Release Notes for Lattice Diamond 3.1

Welcome to Lattice Diamond®, the complete design environment for Lattice Semiconductor FPGAs. Lattice Diamond design software offers leading-edge design and implementation tools optimized for cost-sensitive, low-power Lattice FPGA architectures. Diamond is the next generation replacement for ispLEVER®, featuring design exploration, ease of use, improved design flow, and numerous other enhancements. Diamond is available for both the Windows and Linux operating systems. For details, see “System Requirements” on page 9.

This version of Diamond adds a variety of enhancements to make designing for Lattice Semiconductor programmable devices easier than ever. The design tools also include support for the latest Lattice Semiconductor devices. See “What’s New” on page 2.

Lattice Semiconductor offers a rich variety of information sources, including the Help system, PDF manuals, tutorials, and online discussions. The easiest way to reach them all is through the online Help. The first topic in the Help provides links to all the other sources of information.

You can also find extensive information about Diamond, it’s capabilities, tools, and workflow on the Lattice Semiconductor Web site under:

www.latticesemi.com/latticediamond

What's New

This release of Diamond provides a variety of new features in the following areas. See the online Help for details. Also see "Issues Fixed" on page 11 for known issues of the previous release that have been fixed.

New Device Support The following new devices are available with device programming enabled:

- MachXO3L

Documentation A new *Programming Tools User Guide* has been added. This document provides high-level descriptions of the major Diamond programming tools including Diamond Programmer, Deployment Tool, Programming File Utility, Model 300, and the driver installation utility. This document also contains extensive technical information on Lattice Embedded VME, which consists of JTAG Full VME Embedded, JTAG Slim VME Embedded, Slave SPI Embedded, I2C Embedded, and sysCONFIG Embedded types. This embedded chapter combines and updates content that was previously contained in separate Technical Notes.

A printable PDF version of the *FPGA Libraries Reference Guide* is available at *<install_dir>*/docs/manuals/fpga_library.pdf. The PDF version is identical to the guide in the online help.

EPIC The EPIC user interface has been redesigned.

IPexpress IPexpress™ includes updates to many modules. For more information, open the online Help and go to Lattice Module Reference Guide.

LatticeMico System LatticeMico™ System updates include:

- Updates to SDRAM controller (v3.8), SPI Flash (v3.5), GPIO (v3.5), Fault Logger (v1.1), and EFB (v1.5) components.
- Programmer cable names have been changed throughout.
- An additional LatticeMico32 Optimization option: Optimization Level s(-0s), has been added to LatticeMico32 SPE.

For more information, refer to the "LatticeMico System Software Release Notes for Diamond." To access the release notes:

- If LatticeMico System is installed with Diamond, go to the Windows Start menu and choose **Programs > Lattice Diamond > Accessories > LatticeMico System Release Notes**.
- If LatticeMico System is installed as a stand-alone tool, go to the Windows Start menu and choose **Programs > Lattice Diamond > LatticeMico System Release Notes**.

Main Window The Process > Refresh Process command has been changed to the more complete Design > Refresh Design. The new command not only refreshes the Process view after changing a source file, but also updates the Hierarchy view, HDL Diagram, and Reveal Inserter.

The new File > Save Project As command saves a copy of the whole design project under another name. This can be an easy way to start another, similar design.

Messages You can promote warning messages to the error level so that warnings that are especially important to you are easier to spot. For more information, open the online Help and go to Managing Projects > Viewing Logs and Reports > Changing Warnings to Errors.

Platform Designer Platform Designer's new Hot Swap utility enables you to configure a component for controlling the in-rush current in applications where power is rapidly applied. Such an application can include a line card, blade, or a PCB that is plugged into a "hot" backplane. For more information, open the online Help and go to Designing with Lattice Diamond Platform Designer > Configuring Hot Swap.

Programmer Programming File Utility has been enhanced. You can now edit Feature Row Fuse settings for MachXO2, MachXO3L, and Platform Manager 2 devices; edit Control Register0 values of a bitstream file; and edit USERCODE in the data file. For more information, open the online Help and go to Programming the FPGA > Using Programming File Utility.

Programming Cable Names Lattice USB and Parallel cables have been renamed as follows:

Table 1: New Programming Cable Names

Old Cable Names	New Cable Names	New Complete Cable Names
USB	HW-USBN-2A	Lattice HW-USBN-2A USB port programming cable
USB2	HW-USBN-2B (FTDI)	Lattice HW-USBN-2B (FTDI) USB programming cable
Lattice	HW-DLN-3C (Parallel)	Lattice HW-DLN-3C parallel programming cable

Reports The Map report has been enhanced to show the number and percentages of resources used out of the total resources in the device. For more information, open the online Help and go to Implementing the Design > Mapping > MAP Report File.

Reveal Reveal Analyzer has the following enhancements:

- It can avoid the test-logic-reset JTAG state when using a USB cable. JTAG chains that require the assertion of TRST can get out of sync when using Reveal. When starting Reveal Analyzer with a new file, select **Avoid TLR State**.
- The minimum frequency of the sample clock has been reduced from three times the JTAG clock to the same as the JTAG clock.

Simulation (Windows version) The Aldec® Active-HDL™ Lattice Edition simulator has been updated.

Synthesis Tools The Synopsys® Synplify Pro® for Lattice and Lattice Synthesis Engine (LSE) synthesis tools have been updated.

LSE supports the new MachXO3L devices.

LSE supports VHDL2008. To use this version of VHDL, go to the LSE strategies and set VHDL 2008 to **True**.

Selection of a synthesis tool is now done directly in the Project Properties dialog box. For more information, open the online Help and go to Managing Projects > Setting Options for Synthesis and Simulation > Selecting a Synthesis Tool.

Supported Devices

Lattice Diamond can be used with either a free license or a subscription license. The two licenses provide access to different device families.

Device Family	Free License	Subscription License
ASC	◀	◀
LatticeEC™	◀	◀
LatticeECP™	◀	◀
LatticeECP2™	◀	◀
LatticeECP2M™		◀
LatticeECP2S		◀
LatticeECP2MS		◀
LatticeECP3™		◀
LatticeSC™		◀
LatticeSCM™		◀
LatticeXP™	◀	◀
LatticeXP2™	◀	◀
MachXO™	◀	◀
MachXO2™	◀	◀
MachXO3L	◀	◀
Platform Manager™	◀	◀
Platform Manager 2	◀	◀

Updating Projects from an Earlier Version

If you want to work on a design project created with an earlier version of Diamond, start with the following procedures. These procedures adapt the project for the changes in Diamond.

Find out which version of Diamond your project was created with. Then work through the changes for that and every later version, starting with the earliest and going to the most recent. For example, if your project was created with Diamond 1.1, you would start with the changes for 1.1. After completing those changes, you would work on the changes for 1.2, then 1.4, and so on.

When you open a project from Diamond 1.2 or earlier, Diamond opens a dialog box warning that Diamond will automatically move all SDC files to the Synthesis Constraint Files folder in File List view and remove the “Input SDC Constraint File” options from the strategies. If the project is using LSE, the file names will be changed to use an .ldc extension.

Once saved, the project will not be compatible with earlier Diamond versions.

2.0.1 Projects

The default values of several strategy options were changed. If you are using Synplify Pro in integrated mode (running synthesis automatically in Diamond), check that the following settings are still as you want them. Also, check the setting of the Auto Hold-Time Correction option under Place & Route Design. Its default changed to On for all devices.

Table 2: New Default Values for Synplify Pro for Lattice

Option	Before	Now
Fanout Limit is now Fanout Guide	100	1000
Export Diamond Settings to Synplify Pro GUI (new in 2.2)	Not available	No
Fix Gated Clocks and Fix Generated Clocks combined into new Clock Conversion	3 (converts and reports all sequential elements)	True (converts with no report)
Frequency	200	auto (blank means “auto”)
Number of Critical Paths	3	blank (unspecified)
Number of Start/End Points	0	blank (unspecified)
Output Preference File	False	True
Pipelining and Retiming	False	Pipelining Only
Resolved Mixed Drivers	True	False
Use Clock Period for Unconstrained I/O	True	False

1.4 Projects

For Diamond 1.4 and earlier, there might be some constraints that are not honored because of the Synplify Pro cross-probing feature. This EDIF renaming is usually related to bus names.

If such a problem occurs, you can turn off the renaming feature by placing the following line in the “Command line Options” text box of the Synplify Pro section of the active strategy:

set_option -syn_edif_array_rename 0

1.2 Projects

There were several enhancements for IP and MachXO2.

IP Incompatibilities

SPI4.2 2.7 is not compatible with Diamond 1.3 or later. If you are using this IP, check the Lattice Semiconductor Web site for a more recent version.

MachXO2 Changes

See if your design involves any of the following features:

- For EFB modules with user flash memory (UFM), regenerate the module.
- For IO_TYPE=PCI33 on a MachXO2-1200 or larger device, check if the CLAMP is using the default setting. With Diamond 1.3 the CLAMP default changes from ON to PCI and the I/O will be placed in bank 2. If you were using the default and still want the setting to be ON, you need to set it explicitly.
- For PCI33 MT 6.5 and PCI33 T 6.4 IP, either set the CLAMP to ON explicitly or choose a bigger package (256 or more).

1.1 or 1.0 Projects

There were several enhancements for IP and MachXO2.

IP Incompatibilities

The following IP versions are not compatible with Diamond 1.2 or later. If you are using any of these IP, check the Lattice Semiconductor Web site for a more recent version.

- Convolution Block Encoder 3.6
- DDR1 6.9
- DDR2 7.1
- DDR3 1.2.1
- DDR1_CP 1.1 with MachXO2
- DDR2_CP 1.1 with MachXO2
- Interleaver Deinterleaver 3.5
- PCI_MT_33 6.4
- PCIe RC Lite 1.2
- Tri-Speed MAC 3.4
- Viterbi Block Decoder 4.6

MachXO2 Support

Some aspects of the software support for MachXO2 designs have been improved. See if your design involves any of the following features:

- The 4K/7K design with PLL has a CIB-to-PLL jump change. If you are using this design, recompile it.
- The EFB simulation model has changed. If you are using the EFB module, rerun your simulation tests to see more accurate results.
- In the DDR_GENERIC module of IPexpress, the GDDRX1_RX.Aligned with PLL interface is no longer supported. If you are using such a module, use IPexpress to regenerate it without the PLL option.

Also, MachXO2 has IP evaluation capability and TransFR mode for all I/Os.

Migrating ispLEVER Projects

Diamond uses a different project structure than ispLEVER and cannot directly open an ispLEVER project. However, design projects created in ispLEVER can easily be imported into Diamond. The process is automatic except for the ispLEVER process properties, which are similar to the Diamond strategy settings, and some modules and IPs. All of your ispLEVER project source will be automatically handled.

Projects created using ispLEVER can be imported into Lattice Diamond through two different paths:

- On the Start Page, click **Import ispLEVER Project** (in the upper-left corner).
- From the File menu, choose **Open > Import ispLEVER Project**.

Follow the directions in the dialog box that opens to convert your ispLEVER project into a Lattice Diamond project.

Limitations to the import/conversion process include:

- NGO files in ispLEVER projects need to be manually copied into the Lattice Diamond project if the NGO files were originally copied into the ispLEVER project. For example, NGO files that were copied from Lattice IP generation.
- The .lpc files are replaced with .ipx files in Lattice Diamond. You need to regenerate your IP by double-clicking on the .lpc file. The resultant wizard will help you generate the new .ipx file, replacing the old .lpc file.

More information on importing ispLEVER projects can be found in the *Lattice Diamond User Guide*, online Help (see Managing Projects > Importing ispLEVER Projects), and training videos on the Lattice Web site.

Supported Third-Party Tools

This version of Diamond has been tested with the following third-party tools:

- Active-HDL™ 9.3
- Modelsim® (SE) 10.1c-se
- NC-Sim 11.10-s025
- QuestaSim 10.1a
- Riviera 2012.06
- Synplify Pro I-2013.09L
- VCS D-2010.06

Other Information Resources

Other available information resources for the Diamond software include the following.

- General Information: General information on Lattice Diamond can be found on the Lattice Web site at:

  www.latticesemi.com/latticediamond

- Online Help: Start Lattice Diamond and choose **Help > Lattice Diamond Help**.
- *Lattice Diamond User Guide*: This document can be found from a link on the Start Page view.
- Training Videos: Several short videos are available on different aspects of the Lattice Diamond software. These can be viewed online at:

  www.latticesemi.com/latticediamond

  Click the **Videos** tab.

System Requirements

The basic system requirements for Lattice Diamond are:

- Intel Pentium or Pentium-compatible PC, or AMD Opteron system support (Linux only)
- One of the following operating systems:
  - Windows XP, Windows Vista (32-bit), or Windows 7 (32-bit or 64-bit).

    Note: Windows 8 is *not* supported.
  - Red Hat Enterprise Linux 4.X, 5.3, or 6. The host operating system can be either 32-bit or 64-bit.

    Version 5.3 of Red Hat Enterprise Linux has some extra installation requirements. See “Configuring Red Hat 5.3” on page 11.
  - Novell SUSE Linux Enterprise 10 SP1 or 11 operating system. Novell SUSE Linux supports 32-bit only.
- Approximately 5.75 GB free disk space
- RAM adequate for your FPGA design. For guidelines see “Memory Requirements” on page 9.
- Network adapter and, for a floating license, network connectivity

  A node-locked license is based on the physical (hard-coded) address provided by the network adapter. Network connectivity is not required for a node-locked license. In the absence of a network connection, you can install the NWLink IPX/SPX protocol to force recognition of your NIC card ID (see the installation notice).

  A floating license requires access to the license server, so both a network adapter and connectivity are required.
- JScript-capable Web browser
- Acrobat Reader 5.0 or later

Memory Requirements

Table 3 lists the minimum memory requirements and the recommended memory for the Lattice Semiconductor devices supported by Diamond.

On Windows, designing for the largest FPGAs may require more than the usual 2 GB of memory found in 32-bit computers. For help in extending your memory to 3 GB, see “Extending Memory on Windows” on page 9. Designing for LatticeECP3 with more than 95K LUT on a Windows system requires a 64-bit operating system.

Extending Memory on Windows

Designing for LatticeECP3 may require more than the 2 GB normally available with 32-bit Windows systems. But you can configure Windows to use up to 3 GB of memory.

Table 3: Recommended Memory

Device	Size	32-Bit Operating Systems		64-Bit Operating Systems	
		Minimum	Recommended	Minimum	Recommended
LatticeEC, LatticeECP	Up to 20K LUT	512 MB	768 MB	1 GB	1.5 GB
	Up to 50K LUT	768 MB	1 GB	1.5 GB	2 GB
LatticeECP2/M	Up to 20K LUT	768 MB	1 GB	1.5 GB	2 GB
	Up to 50K LUT	1 GB	1.5 GB	2 GB	3 GB
	Up to 100K LUT	1 GB	2 GB	2 GB	4 GB
LatticeECP3	Up to 95K LUT	2 GB	3 GB	4 GB	6 GB
	Up to 150K LUT	3 GB	4 GB	6 GB	8 GB
LatticeSC/M	Up to 40K LUT	768 MB	1 GB	1.5 GB	2 GB
	Up to 115K LUT	1 GB	2.5 GB	2 GB	5 GB
LatticeXP, LatticeXP2	Up to 20K LUT	512 MB	768 MB	1 GB	1.5 GB
	Up to 50K LUT	768 MB	1 GB	1.5 GB	2 GB
MachXO, MachXO2, MachXO3L	All	256 MB	512 MB	512 MB	1 GB
Platform Manager, Platform Manager 2	All	256 MB	512 MB	512 MB	1 GB

Note that increasing the amount of memory available to applications, decreases the amount available for the file cache, paged pool, and nonpaged pool, which can affect applications with heavy networking or I/O.

In Windows XP

In Windows XP Professional, add the **/3GB** switch to the end of the startup line in the boot.ini file. For details, see the following Microsoft articles:

- "Windows XP SP1 May Not Start with the /3GB or /USERVA Switch": support.microsoft.com/?kbid=328269
- "How to edit the Boot.ini file in Windows XP": support.microsoft.com/default.aspx?scid=kb;en-us;q289022
- "Memory Support and Windows Operating System" shows an example of the boot.ini with the /3GB switch: msdn.microsoft.com/en-us/windows/hardware/gg487508.aspx

In All Other Versions of Windows

Use the **BCDEdit /set increaseuserva 3072** command to set the boot entry option to 3 GB. For details, see Microsoft article "BCDEdit /set": msdn.microsoft.com/en-us/library/ff542202.aspx

Configuring Red Hat 5.3

Red Hat Enterprise Linux 5.3 has some extra requirements for Diamond:

- In addition to the basic installation of Red Hat 5.3, under Development/ Legacy Software Development, select:

  `1:gtk+-1.2.10-56.el5.i386 - GIMP Toolkit (GTK+) sb:(9 of 9)`

  Under Base System/Legacy Software Support, add the following to the default items:

  `Openmotif22-2.2.3-18.i386 - Open Motif runtime`

  Proper Diamond operation depends upon these libraries being installed.

- When installing the Red Hat Enterprise Linux version, be sure to install the PERL modules XML::Parser, XML::DOM, and XML::RegExp. These PERL modules are available at www.cpan.org.

Issues Fixed

The following known issues are fixed with this release. Their workarounds are no longer needed.

Design Entry

Platform Designer displays Current Monitor trip points that are inconsistent with the datasheet

The trip points displayed in the Current Monitor Trip Point Selection menu differ, depending on the Hysteresis option selected. When Enabled is selected for Hysteresis, the trip points displayed are inconsistent with those in the datasheet. The correct trip points are those displayed when Disabled is selected, and the menus should be the same for both Enabled and Disabled hysteresis.

Devices affected: Platform Manager 2
CR117823

Signal groups are not supported in the Platform Designer Generate Stimulus dialog box

In the Diamond Platform Designer, signal groups do not appear in the Generate Stimulus dialog box. To work around this issue, select individual group members one by one.

Devices affected: Platform Manager 2
CR102680

Other Areas

VME file missing USERCODE verification opcode

Deployment Tool, with the Verify USERCODE option, does not include the opcode for USERCODE Verification test (case VUES = 0x61) at the beginning of the VME hex file.

Use ispVM System to generate the VME file instead.

Devices affected: All
CR117915

Debug Configuration operation may time-out over a slow Linux network

When running the Linux version of LatticeMico System software remotely over a slow Linux network connection, the Run > Debug Configuration operation may hang or display an “Unknown Device” error message.

The workaround is to debug your design using the LatticeMico System software installed on a local computer (PC or Linux), rather than running over a Linux network.

Versions affected: All LatticeMico System software versions
Devices affected: All
CR117821

The MachXO2 SEDFA simulation model does not contain timing requirements for the signal SEDFRCERR

The MachXO2 SEDFA simulation model does not contain timing requirements for the signal SEDFRCERR.

Refer to the latest version of Lattice Technical Note TN1206 for the correct timing requirements.

Device affected: MachXO2
CR58746

Known Issues

Following are known issues with this release and workarounds for them.

Design Entry

Platform Designer rejects multiple hot swap components on an ASC

When you run DRC, after creating two or more hot swap components with fast shutdown enabled on the same ASC device, Platform Designer generates an error message similar to the following:

ASC_NONE can’t be used in HotSwap1 and HotSwap2 at the same time.

There is no workaround for this issue.

Devices affected: Platform Manager2
CR119823

Removing an implementation from Diamond does not delete the result files from the implementation directory

Removing an implementation from Diamond will not delete the result files from the implementation directory.

Manually delete the files or the implementation directory if needed. If deleting the implementation directory, be careful to make sure that there are no source files in the implementation directory.

Devices affected: All
CR48000

User Interface

Spreadsheet View takes a long time to open

For large projects, it might take a minute or longer for Spreadsheet View to open. This is because of the time needed for real-time PIO design rule checking as the design is loaded.

Devices affected: All
CR56872

Help does not work in Google Chrome browser

When you try to open the help with Google Chrome, the browser displays an empty window. If you get the help from a server it works fine, but if you get the help from your local computer there's nothing.

This is because Google added a security feature in March 2010 that interfered with the file:// protocol, which is at the heart of browser-based help that Diamond and other Lattice software uses. (This affects the help of many other companies' software too.)

Workarounds include:

- Open a different kind of browser (such as Internet Explorer) and browse to the index.htm file of the software's help.
- Set a different kind of browser as your default browser.
- Install the Lattice software on a server.
- Open Chrome from a command prompt with the following flag:

  ```
  chrome --allow-file-access-from-files
  ```

  Note: Doing this means that when you open any Web page that is resident on your computer—not just Diamond Help—the page will automatically run any active content that it has. While active content is common and can be very useful, malicious content can damage your files. Be sure you trust the software on your computer.

Devices affected: All
CR53868

Regions and groups in Physical View are not displayed in the colors assigned to them

Physical View displays only fixed colors for different elements such as regions, groups, sites, and delay paths. It does not support customized color settings. Therefore, the borders of all regions and groups are displayed in the same default color on the layout. They are not displayed in the colors that were assigned to them.

To view regions and groups in their assigned colors on the layout, open Floorplan View.

Devices affected: All
CR50166

Physical View does not match delay path colors or allow custom colors

Physical View displays only fixed colors for different elements such as delay paths, regions, groups, and sites. Therefore, when you cross-probe a delay path from Timing Analysis View, Physical View highlights the path in the same default color. It does not show the path color that is displayed in Timing

Analysis View or allow you to manually change the color. Currently there is no way to distinguish the color of individual delay paths in Physical View. However, if you cross-probe to Floorplan View from Timing Analysis View, you will see the delay paths distinguished by color.

Devices affected: All
CR47031, CR49201

Other Areas

Reveal Analyzer fails to open on Windows 8

Diamond does not support the Windows 8 operating system. Reveal Analyzer fails to open.

Run Diamond on a different operating system.

Devices affected: All
CR118978

Synthesis fails with schematic file on Windows 8

Diamond does not support the Windows 8 operating system. Synthesizing a design with a schematic file fails with error code 1.

Run Diamond on a different operating system.

Devices affected: All
CR118394

PAR report does not show placement results sorted by timing score

When “Generate TRACE report for each iteration” has been enabled in the active strategy, the Place & Route report will show placement results sorted by “Worst Slack,” even when the “Timing Score” option has been selected for “Placement Sort Best Run.”

Devices affected: All
CR59212

Contacting Technical Support

FAQs The first place to look. The Answer Database provides solutions to questions that many of our customers have already asked. Lattice Applications Engineers are continuously adding to the Database.

Telephone Support Hotline Receive direct technical support for all Lattice products by calling Lattice Applications from 5:30 a.m. to 6 p.m. Pacific Time.

- For USA & Canada: 1-800-LATTICE (528-8423)
- For other locations: +1 503 268 8001

In Asia, call Lattice Applications from 8:30 a.m. to 5:30 p.m. Beijing Time (CST), +0800 UTC. Chinese and English language only.

- For Asia: +86 21 52989090

E-mail Support

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