ADS
2015.01

SI and PI Analyzer Add-on

KEYSIGHT TECHNOLOGIES

Notice

© Keysight Technologies, Inc. 1983-2015
1400 Fountaingrove Pkwy., Santa Rosa, CA 95403-1738, United States

All rights reserved.

No part of this documentation may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies, Inc. as governed by United States and international copyright laws.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause.

Use, duplication or disclosure of Software is subject to Keysight Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Acknowledgments

Layout Boolean Engine by Klaas Holwerda, v1.7 http://boolean.klaasholwerda.nl/bool.html

FreeType Project, Copyright (c) 1996-1999 by David Turner, Robert Wilhelm, and Werner Lemberg.

QuestAgent search engine (c) 2000-2002, JObjects.

Portions of the code Copyright (c) 1990-1996
The Regents of the University of California. All rights reserved. Permission is hereby granted, without written agreement and without license or royalty fees, to use, modify and distribute the Ptolemy software and its documentation for any purpose, provided that the above copyright notice and the following two paragraphs appear in all copies of the software and documentation.

In no event shall the University of California be liable to any party for direct, indirect, special, incidental, or consequential damages arising out of the use of this software and its documentation, even if the University of California has been advised of the possibility of such damage.

The University of California specifically disclaims any warranties, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The software provided hereunder is on an "as is" basis and the University of California has no obligation to provide maintenance, support, updates, enhancements, or modifications.

Portions of this product include the SystemC software licensed under Open Source terms, which are available for download at http://systemc.org/. This software is redistributed by Keysight. The Contributors of

the SystemC software provide this software "as is" and offer no warranty of any kind, express or implied, including without limitation warranties or conditions or title and non-infringement, and implied warranties or conditions merchantability and fitness for a particular purpose. Contributors shall not be liable for any damages of any kind including without limitation direct, indirect, special, incidental and consequential damages, such as lost profits. Any provisions that differ from this disclaimer are offered by Keysight only.

Motif is a trademark of the Open Software Foundation.

Netscape is a trademark of Netscape Communications Corporation.

UNIX is a registered trademark of the Open Group.

Microsoft, Windows, Windows NT, Windows 2000, and Windows Internet Explorer are registered trademarks of Microsoft Corporation in the United States and other countries.

Pentium is a registered trademark of Intel Corporation.

Acrobat, PDF, and PostScript are registered trademarks of Adobe Systems Incorporated.

FLEXlm and FLEXnet are registered trademarks of Flexera Software LLC Terms of Use for Flexera Software information can be found at http://www.flexerasoftware.com/company/about/terms.htm

Netscape Portable Runtime (NSPR), Copyright (c) 1998-2003 The Mozilla Organization. A copy of the Mozilla Public License is at http://www.mozilla.org/MPL/

FFTW, The Fastest Fourier Transform in the West, Copyright (c) 1997-1999 Massachusetts Institute of Technology. All rights reserved.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Cadence, Allegro, Assura, Dracula, SKILL, Spectre, and Virtuoso are registered trademarks of Cadence Design Systems, Inc. in the United States and/or other jurisdictions.

Mentor, Mentor Graphics, Board Station, Calibre, and Expedition are registered trademarks of Mentor Graphics Corporation in the United States and other countries.

SystemC is a registered trademark of Open SystemC Initiative, Inc. in the United States and other countries and is used with permission.

Gradient, HeatWave and FireBolt are trademarks of Gradient Design Automation Inc.

The following third-party libraries are used by the NlogN Momentum solver:

Metis 4.0, Copyright © 1998, Regents of the University of Minnesota", http://www.cs.umn.edu/~metis, METIS was written by George Karypis (karypis@cs.umn.edu).

Intel@ Math Kernel Library, http://www.intel.com/software/products/mkl

HSPICE is a registered trademark of Synopsys, Inc. in the United States and/or other countries.

DWG and DXF are registered trademarks of Autodesk, Inc. in the United States and/or other countries.

MATLAB is a registered trademark of The MathWorks, Inc. in the United States and/or other countries.

SuperLU_MT version 2.0

SuperLU Copyright: Copyright © 2003, The Regents of the University of California, through Lawrence Berkeley National Laboratory (subject to receipt of any required approvals from U.S. Dept. of Energy). All rights reserved.

SuperLU Disclaimer: THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

7-zip

7-Zip Copyright: Copyright (C) 1999-2009 Igor Pavlov.

Licenses for files are:

1. 7z.dll: GNU LGPL + unRAR restriction.
2. All other files: GNU LGPL.

7-zip License: This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful,but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA.

unRAR copyright: The decompression engine for RAR archives was developed using source code of unRAR program.All copyrights to original unRAR code are owned by Alexander Roshal.

unRAR License: The unRAR sources cannot be used to re-create the RAR compression algorithm, which is proprietary. Distribution of modified unRAR sources in separate form or as a part of other software is permitted, provided that it is clearly stated in the documentation and source comments that the code may not be used to develop a RAR (WinRAR) compatible archiver.

7-zip Availability: http://www.7-zip.org/

AMD Version 2.2

AMD Notice: The AMD code was modified. Used by permission.

AMD copyright: AMD Version 2.2, Copyright © 2007 by Timothy A. Davis, Patrick R. Amestoy, and Iain S. Duff. All Rights Reserved.

AMD License: Your use or distribution of AMD or any modified version of AMD implies that you agree to this License. This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA Permission is hereby granted to use or copy this program under the terms of the GNU LGPL, provided that the Copyright, this License, and the Availability of the original version is retained on all copies.User documentation of any code that uses this code or any modified version of this code must cite the Copyright, this License, the Availability note, and "Used by permission." Permission to modify the code and to distribute modified code is granted, provided the Copyright, this License, and the Availability note are retained, and a notice that the code was modified is included.

AMD Availability: http://www.cise.ufl.edu/research/sparse/amd

UMFPACK 5.0.2

UMFPACK Notice: The UMFPACK code was modified. Used by permission.

UMFPACK Copyright: UMFPACK Copyright © 1995-2006 by Timothy A. Davis. All Rights Reserved.

UMFPACK License: Your use or distribution of UMFPACK or any modified version of UMFPACK implies that you agree to this License. This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA Permission is hereby granted to use or copy this program under the terms of the GNU LGPL, provided that the Copyright, this License, and the Availability of the original version is retained on all copies. User documentation of any code that uses this code or any modified version of this code must cite the Copyright, this License, the Availability note, and "Used by permission." Permission to modify the code and to distribute modified code is granted, provided the Copyright, this License, and the Availability note are retained, and a notice that the code was modified is included.

UMFPACK Availability: http://www.cise.ufl.edu/research/sparse/umfpack UMFPACK (including versions 2.2.1 and earlier, in FORTRAN) is available at http://www.cise.ufl.edu/research/sparse. MA38 is available in the Harwell Subroutine Library. This version of UMFPACK includes a modified form of COLAMD Version 2.0, originally released on Jan. 31, 2000, also available at http://www.cise.ufl.edu/research/sparse. COLAMD V2. 0 is also incorporated as a built-in function in MATLAB version 6.1, by The MathWorks, Inc. http://www. mathworks.com. COLAMD V1.0 appears as a column-preordering in SuperLU (SuperLU is available at http://www.netlib.org). UMFPACK v4.0 is a built-in routine in MATLAB 6.5. UMFPACK v4.3 is a built-in routine in MATLAB 7.1.

Errata

The ADS product may contain references to "HP" or "HPEESOF" such as in file names and directory names. The business entity formerly known as "HP EEsof" is now part of Keysight Technologies and is known as "Keysight EEsof". To avoid broken functionality and to maintain backward compatibility for our customers, we did not change all the names and labels that contain "HP" or "HPEESOF" references.

Qt Version 4.8.4

Qt Notice: The Qt code was modified. Used by permission.

Qt Version 4.8.4, Copyright (C) 2014 Digia Plc and/or its subsidiary(-ies). All Rights Reserved. Contact: http://www.qt-project.org/legal

Qt License: http://qt-project.org/doc/qt-4.8/lgpl.html. Your use or distribution of Qt or any modified version of Qt implies that you agree to this License. This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA Permission is hereby granted to use or copy this program under the terms of the GNU LGPL, provided that the Copyright, this License, and the Availability of the original version is retained on all copies. User documentation of any code that uses this code or any modified version of this code must cite the Copyright, this License, the Availability note, and "Used by permission." Permission to modify the code and to distribute modified code is granted, provided the Copyright, this License, and the Availability note are retained, and a notice that the code was modified is included.

Qt Availability: http://www.qtsoftware.com/downloads

Patches Applied to Qt can be found in the installation at: $HPEESOF_DIR/prod/licenses/thirdparty/qt/patches.

You may also contact Brian Buchanan at Keysight Inc. at brian_buchanan@keysight.com for more information.

The HiSIM_HV source code, and all copyrights, trade secrets or other intellectual property rights in and to the source code, is owned by Hiroshima University and/or STARC.

HDF5

HDF5 Notice: The HDF5 code was modified. Used by permission.

HDF5 Copyright: Copyright 2006-2013 by The HDF Group.

HDF5 License:

Copyright Notice and License Terms for HDF5 (Hierarchical Data Format 5) Software Library and Utilities

---

HDF5 (Hierarchical Data Format 5) Software Library and Utilities

Copyright 2006-2013 by The HDF Group.

NCSA HDF5 (Hierarchical Data Format 5) Software Library and Utilities

Copyright 1998-2006 by the Board of Trustees of the University of Illinois.

All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted for any purpose (including commercial purposes) provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions, and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions, and the following disclaimer in the documentation and/or materials provided with the distribution.
3. In addition, redistributions of modified forms of the source or binary code must carry prominent notices stating that the original code was changed and the date of the change.
4. All publications or advertising materials mentioning features or use of this software are asked, but not required, to acknowledge that it was developed by The HDF Group and by the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign and credit the contributors.
5. Neither the name of The HDF Group, the name of the University, nor the name of any Contributor may be used to endorse or promote products derived from this software without specific prior written permission from The HDF Group, the University, or the Contributor, respectively.

libpng

libpng Copyright: libpng versions 1.2.6, August 15, 2004, through 1.6.3, July 18, 2013, are Copyright (c) 2004, 2006-2013.

libpng License: This copy of the libpng notices is provided for your convenience. In case of any discrepancy between this copy and the notices in the file png.h that is included in the libpng distribution, the latter shall prevail.
COPYRIGHT NOTICE, DISCLAIMER, and LICENSE:
If you modify libpng you may insert additional notices immediately following this sentence.

This code is released under the libpng license.
libpng versions 1.2.6, August 15, 2004, through 1.6.3, July 18, 2013, are Copyright (c) 2004, 2006-2013 Glenn Randers-Pehrson, and are distributed according to the same disclaimer and license as libpng-1.2.5 with the following individual added to the list of Contributing Authors, Cosmin Truta

libpng versions 1.0.7, July 1, 2000, through 1.2.5 - October 3, 2002, are Copyright (c) 2000-2002 Glenn Randers-Pehrson, and are distributed according to the same disclaimer and license as libpng-1.0.6 with the following individuals added to the list of Contributing Authors
Simon-Pierre Cadieux, Eric S. Raymond, Gilles Vollant and with the following additions to the disclaimer:
There is no warranty against interference with your enjoyment of the library or against infringement. There is no warranty that our efforts or the library will fulfill any of your particular purposes or needs. This library is provided with all faults, and the entire risk of satisfactory quality, performance, accuracy, and effort is with the user.

libpng versions 0.97, January 1998, through 1.0.6, March 20, 2000, are Copyright (c) 1998, 1999 Glenn Randers-Pehrson, and are distributed according to the same disclaimer and license as libpng-0.96, with the following individuals added to the list of Contributing Authors: Tom Lane, Glenn Randers-Pehrson, Willem van Schaik

libpng versions 0.89, June 1996, through 0.96, May 1997, are Copyright (c) 1996, 1997 Andreas Dilger Distributed according to the same disclaimer and license as libpng-0.88, with the following individuals added to the list of Contributing Authors: John Bowler, Kevin Bracey, Sam Bushell, Magnus Holmgren, Greg Roelofs, Tom Tanner

libpng versions 0.5, May 1995, through 0.88, January 1996, are Copyright (c) 1995, 1996 Guy Eric Schalnat, Group 42, Inc.
For the purposes of this copyright and license, "Contributing Authors" is defined as the following set of individuals: Andreas Dilger, Dave Martindale, Guy Eric Schalnat, Paul Schmidt, Tim Wegner

The PNG Reference Library is supplied "AS IS". The Contributing Authors and Group 42, Inc. disclaim all warranties, expressed or implied, including, without limitation, the warranties of merchantability and of fitness for any purpose. The Contributing Authors and Group 42, Inc. assume no liability for direct, indirect, incidental, special, exemplary, or consequential damages, which may result from the use of the PNG Reference Library, even if advised of the possibility of such damage.
Permission is hereby granted to use, copy, modify, and distribute this source code, or portions hereof, for any purpose, without fee, subject to the following restrictions:

1. The origin of this source code must not be misrepresented.
2. Altered versions must be plainly marked as such and must not be misrepresented as being the original source.
3. This Copyright notice may not be removed or altered from any source or altered source distribution.

The Contributing Authors and Group 42, Inc. specifically permit, without fee, and encourage the use of this source code as a component to supporting the PNG file format in commercial products. If you use this source code in a product, acknowledgment is not required but would be appreciated.

OpenSSL

The OpenSSL toolkit stays under a dual license, i.e. both the conditions of the OpenSSL License and the original SSLeay license apply to the toolkit. See below for the actual license texts. Actually both licenses are BSD-style Open Source licenses. In case of any license issues related to OpenSSL please contact openssl-core@openssl.org.

OpenSSL License

==========
Copyright (c) 1998-2011 The OpenSSL Project. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. All advertising materials mentioning features or use of this software must display the following acknowledgment: "This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (http://www.openssl.org/)"
4. The names "OpenSSL Toolkit" and "OpenSSL Project" must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact openssl-core@openssl.org.
5. Products derived from this software may not be called "OpenSSL" nor may "OpenSSL" appear in their names without prior written permission of the OpenSSL Project.
6. Redistributions of any form whatsoever must retain the following acknowledgment: "This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/)"

THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT "AS IS" AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
==========

This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

Original SSLeay License

Copyright (C) 1995-1998 Eric Young (eay@cryptsoft.com)
All rights reserved.

This package is an SSL implementation written by Eric Young (eay@cryptsoft.com).
The implementation was written so as to conform with Netscapes SSL. This library is free for commercial and non-commercial use as long as the following conditions are aheared to. The following conditions apply to all code found in this distribution, be it the RC4, RSA, lhash, DES, etc., code; not just the SSL code. The SSL documentation included with this distribution is covered by the same copyright terms except that the holder is Tim Hudson (tjh@cryptsoft.com).

Copyright remains Eric Young's, and as such any Copyright notices in the code are not to be removed. If this package is used in a product, Eric Young should be given attribution as the author of the parts of the library used. This can be in the form of a textual message at program startup or in documentation (online or textual) provided with the package.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. All advertising materials mentioning features or use of this software must display the following acknowledgement: "This product includes cryptographic software written by Eric Young (eay@cryptsoft.com)" The word 'cryptographic' can be left out if the rouines from the library being used are not cryptographic related.
4. If you include any Windows specific code (or a derivative thereof) from the apps directory (application code) you must include an acknowledgement: "This product includes software written by Tim Hudson (tjh@cryptsoft.com)"

THIS SOFTWARE IS PROVIDED BY ERIC YOUNG ``AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The licence and distribution terms for any publically available version or derivative of this code cannot be changed. i.e. this code cannot simply be copied and put under another distribution license \[including the GNU Public Licence.]

Growl GNTP support:
[The "BSD licence"] Copyright (c) 2009-2010 Yasuhiro Matsumoto
All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. The name of the author may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE AUTHOR "AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Cuda
Cuda Redistributable Software - 1.8. Attachment A

In connection with Section 1.2.1.1 of this Agreement, the following files may be redistributed with software applications developed by Licensee, including certain variations of these files that have version number or architecture specific information embedded in the file name - as an example only, for release version 6.0 of the 64-bit Windows software, the file cudart64_60.dll is redistributable.

Component : CUDA Runtime
Windows : cudart.dll, cudart_static.lib
MacOS : libcudart.dylib, libcudart_static.a
Linux : libcudart.so, libcudart_static.a
Android : libcudart.so, libcudart_static.a

Component : CUDA FFT Library
Windows : cufft.dll
MacOS : libcufft.dylib
Linux : libcufft.so
Android : libcufft.so

Component : CUDA BLAS Library
Windows : cublas.dll
MacOS : libcublas.dylib
Linux : libcublas.so
Android : libcublas.so

Component : CUDA Sparse Matrix Library
Windows : cusparse.dll
MacOs : libcusparse.dylib
Linux : libcusparse.so
Android : libcusparse.so

Component : CUDA Random Number Generation Library
Windows : curand.dll
MacOs : libcurand.dylib
Linux : libcurand.so
Android : libcurand.so

Component : NVIDIA Performance Primitives Library
Windows : nppc.dll, nppi.dll, npps.dll
MacOs : libnppc.dylib, libnppi.dylib, libnpps.dylib
Linux : libnppc.so, libnppi.so, libnpps.so
Android : libnppc.so, libnppi.so, libnpps.so

Component : NVIDIA Optimizing Compiler Library
Windows : nvvm.dll
MacOs : libnvvm.dylib
Linux : libnvvm.so

Component : NVIDIA Common Device Math Functions Library
Windows : libdevice.compute_20.bc, libdevice.compute_30.bc, libdevice.compute_35.bc
MacOs : libdevice.compute_20.bc, libdevice.compute_30.bc, libdevice.compute_35.bc
Linux : libdevice.compute_20.bc, libdevice.compute_30.bc, libdevice.compute_35.bc

Component : CUDA Occupancy Calculation Header Library
All : cuda_occupancy.h

Read more at: http://docs.nvidia.com/cuda/eula/index.html#ixzz30CrknWfU

Warranty The material contained in this document is provided "as is", and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Keysight disclaims all warranties, either express or implied, with regard to this documentation and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Keysight shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Keysight and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Table of Contents

SI/PI Analyzer Add-on

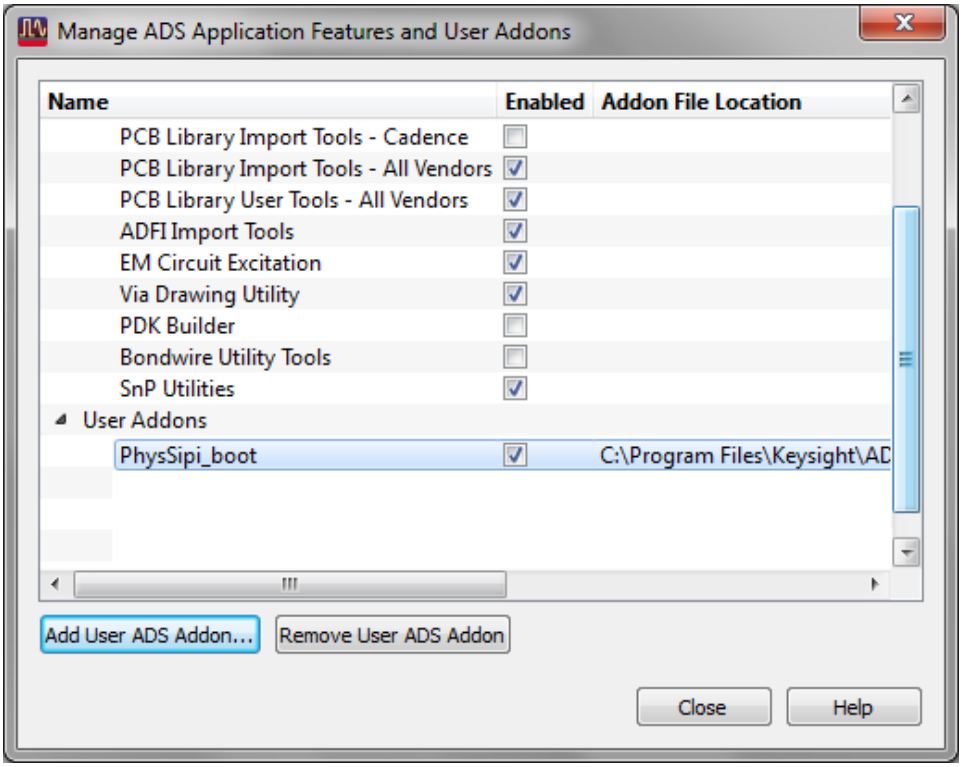
Installing the SI and PI Analyzer Addon

The legacy SI/PI analyzer is available as an addon. The SI/PI Analyzer addon assists in setting up SI or PI EM and circuit simulations. This addon consists of two parts:

- Setup wizard: The setup wizard guides you through the process of creating a new cell that contains only selected nets (physical interconnects) to be analyzed. The output of the setup wizard is a cell that is ready for EM analysis.
- Analysis guide: The analysis guide assists in setting up typical SI or PI circuit simulation testbench. The output of the analysis guide is a circuit schematic, ready to be simulated, a data display template that captures relevant output figures. In addition, the analysis guide supports Momentum current visualization based on the results.

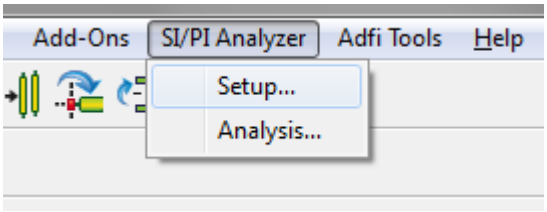
To install the SI and PI Analyzer addon:

1. Select **Tools** > **App Manager** in the ADS Main window.
2. Click **Add User ADS Addon**. The Add User Addon dialog box is displayed.
3. Click **Browse**.
4. Access the **$HPEESOF_DIR/ael_addons/sipi_deprecated/ael** folder.
5. Select the **PhysSipi_boot.atf** file and click **Open**.
6. Click **OK**. The PhysSipi_boot option is displayed in the User Addons list.
7. Select the **Enabled** check box for **PhysSipi_boot**, as shown in the following figure:



8. Click **Yes** in the message box.
9. Click **OK** in the message box.
10. Click **Close** in the App Manager window.

11. Open a Layout window. The SI/PI Analyzer addon is displayed in the menu bar, as shown in the following figure:



Performing Analysis Using the SI and PI Analyzer Addon

Using the SI/PI analyzer addon, you can perform the following types of analysis:

- **Power Distribution Network(PDN) Analysis**: The PDN analysis enables you to:
  - Extract PDN impedance.
  - Visualize current distribution with SMD components (if any) in 3D Visualizer.
- **Signal Path Analysis**: The signal path analysis enables you to extract signal path characteristics, such as R, L, G, and C characteristic impedance.

Before performing the analysis, set up the SI/PI Analyzer. For more information, see Setting up SI and PI Analyzer.

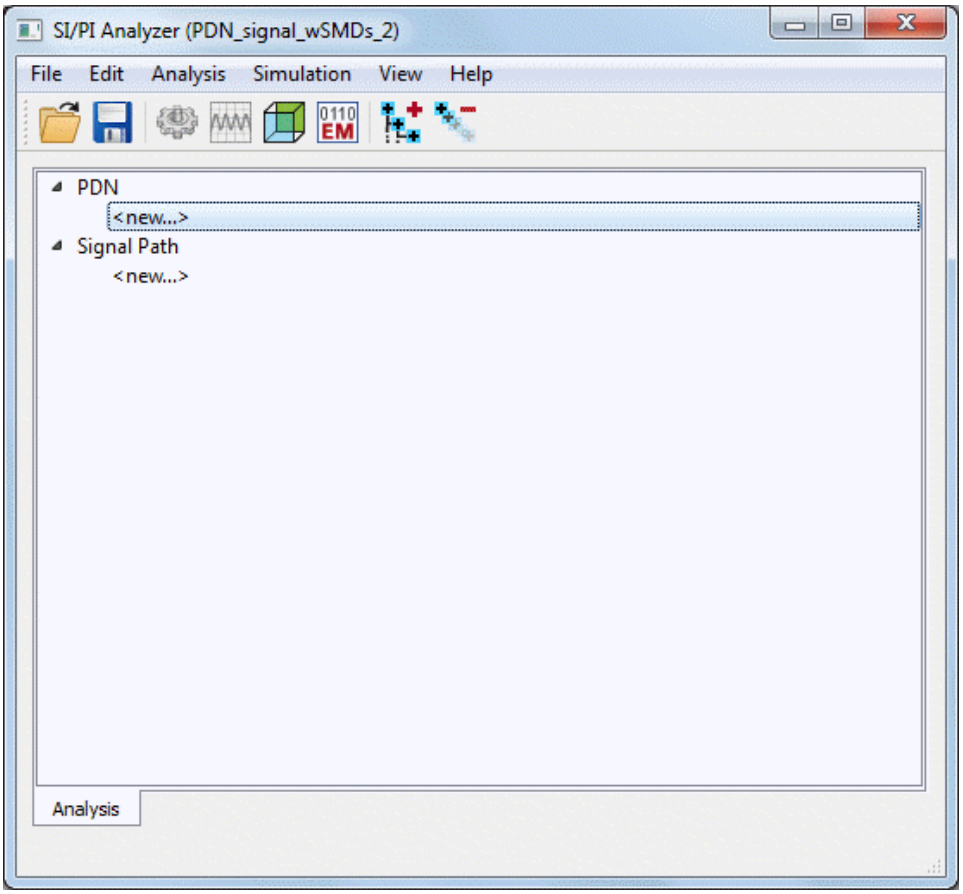
Installing SI/PI Analyzer Addon

The legacy SI/PI analyzer is available as an addon. For more information, see Installing the SI/PI Analyzer addon.

After installing the addon:

1. Open the layout view of the cell you want to analyze.
2. Select **Tools** > **Set Connectivity option**. The Design Connectivity Options window is displayed.
3. Select **WYSIWYG Mode: Physical connections only** and **Enable PCE: consider all shapes for making connections**.
4. Click **OK**.

5. Select **SI/PI Analyzer** > **Analysis**. The SI/PI Analyzer window is displayed, as shown in the following figure:

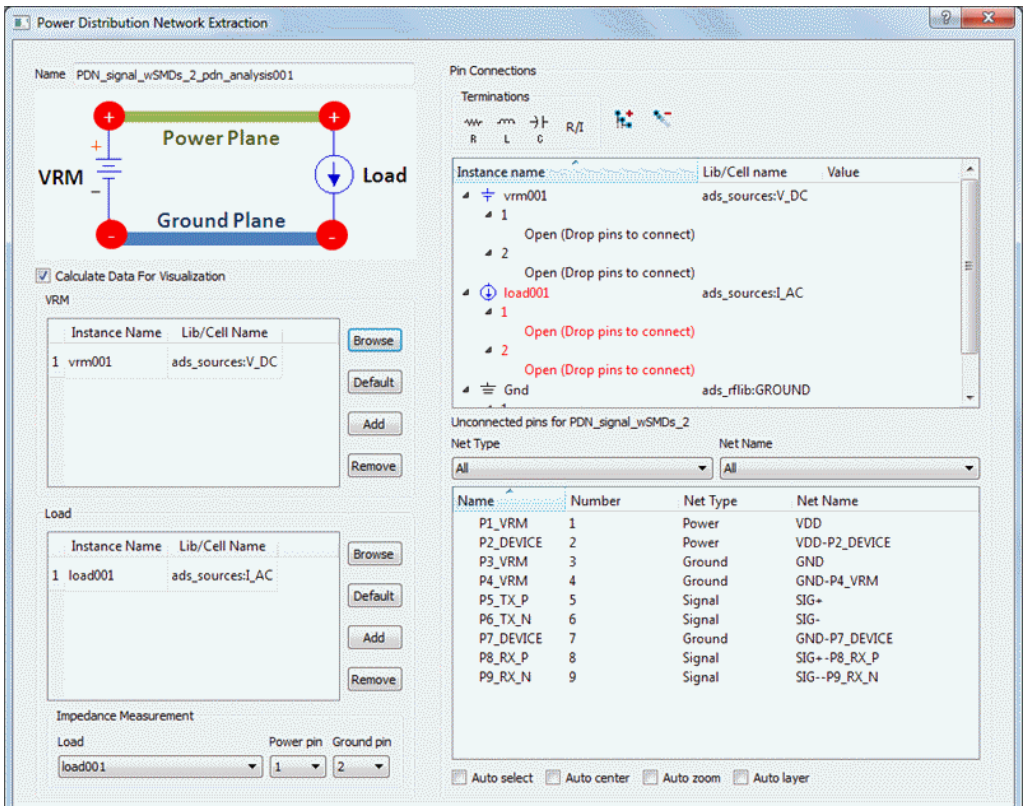


The SI/PI Analyzer window displays a list of analysis that you have created. In this window:

- A grey ( ) icon indicates that the analysis is not performed yet or finished with an error.
- A green ( ) icon indicates that the analysis is finished successfully.

Defining Power Distribution Network Analysis

To define a PDN analysis, select **Analysis** > **New analysis** > **PDN impedance** in the SI/PI Analyzer window. You can also double-click the item displayed as **<new...>** to create an analysis for PDN. The **Power Distribution Network Extraction** window is displayed, as shown in the following figure:



In the Power Distribution Network Extraction window, you can specify:

- On or off capability of calculating currents flowing in the PDN including SMDs (if any).
- Models for Voltage Regulator Module (VRM) and Load.
- Connections between VRM/Load models and DUT.

Editing the PDN Analysis Setup

Using the Power Distribution Network Extraction window, you can perform the following tasks:

- **Calculating current distribution**: You can calculate current distribution by selecting the **Calculate data for visualization** check box.
- **Selecting a VRM and Load**: In the VRM or Load frame, you can:
  - Select a source or load model: Click **Browse** to select a source or load model to use. Note that only frequency domain model can be used.
  - Restore models: Click **Default** to restore a default model.
  - Add a new source or load: Click **Add** to include a new source or load into the analysis.
  - Delete a source or load: Click **Remove** to delete a source or load from the analysis.

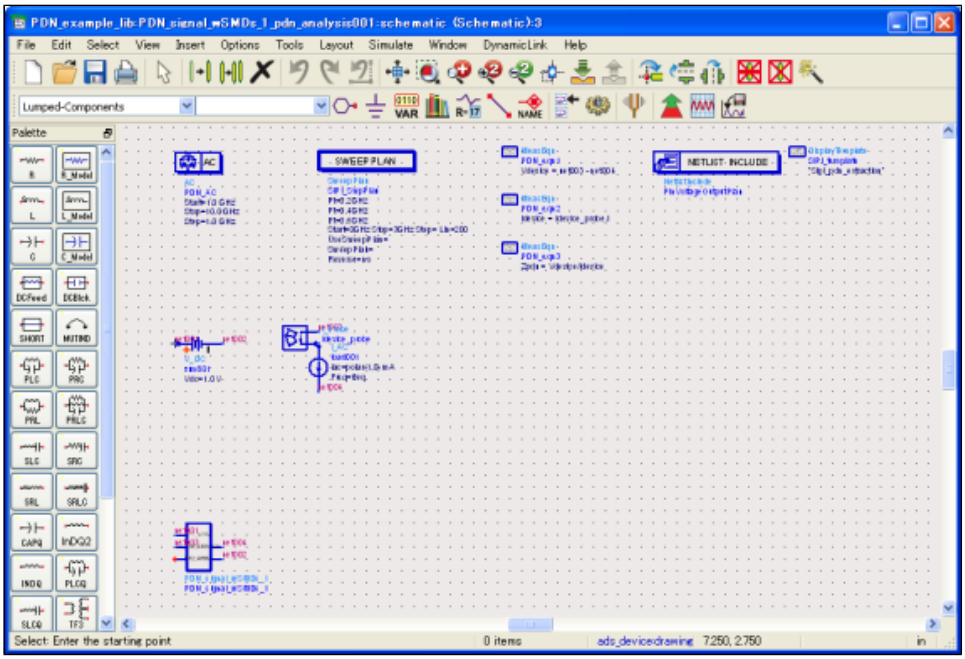
- **Measuring Impedance**: To calculate the impedance of a power distribution network, you need to monitor the current that flows a load and voltage between power pin and ground pin. You need to provide the following values in **Impedance Measurement**:
    - Load value: Specify a load model which you want to make measurement of your impedance in the **Load** field.
    - Power pin value: Specify a pin number which should connect to the power nets in the **Power pin** field.
    - Ground pin value: Specify a pin number which should connect to the ground nets in the **Ground pin** field.
- **Specifying Pin connections**: You can specify the following connections between your model that is being analyzed and a source or load in **Pin Connections**:
    - You can terminate unconnected pins in a model by using the icons in the Termination section. You can also drag and drop unconnected pins to end a connection.
    - You can view instances of source/load and termination are shown with these pins in the top pane.
    - You can view unconnected pins of your model that are analyzed in the bottom pane.
    - You can generate a connection between pins of your model and source/loads by using the drag and drop operation.

Creating a Power Distribution Network Analysis

To analyze a PDN:

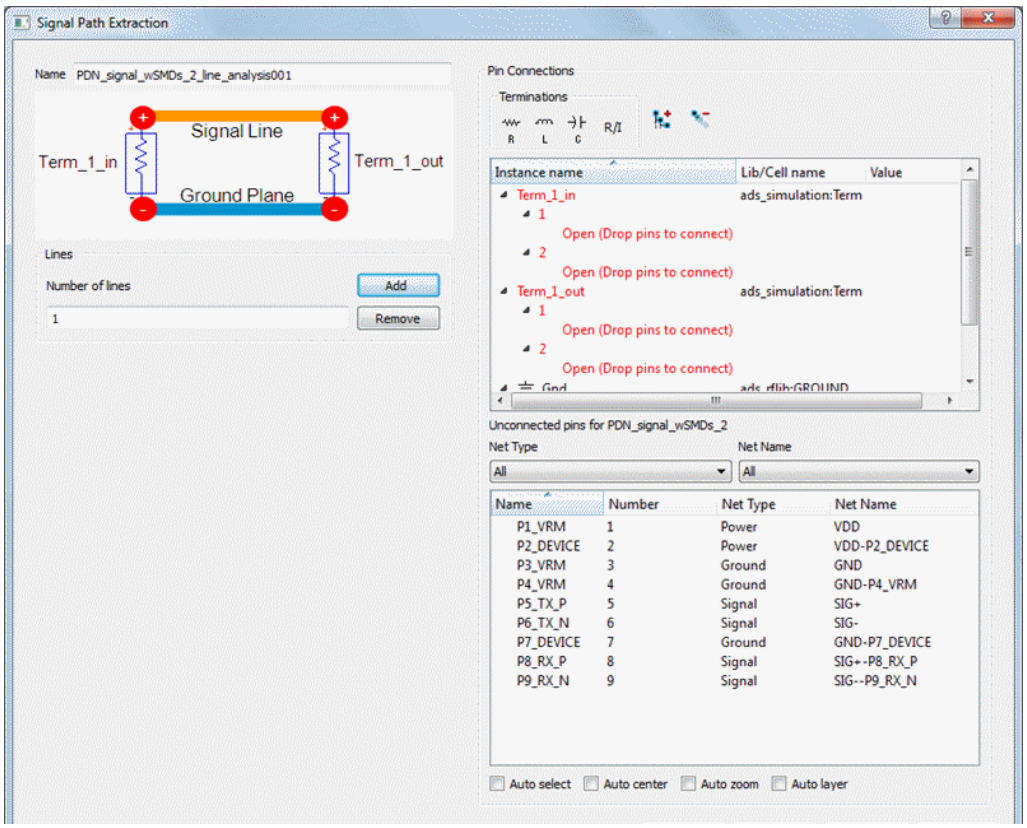
1. Select **Analysis** > **New analysis** > **PDN impedance** or double-click the item displayed as **<new...>** to open the **Power Distribution Network Extraction** window.
2. Select the **Calculate data for visualization** check box.
3. Click **Browse** to select a source model.
4. Click **Browse** to select a load model.
5. In **Impedance Measurement**, specify the following values:
    - Select a load model from the **Load** drop-down list.
    - Select a pin number from the **Power pin** drop-down list.
    - Select a ground pin number from the **Ground pin** drop-down list.
6. In **Pin Connections**, generate a connection between pins of your model and source/loads by dragging pins from unconnected pins and drop on the required pin in the upper pane.

7. Click **OK** to create a test bench schematic for the PDN analysis.



Defining Signal Path Analysis

To define a Signal Path analysis, select **Analysis** > **New analysis** > **Signal Path characteristics** in the SI/PI Analyzer window. You can also double-click the item displayed as **<new...>** in **Signal Path** to create an analysis for signal path. The Signal Path Extraction window is displayed, as shown in the following figure:



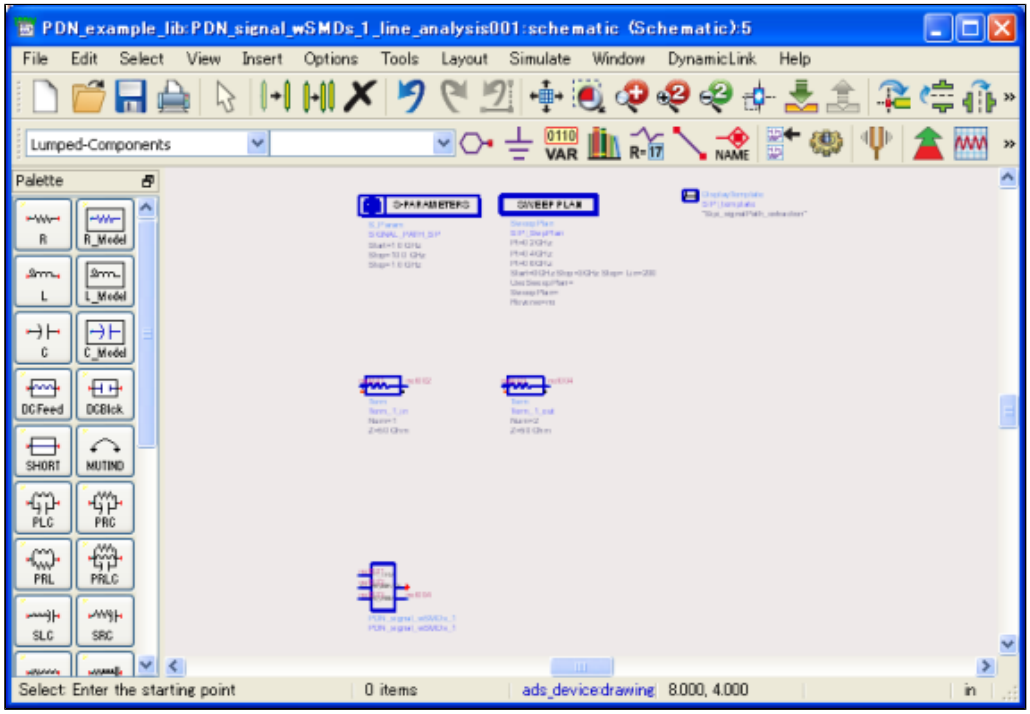
The Signal Path Extraction window allows you to specify the:

- Number of paths you want to analyze.
- Connections between S-parameter terms and your DUT.

Editing the Signal Path Analysis

You can perform the following tasks for the Signal Path Extraction window:

- **Specifying Lines**: You can specify number of lines (paths) to analyze. Click **Add** or **Remove** to increase or decrease the number of lines, respectively.
- **Specifying pin connections**: You can specify the following connections between your model that is being analyzed and S-parameter terms in **Pin Connections**:
  - Terminate unconnected pins in a model by using the icons in the Termination section. You can also drag and drop unconnected pins to end a connection.
  - View instances of S-parameter terms and termination are shown with these pins in the top pane.
  - View unconnected pins of your model that are analyzed in the bottom pane.
  - Generate a connection between pins of your model and S-parameter terms by using the drag and drop operation.



Creating a Signal Path Analysis

To analyze a signal path:

1. Select **Analysis** > **New analysis** > **Signal Path** or double-click the item displayed as **<new...>** in the SI/PI Analyzer window to create an analysis for signal path.
2. Type the required number of lines or click **Add** in the **Lines** frame.

3. In **Pin Connections**, generate a connection between pins of your model and source/loads by dragging pins from the unconnected pins section and drop on the required pin in the upper pane.
4. Click **OK** to create test bench schematic for the PDN analysis.

Performing Analysis

After creating an analysis, you can view it in the Analysis tree. By default, an analysis appears with a gray icon next to the analysis name, which means that the analysis has not been performed yet. If the analysis is successful, this icon is green in color.

To perform an analysis:

1. Select the required analysis for performing simulations.
2. Choose **Simulation** > **Run** or click the **Analysis** button to initiate simulations. Circuit simulations including EM co-simulation are performed sequentially.

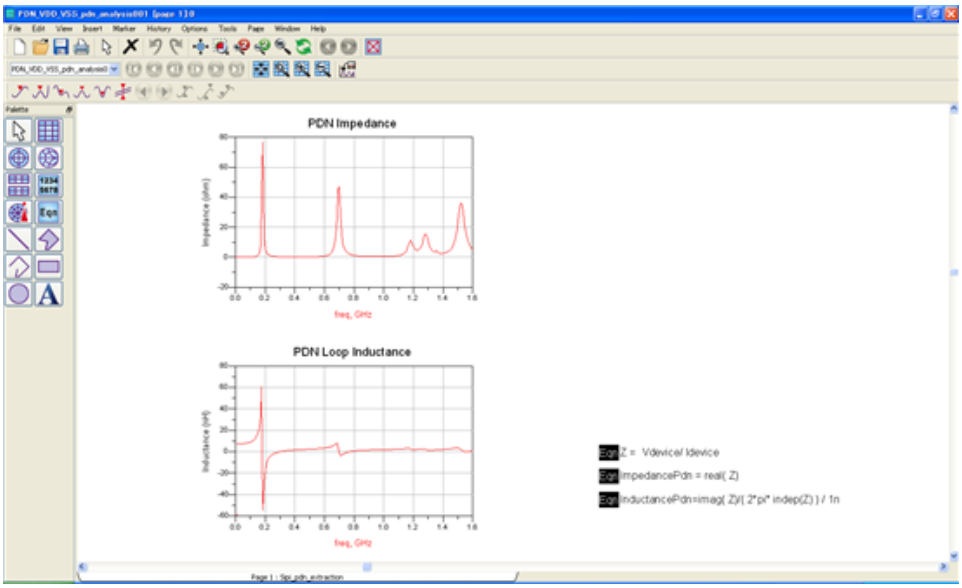
Viewing results

After successfully completing your analysis, you can view the analysis result in the Data Display window. You can also view the current distribution in the 3D Visualizer, if current distribution calculation is specified. However, this feature is applicable for a PDN analysis only.

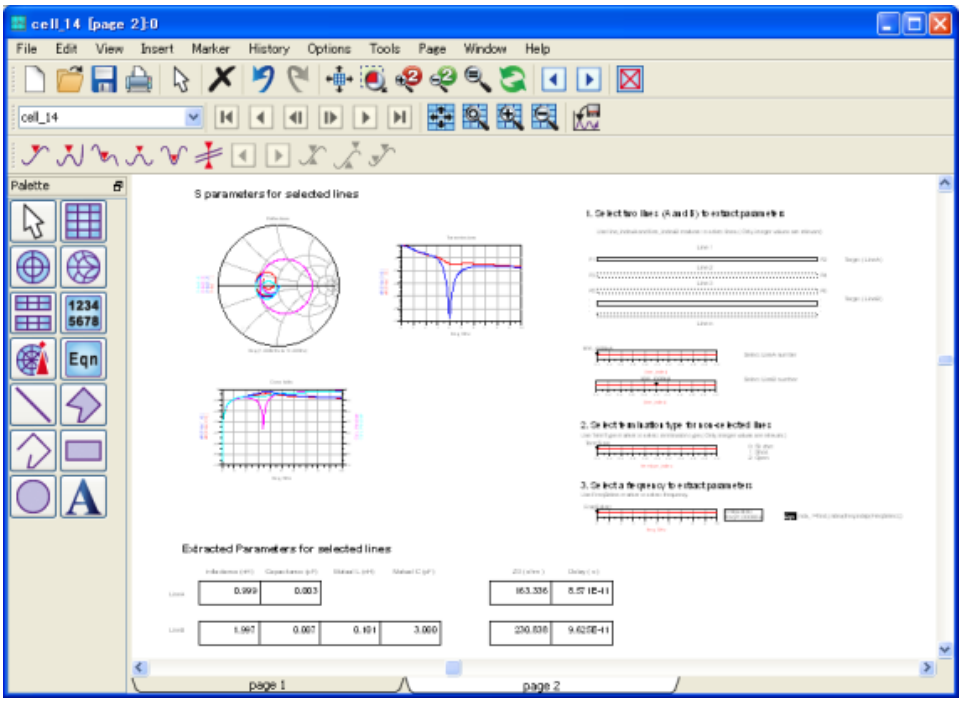
To view analysis results in the Data Display window:

1. Select an analysis with green icon in the SI/PI Analyzer window.

2. Click **Data Display** () to display results in the **Data Display** window. The following figure displays results of a PDN analysis:



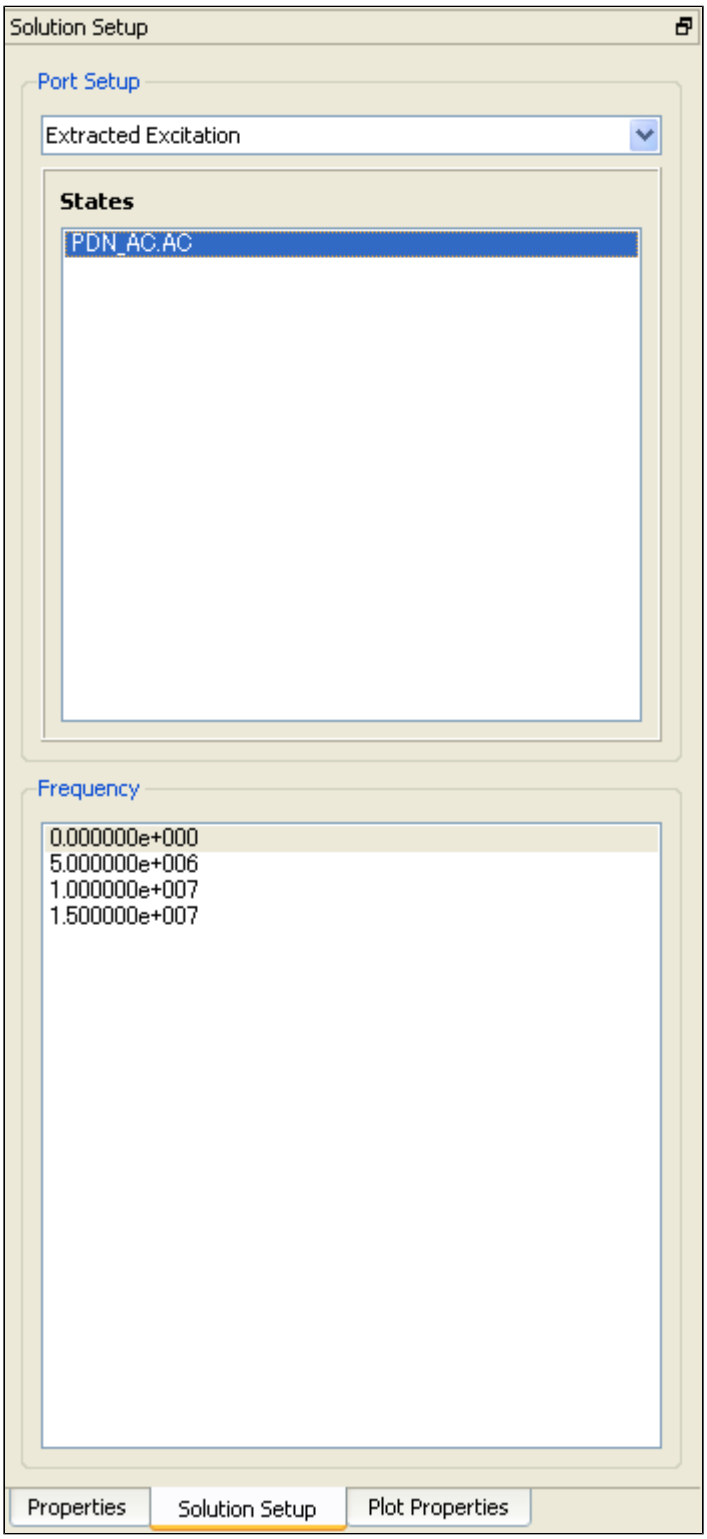
The following figure displays results of a signal path analysis:



To view the current distribution in the 3D Visualizer (PDN analysis only):

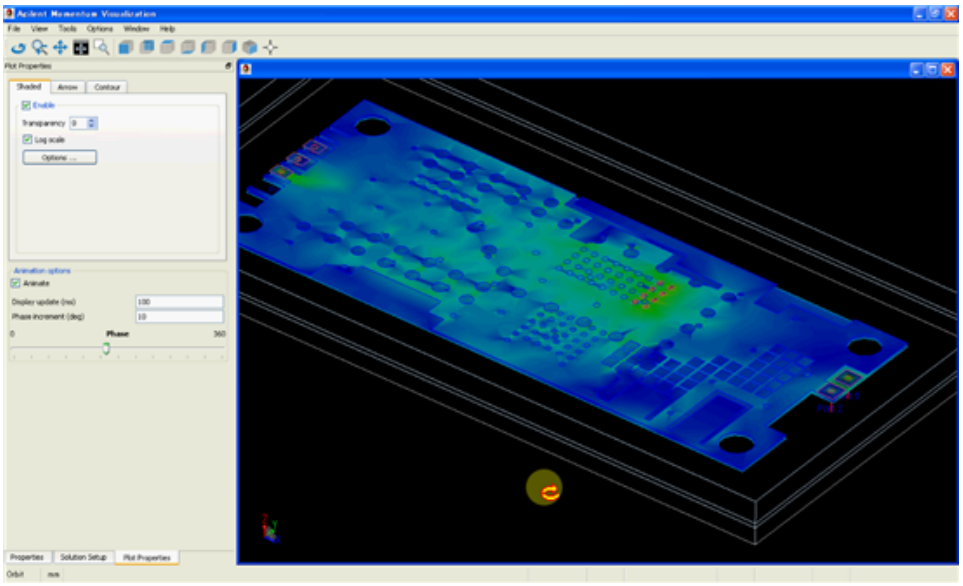
1. Select a PDN analysis with green icon.
2. Select **Show Current Distribution** menu in the context menu.

3. In the 3D visualizer, select the **Solution Setup** tab.



4. Select **Extracted Excitation** in the top drop-down combo box.
5. Select a state in the **States** list.
6. Select a frequency that you want to display.

7. The following figure displays an analysis in 3D Visualizer:

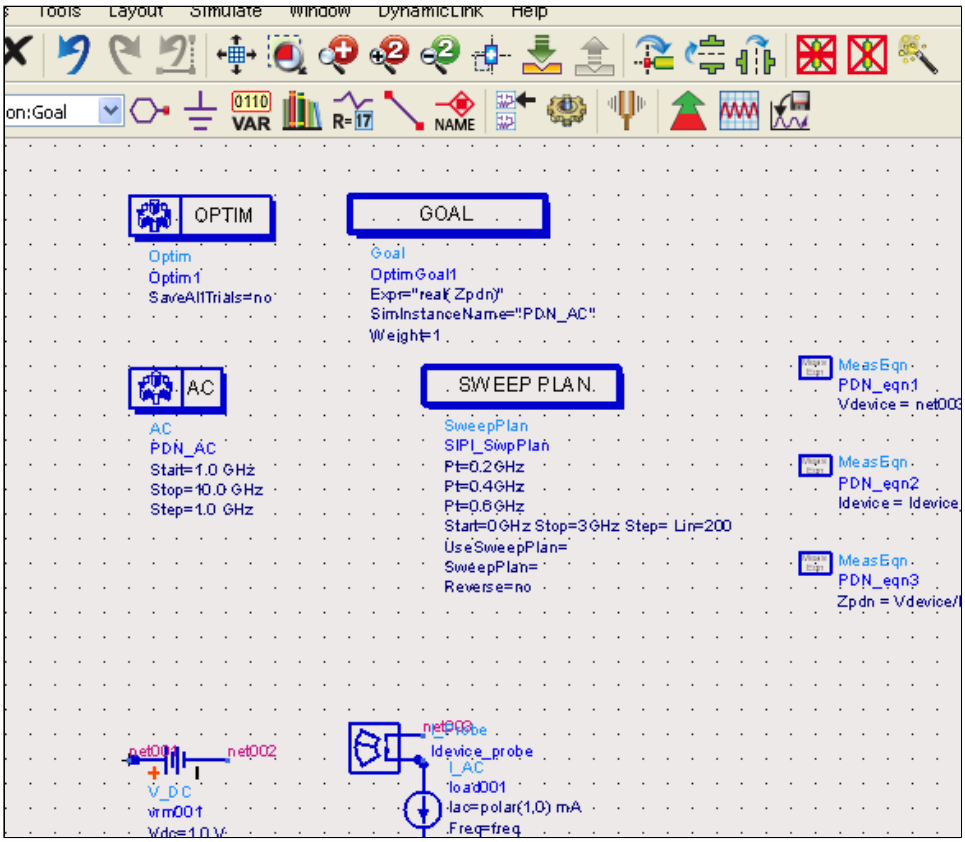


Example

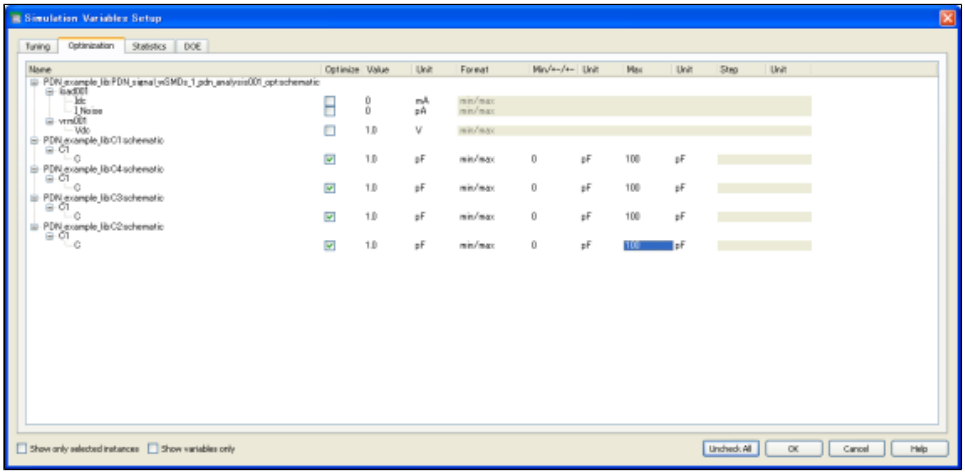
The following example describes how to optimize decoupling capacitor values. It also describes how to view the current distribution after the optimization.

1. Create a PDN analysis and setup it correctly.
2. Generate a test bench schematic from the above analysis.
3. Save the test bench schematic with a different name by selecting **File > Save as** in the Schematic window.

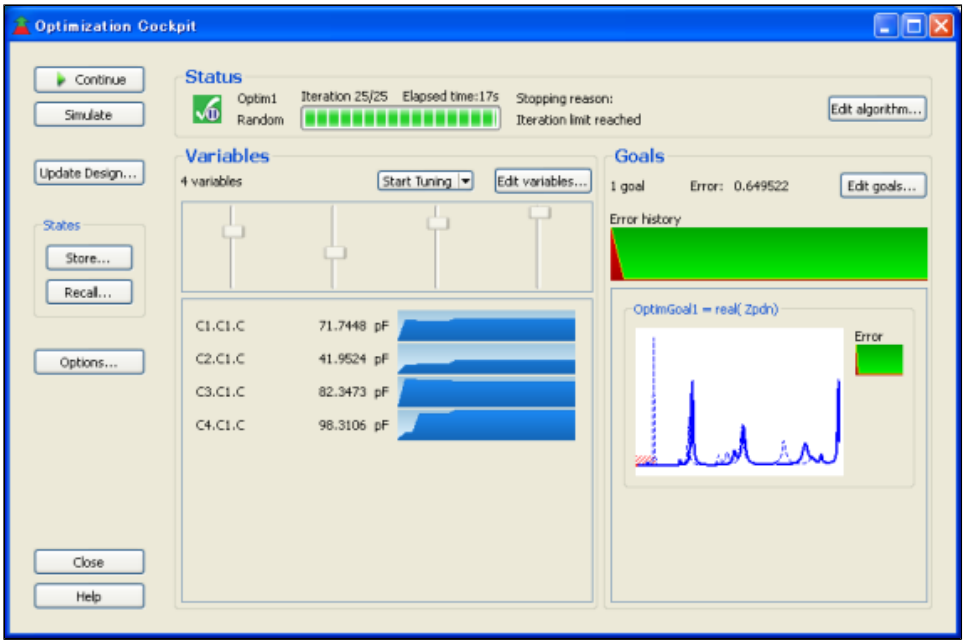
4. Place the optimizer and goals on the schematic and specify the settings accordingly.



5. Setup parameters of decoupling capacitor for optimization. Select **Simulate** > **Simulation Variable Setup** to open the **Simulation Variables Setup** dialog box, as shown in the following figure:



6. Click the **Optimize** icon to optimize the decoupling capacitors and update optimized values to the schematic when optimization is finished.

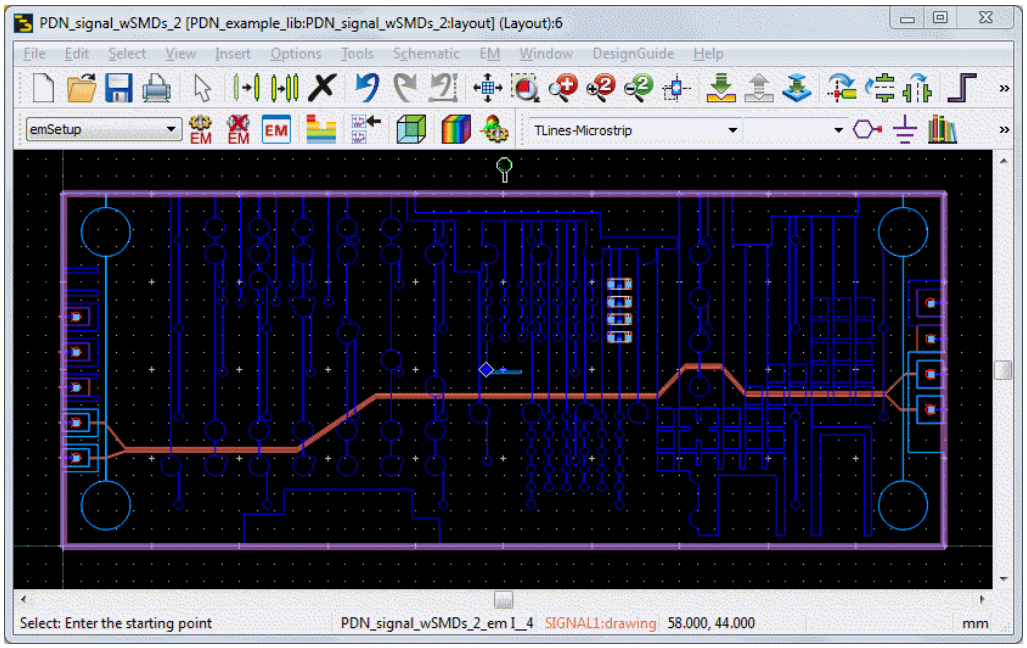


7. Open the SI/PI analyzer and copy the original PDN analysis with a different name and edit it to make sure **Calculate data for visualization** is selected.
8. Perform a simulation for the new PDN analysis. This PDN analysis is done with the optimized decoupling capacitor values.
9. Select **Show Current Distribution** to show current distribution with optimized decoupling capacitors.

Setting up SI and PI Analyzer

Setting up SI/PI Analyzer

The SI/PI Analyzer Setup wizard guides you through the process of creating a new hierarchical cell that contains only selected nets (physical interconnects) and components to be analyzed. All the objects that were not selected are removed from the output cell created by the wizard. You can use the hierarchical cell for circuit and EM simulations. The structures to be modeled by the Momentum EM simulator are grouped in a sub cell. Any components mounted on the interconnects are in the top level cell. The following figure displays the design of a hierarchical cell:



This cell is used to illustrate how the power distribution network can be setup for analysis.

NOTE

You need to connect all the top level pins with any other object before starting the SI/PI Analyzer Setup wizard. The SI/PI Analyzer Setup wizard checks it at the very beginning of setup and generates an error if it detects non-connected pins. To connect the pins correctly, you should setup the layer binding and process role (conductor and conductor via) correctly.

Example: Creating an SI/PI Analyzer Setup

The SI/PI analyzer setup is explained by using an example workspace present at the following location: $EESOFHOME\examples\Momentum\HighSpeedDigital\PDN_example_wrk.7zads

NOTE

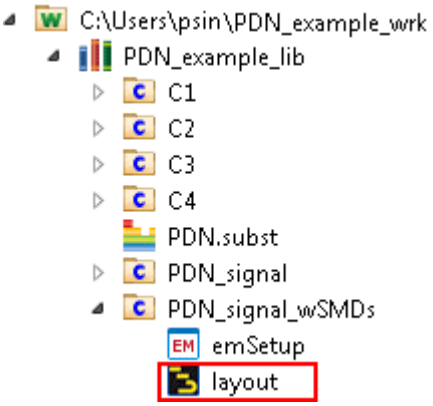
The HighSpeedDigital folder also contains another advanced example (PDN_PC3-UDIMM_wrk.7zap), which you can complete after using PDN_example_wrk.7zads.

Open the Example Workspace

1. Open the example workspace present at the following location:

   $HPEESOF_DIR\examples\Momentum\HighSpeedDigital\PDN_example_wrk.7zads

2. Open the layout view of the cell you want to analyze. In this example, from the Library View, open the layout present in the **PDN_signal_wSMDs** cell.



3. Select **Tools** > **Set Connectivity option** . The Design Connectivity Options window is displayed.
4. Select **WYSIWYG Mode: Physical connections only** and **Enable PCE: consider all shapes for making connections**.
5. Click **OK**.

Install the SI/PI Analyzer Addon

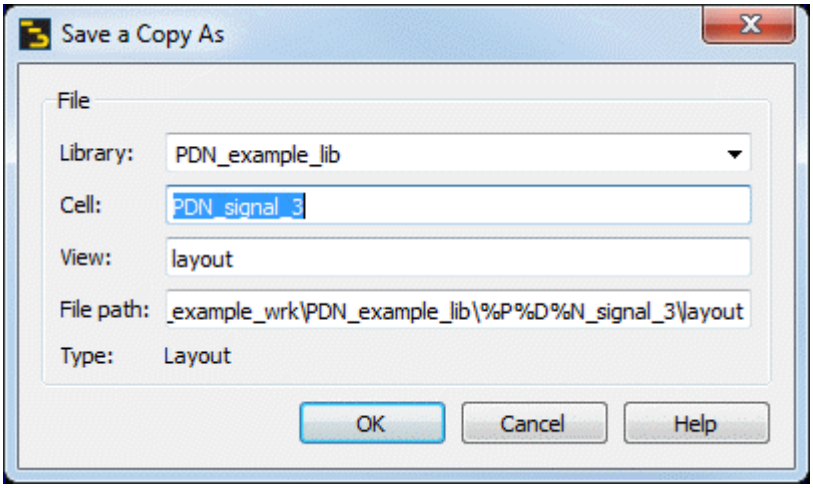
The legacy SI/PI analyzer is available as an addon. For more information, see Installing the SI/PI Analyzer addon.

SI/PI Analyzer Setup

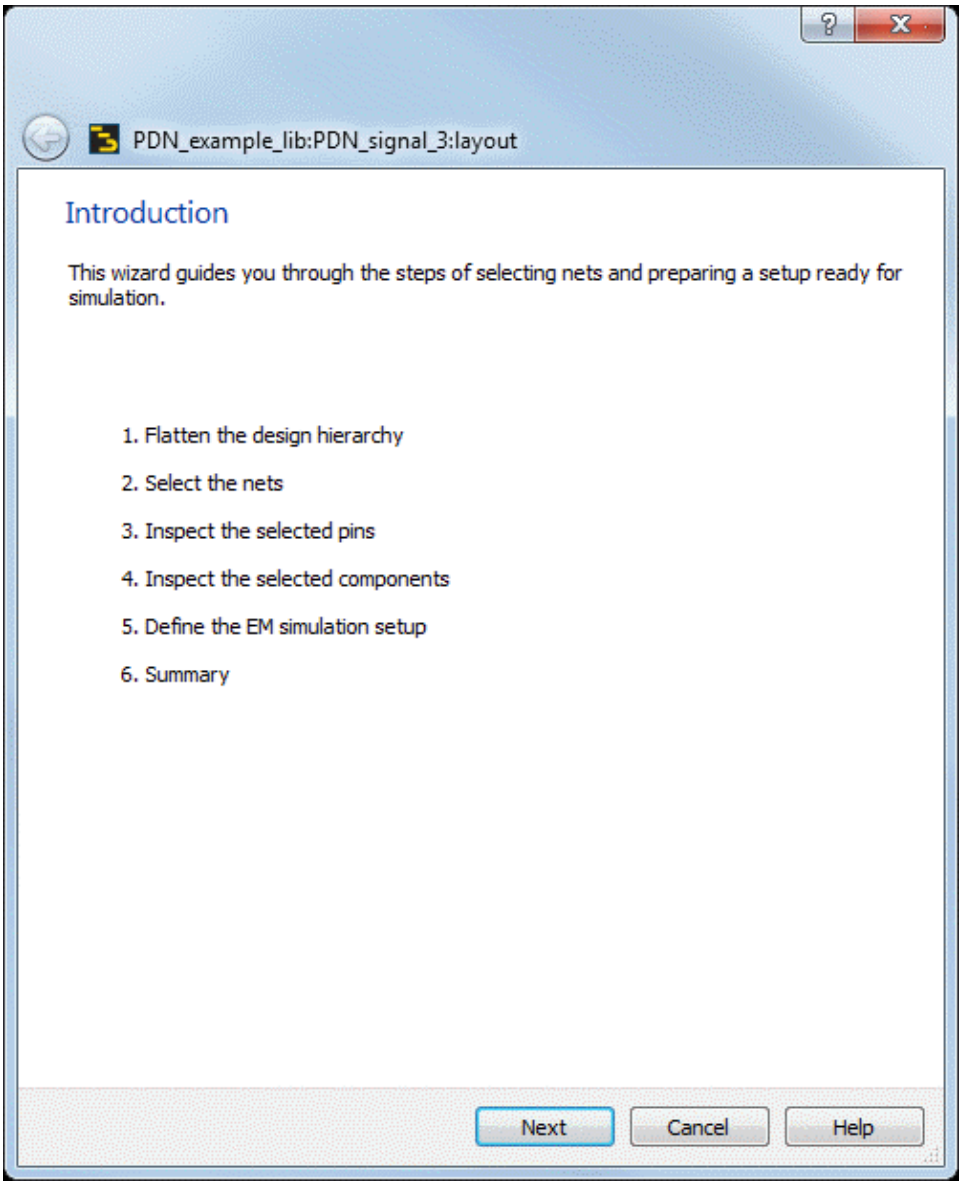
To create a SI/PI analyzer setup:

1. Open a layout window.
2. Select **SI/PIAnalyzer > Setup** in a layout.

3. A message box appears stating that SI/PI Analyzer Setup will modify the current cell and its descendants:
    - Click **Overwrite** to continue work in the current cell. Note that the cell is modified, for example unselected objects are removed from the cell.
    - Click **Copy** to save and modify a copy of the current cell. A copy of the current cell is saved under a new name and values in the current cell are not changed, as shown in the following figure:

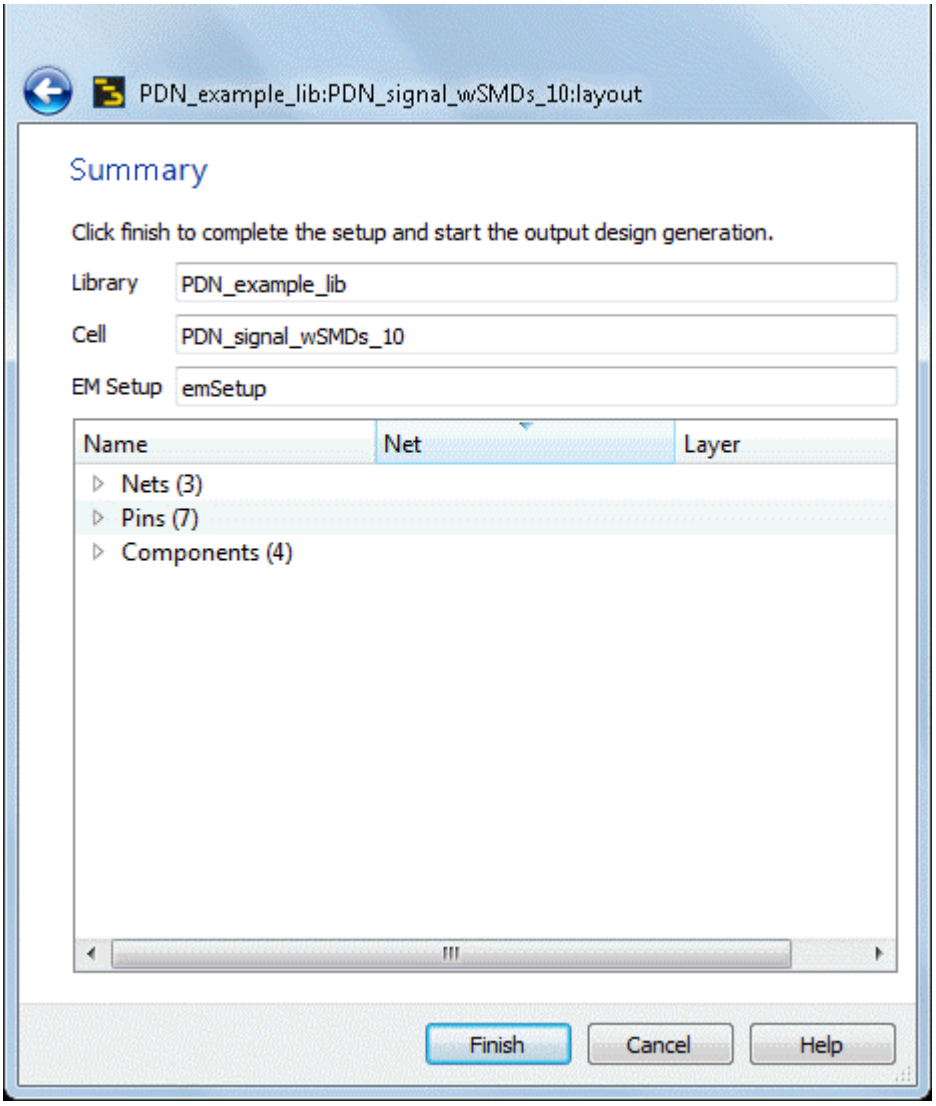


4. The **Introduction** screen is displayed that outlines the steps in the wizard, as shown in the following figure:

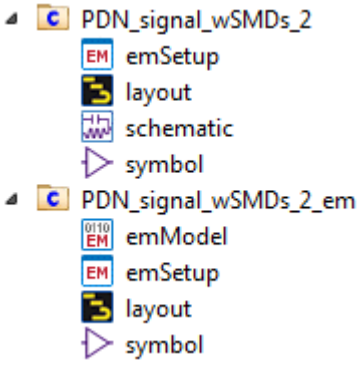


5. Click **Next** to display the **Flatten the Design Hierarchy** screen.
6. Specify the cells that you want to be modeled by EM simulation (applies to cells with components only). In this example, select **PDN_signal**. For more information, see Flattening the Design Hierarchy.
7. Click **Commit**. The **Nets** screen is displayed.
8. Select the nets to modeled by EM. For more information, see Selecting Nets.
9. Click **Next**. The **Pins** screen is displayed.
10. Inspect the pins connected to the selected nets. For more information, see Analyzing Pins.
11. Click **Next** to display the **EM Simulation Setup** screen.
12. Specify the EM simulation setup. For more information, see Specifying EM Simulation Setup.
13. Click **Next** to display the **Summary** screen.

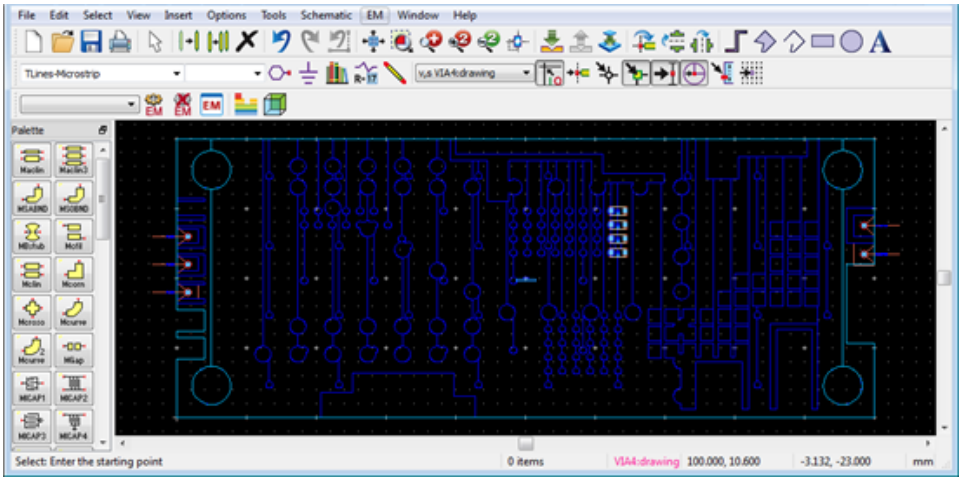
14. The Summary screen provides information about the library, cell, EM setup, and pins, as shown in the following figure:



15. Click **Finish** to create the output cells.
16. A message box appears stating the completion of the cells:
17. Click **OK** to open the SI/PI Analyzer analysis guide.
18. This creates two new cells as displayed in the following figure:



19. The top level PDN_signal_wSMDs_2 cell consists of a schematic, layout, and symbol view. This cell contains all component instances and an instance of the sub cell that bundles everything modeled by EM:



The sub level cell PDN_signal_wSMDs_2_em cell consists of a layout, symbol, emSetup, and emModel view. Everything is properly connected, the schematics used named connections, and are ready to be used in circuit and EM simulations.

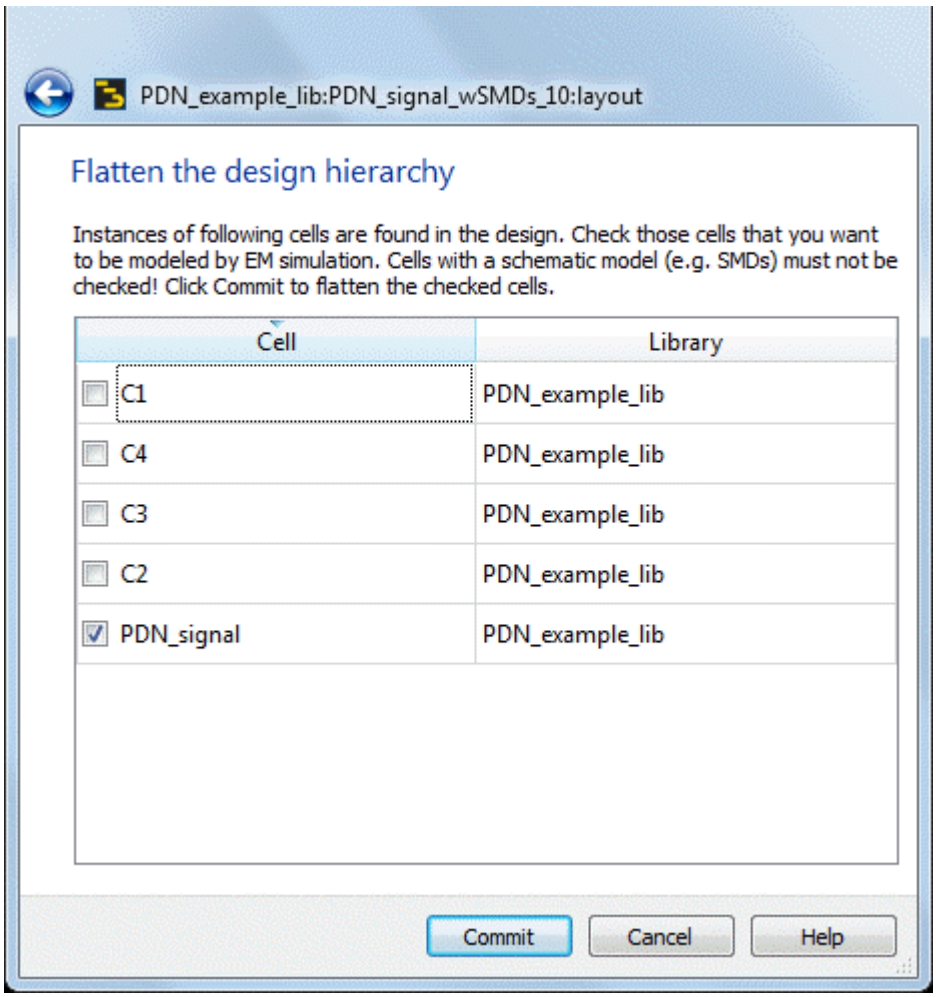
Flattening the Design Hierarchy

Using the Setup wizard, the **Flatten the Design Hierarchy** screen is displayed only when the instances of other cells are found in the current cell. You need to select all the instances that must be modeled by the EM simulation. Do not select cells with other components, such as schematic model cells SMDs. You must provide models for these cells in a schematic view of the component cells.

WARNING

SI/PI setup wizard adds a top level pin per inst pins of the components that you do not select here at the same location or layer of the inst pins so that other models such as schematic model can be connected later. Make sure that the layer of such component pins are correctly mapped in the substrate. Otherwise, having such top level pins are causing EM simulation errors later as these pins are not mapped in the substrate layers.

In the following figure, the PDN_signal cell contains a power net, a ground net, and two signal nets from a differential trace. This cell is modeled by EM. The other cells are instances of surface mounted device (SMD) components.



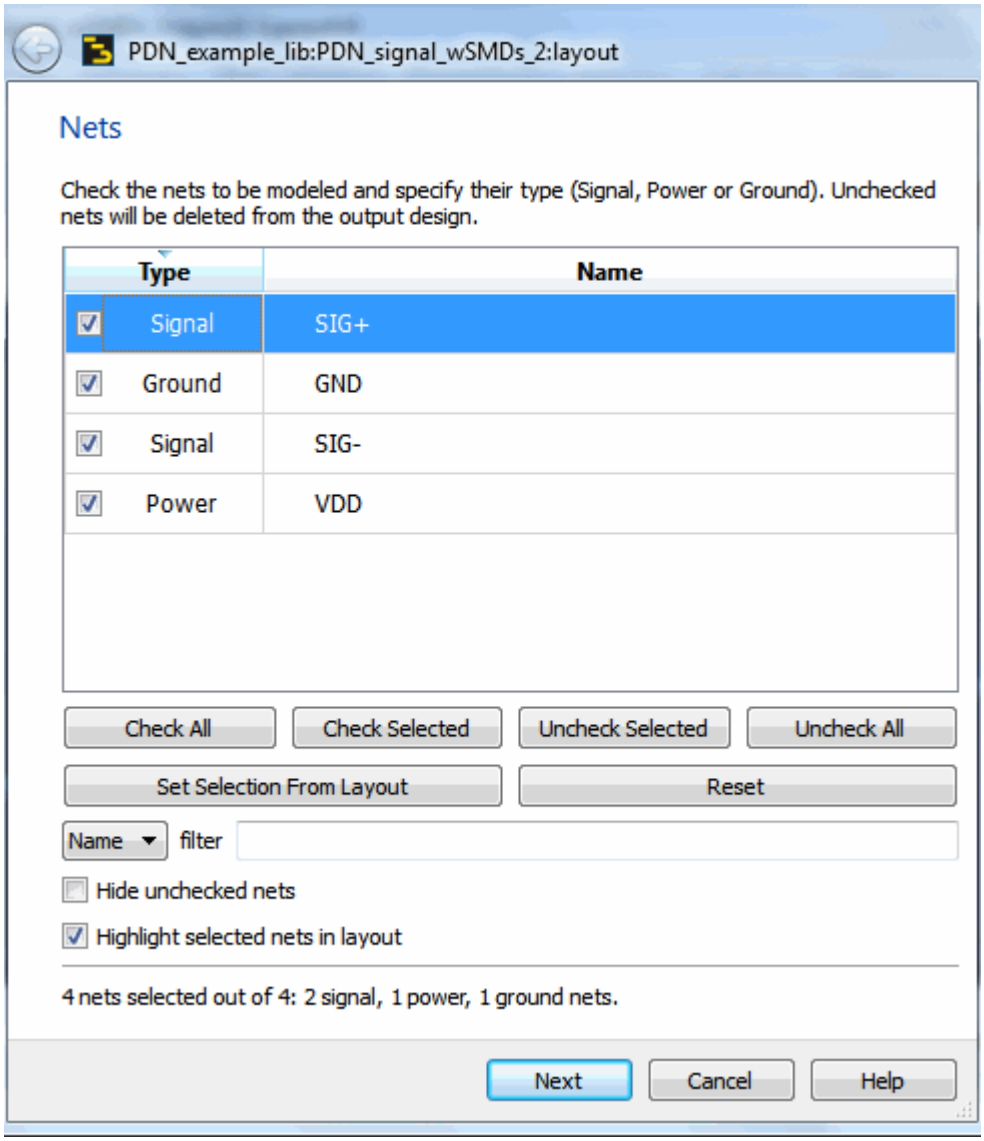
Click **Commit** to flatten the selected cells. This step is irreversible and modifies the current cell for the first time.

Selecting Nets

In the **Nets** screen, you need to specify the nets you want to analyze. The nets, extracted by the Physical Connectivity Engine, are shown in a table. Each net has a type and a name. The default net type is **Signal**. Other choices are **Power** or **Ground**. The net type facilitates sorting or filtering the nets. Double-click a net type to select the required type. The new name is stored in the cell and automatically updated in the table. Multiple PCE nets given the same name will be considered as one net in the SI/PI analyzer.The following names should be specified with a type:

Type	Name
Signal	SIG
Power	VDD
Ground	GND

The following figure displays the Nets screen in the SI/ PI Analyzer Setup wizard.

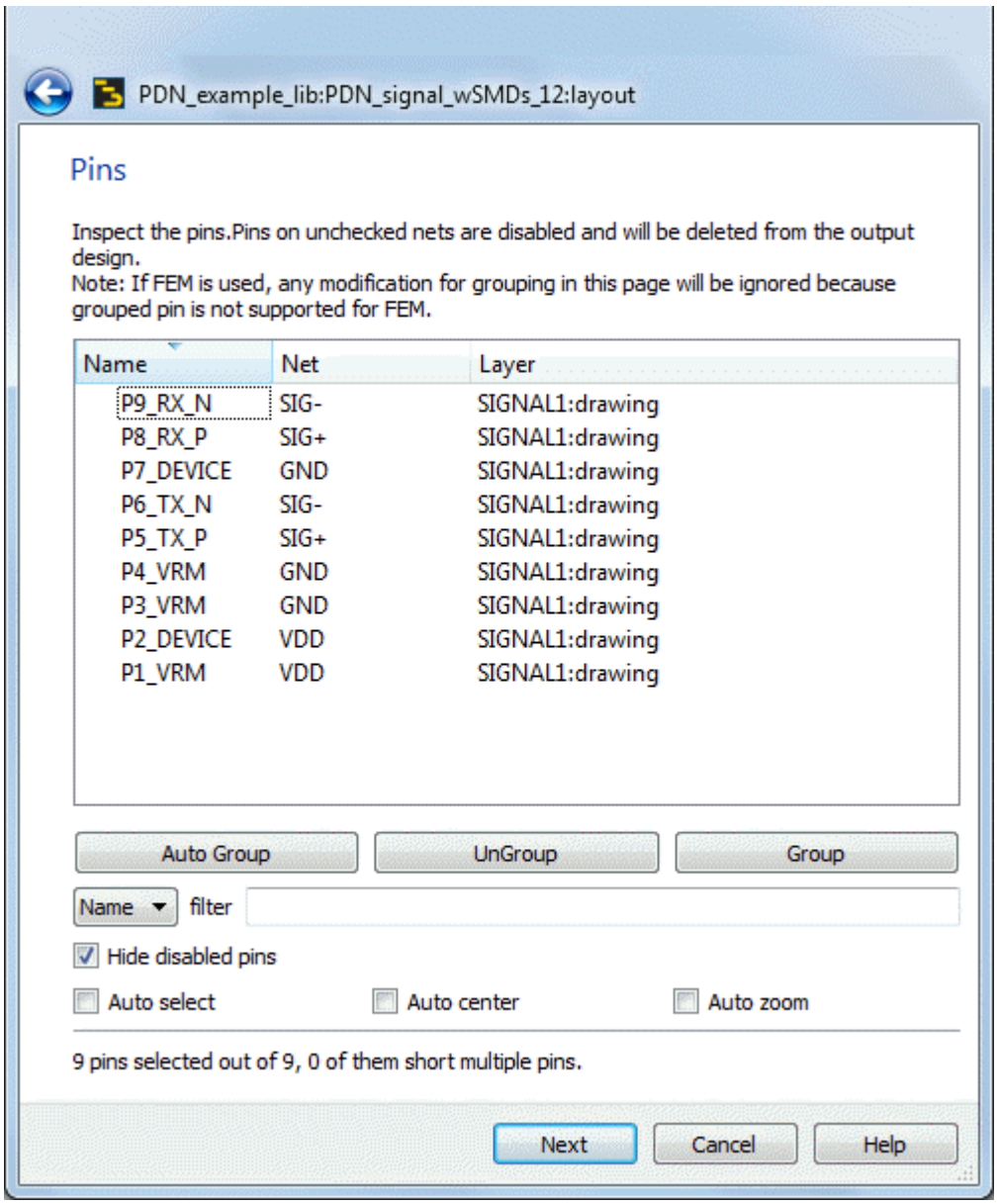


All selected nets are saved in the output cell. However, the nets that are not selected are excluded from the analysis. In the Nets screen, you can perform the following tasks:

- **Setting the Selection From Layout**: You can select all nets in the table based on the selection made in the layout by clicking **Set the Selection From Layout**. The layout is scanned for all selected shapes and pins. The corresponding net is selected in the table.
- **Filtering**: You can display the required nets in table based on type or name from the **Filter** list. Regular expressions are also supported while filtering the nets.
- **Selecting Nets**: You can hide the nets that are not selected int he Nets screen by selecting the **Hide unchecked Nets** option. You can also highlight selected nets in the layout window by selecting the **Highlight selected nets in layout** option.

Analyzing Pins

The Pins screen enables you to analyze the pins that are connected to the selected nets, as shown in the following figure:

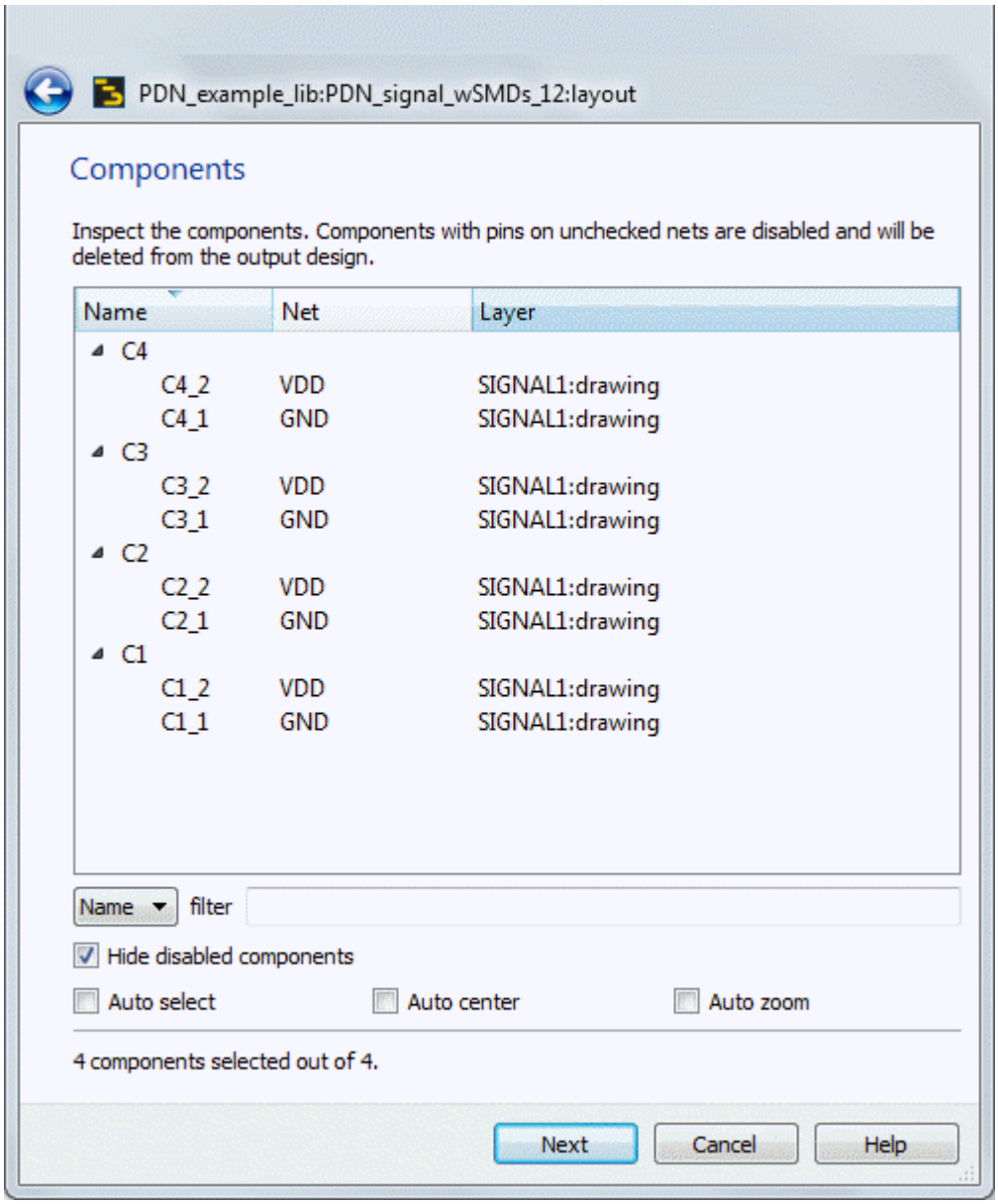


In the Pins screen, you can perform the following tasks:

- **Grouping pins automatically**: You can select pins in the table and create groups automatically for selected pins by selecting **Auto Group**. Pins on a same net and a same layer will become a group.
- **Removing pins from a group**: You can remove grouped pins by selecting the required group and click **UnGroup**.
- **Grouping Pins**: You can select the required pins and create a group by selecting **Group**. Grouping is possible for pins on a same net only.
- **Filtering**: You can display the required nets in table based on type or name from the **Filter** list. Regular expressions are also supported while filtering the nets.
- **Selecting Nets**: You can hide the nets that are not selected int he Nets screen by selecting the **Hide unchecked Nets** option. You can also highlight selected nets in the layout window by selecting the **Highlight selected nets in layout** option.

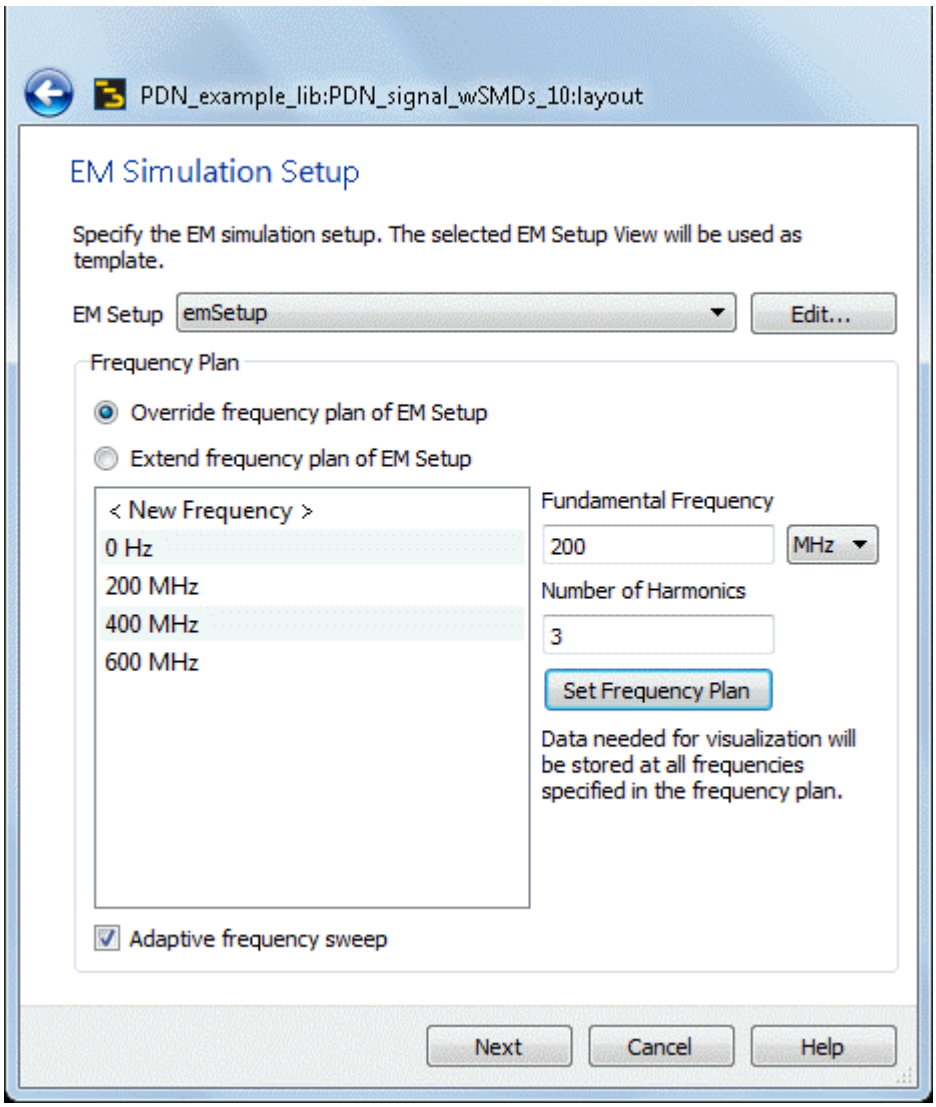
Inspecting Components

The Inspecting Components screen displays all the components connecting the selected nets. Components with pins on nets that are not selected are not included in the output cells.



Specifying EM Simulation Setup

The EM Simulation Setup screen allows you to specify the EM Setup used for generating an EM model. You can select the required view from the **EM Setup** list box. In the absence of existing views, a new EM Setup view named emSetup is created.



Click **Edit** to open the EM Setup window to define the required EM simulation settings.

In the EM Simulation Setup screen, you can define frequency by opening the EM Setup window. You can also override or extend the frequency plan specified in the EM Setup window by using the following options:

- Override frequency plan of EM Setup
- Extend frequency plan of EM Setup

In the EM Simulation Setup screen, specify a fundamental frequency and a number of harmonics and click **Set Frequency Plan**. You can also specify additional frequencies by double-clicking **<New Frequency >**.