaded Run Options." The remote distribution options are supported with the -svdb option in this mode.

Short isolation is always performed as if LVS Isolate Shorts YES BY LAYER BY CELL is specified. Other keywords may apply depending on the rules and the command line options. Choosing just "**-si**" enforces only the rule file's configuration.

Net-Aware Flows

Net-aware flows perform text short isolation on nets specified using one of these keywords following the "**-si=**" option.

- ALL — All nets in any cell.
- IO — Non-supply nets in the primary cell (by default).
- PG — Power and ground nets in the primary cell (by default).

Example command line for power/ground short isolation:

```
calibre -recon -si=PG rules -turbo -hyper
```

Layer-Aware Flows

Layer-aware flows perform text short isolation on specified layers. This is frequently desirable for back end of line (BEOL) layer checks.

If using a rule file, the LVS SI Select Connects statement specifies which layers to check for shorts. If using the **-svdb** option, the **-si**=*tcl_script* option can specify a Query Server Tcl shell script that contains the short_db::select_connects command to select the checked layers. This latter method is discussed under "Custom Flows."

If specifying a rule file, you can either Include the LVS SI Select Connects statement directly in the rule file, or you can follow this example.

In a file called *si_layers.svrf*, include a statement like this:

```
LVS SI SELECT CONNECTS BY LAYER "M*" "D*"
```

In a file called *include.tvf*, include this script:

```
set tvf_arg [ tvf::get_tvf_arg ] ;# gets -tvfarg value
if {$tvf_arg != ""} {tvf::verbatim "INCLUDE $tvf_arg"}
```

Execute this command line with circuit extraction rules:

```
calibre -recon -si rules -tvfarg si_layers.svrf\
-tvf_prerun include.tvf -turbo -hyper
```

Custom Flows

The **-si**=*tcl_script* option is used to specify a Query Server Tcl shell script containing short isolation commands. For example, a *tcl_script* might contain this to isolate shorts between certain nets:

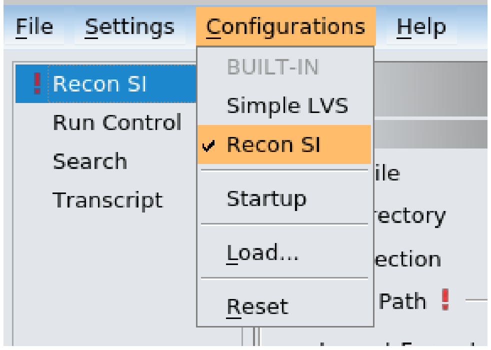
```
short_db::isolate_shorts -by_layer YES \
  -and -name {vdd! vss! dummy1 dummy2}
```

Then execute short isolation as follows:

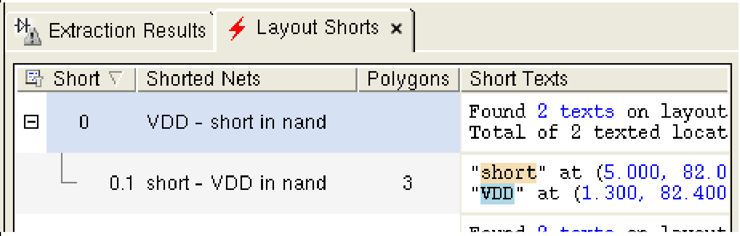
```
calibre -recon -si=tcl_script -svdb svdb -turbo -hyper
```

Interactive GUI Support

You can configure Calibre Interactive - nmLVS for Recon SI from the **Configurations > Recon SI** menu item:



Interactive short isolation is supported in Calibre RVE through the **Layout Shorts** tab:



Short ▽	Shorted Nets	Polygons	Short Texts
⊟ 0	VDD - short in nand		Found 2 texts on layout Total of 2 texted locat
0.1	short - VDD in nand	3	"short" at (5.000, 82.0 "VDD" at (1.300, 82.400

Calibre nmLVS Recon Softchk

Calibre nmLVS Recon Softchk uses this command line:

```
calibre -recon {{-softchk [-si[={ALL | IO | PG | DB |
    tcl_script}] [-hcell hcell_filename] [mt_options]
    rules [-tvfarg tvf_argument [-tvf_prerun file]]} |
  {-softchk[=tcl_script] -svdb svdb_dir [top_cell]
    [-turbo [n] [-turbo_all]]}}
```

The *mt_options* are discussed previously under “Multithreaded Run Options.”

If a rule file is specified, soft connection checking is performed according to LVS Softchk statements in the rules.

If -si is specified, then short isolation is also performed using the default **-recon -si** configuration.

The -tvfarg and -tvf_prerun options allow insertion of rule file parameters and code from the command line.

If **-svdb** is specified, then Sconnect checks are performed as if “LVS Softchk … LOWER” were specified for any layers that had a stamping conflict in the run that produced the SVDB. LVS Softchk statements from the rules stored in the SVDB are ignored.

If “=*tcl_script*” is specified, then checking is performed based upon qs::softchk, qs::softchks, or short_db::softchk commands in a Query Server script, regardless of any rule file statements.

LVS SI Select Connects and short_db::select_connects also apply to **-recon -softchk** runs.

This command line performs Sconnect checks according to the circuit extraction rule file:

```
calibre -recon -softchk rules -turbo -hyper
```

Assume a *softchk.qs* file contains these commands:

```
qs::softchk -lower_layer pwell
qs::softchk -lower_layer pwell -by_vertex_count \
  -upper -all -append
```

which are equivalent to these rule file statements:

```
LVS SOFTCHK pwell
LVS SOFTCHK pwell UPPER ALL
```

This command line performs the corresponding soft connection checks on layers in the *svdb*:

```
calibre -recon -softchk=softchk.qs -svdb svdb -turbo
```

Output is to a *softchk.rdb* file, which can be loaded into Calibre RVE.

Calibre nmLVS Recon ERC

Calibre nmLVS Recon ERC uses this command line:

```
calibre -recon [-waiver setup_file]
  {{-erc [-hcell hcell_filename] [mt_options]
     rules [-tvfarg tvf_arg [-tvf_prerun file]]} |
   {-erc[=svrf_script] -svdb svdb_dir [top_cell]
     [-turbo [n] [-turbo_all]]}}
```

The *mt_options* are discussed previously under “Multithreaded Run Options.” Calibre$^{®}$ Auto-Waivers™ is supported with -recon -erc.

In all run modes, only rule checks from the ERC Select Check set are executed, just as in a regular circuit extraction run with ERC. LVS Execute ERC NO is ignored.

The -tvfarg and -tvf_prerun options allow insertion of rule file parameters and code from the command line.

If **-svdb** is specified, then the Mask SVDB Directory … RECON keyword should be used when the SVDB is produced.

If “=*svrf_script*” is used, the *svrf_script* contains SVRF code, including an ERC Results Database statement. Only rule checks appearing in ERC Select Check statements in the *svrf_script* are executed. If an *svrf_script* is not used, then selected checks from the original rules are executed.

Assume the circuit extraction rules contain these statements:

```
nopower {PATHCHK !POWER}
floating_gate {PATHCHK !POWER && !GROUND gate}
ERC SELECT CHECK nopower
MASK SVDB DIRECTORY svdb RECON
```

(The Pathchk BREAK FILTERED, EXCLUDE UNUSED, and NOFLOAT keywords are applied in -recon mode with a rule file specified.)

Then, this command line executes the nopower check:

```
calibre -recon -erc rules -turbo -hyper
```

Assume an *erc.svrf* file contains this statement:

```
ERC SELECT CHECK floating_gate
ERC RESULTS DATABASE recon_erc.db
```

This command line executes the floating_gate check from the original rules and places the results in *recon_erc.db*.

```
calibre -recon -erc=erc.svrf -svdb svdb -turbo -hyper
```