



intel RN-01080-22.1 Quartus Prime Standard Edition Software User Guide

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intel RN-01080-22.1 Quartus Prime Standard Edition Software



Product Information

The product is the Intel Quartus Prime Standard Edition Software, specifically Version 22.1. It includes functional and security updates, bug fixes, and changes to software behavior. The software is designed to improve the security of your Intel Quartus Prime installation and resolve customer service requests.

For additional information about this software release, please refer to the Intel Quartus Prime Standard Edition README file located at `/quartus/readme.txt`. For information about operating system support, visit the Intel FPGA Operating System Support webpage.

The software is ISO 9001:2015 Registered.

Product Usage Instructions

1. Keep your Intel Quartus Prime software up-to-date to benefit from functional, security updates, bug fixes, and improved security.
2. If you have any customer service requests, review the Software Issues Resolved on page 13 and Software Patches Included in this Release on page 13 to check if this version contains fixes for your issues.
3. To view the default assignment settings for the latest version of the software, refer to the Intel Quartus Prime Default Settings File (.qdf) located at `/quartus/bin/assignment_defaults.qdf`.
4. If any features or functions have been deprecated in earlier versions, migrate your tools and processes to use the replacement or alternate features and functions before they are removed.
5. No features or functions have been deprecated or removed in Intel Quartus Prime Standard Edition Version 22.1.

This document provides late-breaking information about Intel® Quartus® Prime Standard Edition Version 22.1. For additional information about this software release, refer to the Intel Quartus Prime Standard Edition README file in the following location: <installation directory>/quartus/readme.txt. For information about operating system support, refer to the following web page: Intel FPGA Operating System Support.

Related Information

- Intel Quartus Prime Pro Edition Software and Device Support Release Notes
- Intel Quartus Prime Standard Edition Design Software for Linux
- Intel Quartus Prime Standard Edition Design Software for Windows
- Intel Quartus Prime Lite Edition Design Software for Linux
- Intel Quartus Prime Lite Edition Design Software for Windows
- Intel FPGA Software Installation and Licensing

New Features and Enhancements

Intel Quartus Prime Standard Edition Software Version 22.1 includes functional and security updates. Keep your software up-to-date and follow the technical recommendations that help improve the security of your Intel Quartus Prime installation.

Intel Quartus Prime Standard Edition Software Version 22.1 includes the following new features and enhancements:

- Added support for the Nios® V/m processor.
- For Intel MAX® 10 devices, added 1.8V LVDS support.

Bug Fixes

Intel Quartus Prime Standard Edition Software Version 22.1 also includes bug fixes. Review Software Issues Resolved on page 13 and Software Patches Included in this Release on page 13 to see if this version contains fixes for or otherwise resolves any of your customer service requests.

Changes to Software Behavior

This section documents instances in which the behavior and default settings of the Intel Quartus Prime Standard Edition software have been changed from earlier releases of the Intel Quartus Prime Standard Edition software. Refer to the Intel Quartus Prime Default Settings File (.qdf), <Quartus Prime installation directory>/quartus/bin/assignment_defaults.qdf, for a list of all the default assignment settings for the latest version of the Intel Quartus Prime software.

Deprecated Features and Functions

- The functions and features listed in this section have been deprecated but not removed from Intel Quartus Prime Standard Edition Version 22.1 or earlier. Migrate your tools and processes to use the replacement or alternate features and functions before the deprecated features and functions are removed.
- Features and Functions Deprecated as of Intel Quartus Prime Standard Edition Version 22.1
- No Intel Quartus Prime features or functions have been deprecated in Intel Quartus Prime Standard Edition Version 22.1.
- Features and Functions Deprecated as of Intel Quartus Prime Standard Edition Version 21.1.1
- No Intel Quartus Prime features or functions have been deprecated in Intel Quartus Prime Standard Edition

Version 21.1.1.

- Features and Functions Deprecated as of Intel Quartus Prime Standard Edition Version 21.1
- No Intel Quartus Prime features or functions have been deprecated in Intel Quartus Prime Standard Edition Version 21.1.
- Features and Functions Deprecated as of Intel Quartus Prime Standard Edition Version 20.1
- No Intel Quartus Prime features or functions have been deprecated in Intel Quartus Prime Standard Edition Version 20.1.

Removed Features and Functions

- The functions and features listed in this section have been removed from Intel Quartus Prime Standard Edition Version 22.1 or earlier.
- Features and Functions Removed from Intel Quartus Prime Standard Edition Version 22.1
- No Intel Quartus Prime features or functions have been removed from Intel Quartus Prime Standard Edition Version 22.1.

Features and Functions Removed from Intel Quartus Prime Standard Edition Version 21.1.1

No Intel Quartus Prime features or functions have been removed from Intel Quartus Prime Standard Edition Version 21.1.1.

Features and Functions Removed from Intel Quartus Prime Standard Edition Version 21.1

- Removed ModelSim*-Intel FPGA Edition and ModelSim-Intel FPGA Starter Edition
This simulation software has been replaced by Questa*-Intel FPGA Edition and Questa-Intel FPGA Starter Edition respectively.
- Removed support for 32-bit simulation software.
This change removes support for the following simulation tools:
 - Aldec* Active-HDL* (32-bit)
Use a 64-bit version of Aldec Active-HDL or use Aldec Riviera-PRO* instead.
 - Mentor Graphics* ModelSim PE
Use Siemens* EDA ModelSim SE or Siemens EDA Questa Advanced Simulator instead.
- Removed NicheStack TCP/IP Stack support.
- Removed support for Cadence* Incisive* Enterprise Simulator (IES).

Features and Functions Removed from Intel Quartus Prime Standard Edition Version 20.1

Support for the following software has been removed from Intel Quartus Prime Standard Edition Version 20.1 and later:

- DSP Builder for Intel FPGAs
- Intel FPGA SDK for OpenCL™ (*)
- Intel FPGA RTE for OpenCL
- Intel High-Level Synthesis (HLS) Compiler

Operating System Support

Information about operating system support for the Intel Quartus Prime Design Suite is available on the Operating System Support page of the Intel FPGA website.

Operating System Support Changes in Intel Quartus Prime Standard Edition Version 22.1

Support for the following operating systems is deprecated in Intel Quartus Prime Standard Edition Version 22.1:

- CentOS* Linux 8.2
- Windows Server* 2012
- Windows Server 2016
- Windows* 10 Version 1607

Migrate your Windows 10 installation to Windows 10 Version 1809 or later.

Support for these operating systems might be removed in a future release.

Intel Quartus Prime Standard Edition Version 22.1 removed support for the following operating systems:

- CentOS Linux 7.5
- CentOS Linux 8.0(1)
- CentOS Linux 8.1
- Red Hat* Enterprise Linux* 7
- Red Hat Enterprise Linux 8.0(2)
- Red Hat Enterprise Linux 8.1

Operating System Support Changes in Intel Quartus Prime Standard Edition Version 21.1.1

There are no operating system support changes in Intel Quartus Prime Standard Edition Version 21.1.1.

Operating System Support Changes in Intel Quartus Prime Standard Edition Version 21.1

Intel Quartus Prime Standard Edition Version 21.1 added support for the following operating systems:

- CentOS 8.0
- Red Hat Enterprise Linux 8
- SUSE* Linux Enterprise Server 15
- Ubuntu* Linux 20 LTS
- Windows Server 2019

Support for the following operating systems is deprecated as of Intel Quartus Prime Standard Edition Version 21.1. Support for these operating systems might be removed in a future release:

- CentOS 7.5
- Red Hat Enterprise Linux 7

Intel Quartus Prime Standard Edition Version 21.1 removed support for the following operating systems:

- Red Hat Enterprise Linux 6
- Ubuntu Linux 14 LTS

Related Information

Operating System Support

Disk Space and Memory Recommendations

A full installation of the Intel Quartus Prime Standard Edition software requires up to 40 GB of available disk space.

Configure your system to provide additional virtual memory equal to the recommended physical RAM that is required to process your design. This additional virtual memory effectively doubles the total effective memory available to process your design.

Note: Peak virtual memory might exceed these recommendations. These recommendations are based on the amount of physical memory required to achieve runtime within 10% of that achieved on hardware with an infinite amount of RAM.

Table 1. Memory Requirements for Processing Arria® Designs

These requirements are the same for both Windows and Linux installations.

Family	Device	Recommended Physical RAM
Intel Arria® 10	10AT115, 10AX115	48 GB
	10AT090, 10AX090	44 GB
	10AS066, 10AX066	32 GB
	10AS057, 10AX057	30 GB
	10AS048, 10AX048	28 GB
	10AX032, 10AS032	24 GB
	10AX027, 10AS027	22 GB
	10AX022, 10AS022	20 GB
	10AX016, 10AS016	18 GB
Arria V	5AGXB5, 5AGTD7, 5AGXB7, 5ASXB5, 5ASTD5	16 GB
	5AGXB1, 5AGXB3, 5AGTD3, 5ASTD3, 5ASXB3	12 GB
	5AGXA7, 5AGTC7	10 GB
	5AGTC3, 5AGXA3, 5AGXA5	8 GB
	5AGXA1	6 GB
Arria V GZ	5AGZE7	16 GB
	5AGZE3, 5AGZE5	12 GB
	5AGZE1	8 GB
Arria II GX	EP2AGX260	6 GB
	EP2AGX95, EP2AGX125, EP2AGX190	4 GB
	EP2AGX65	2 GB
	EP2AGX45	1.5 GB
Arria II GZ	EP2AGZ350	8 GB
	EP2AGZ300	6 GB
	EP2AGZ225	4 GB

Table 2. Memory Requirements for Processing Cyclone® Designs

These requirements are the same for both Windows and Linux installations.

Family	Device	Recommended Physical RAM
Intel Cyclone® 10 LP	10CL120	1.5 GB
	10CL080, 10CL055	1 GB
	10CL006, 10CL010, 10CL016, 10CL025, 10CL040	512 MB
Cyclone V	5CEA9, 5CGTD9, 5CGXC9	8 GB
	5CEA2, 5CGXC3, 5CEA4, 5CGXC4, 5CEA5, 5CGTD5, 5CGXC5, 5CSEA5, 5CSTD5, 5CSXC5, 5CSEA6, 5CSXC6, 5CEA7, 5CGTD7, 5CGXC7, 5CSEA2, 5CSEA4, 5CSXC2, 5CSXC4, 5CSTD6	6 GB
	EP4CGX110, EP4CGX150	2 GB
	EP4CGX50, EP4CGX75	1.5 GB
Cyclone IV GX	EP4CGX15, EP4CGX22, EP4CGX30	512 MB
	EP4CE115	1.5 GB
	EP4CE55, EP4CE75	1 GB
Cyclone IV E	EP4CE6, EP4CE10, EP4CE15, EP4CE22, EP4CE30, EP4CE40	512 MB

Table 3. Memory Requirements for Processing MAX Designs

These requirements are the same for both Windows and Linux installations.

Family	Device	Recommended Physical RAM
Intel MAX 10	10M50	2 GB
	10M16	2 GB
	10M25	2 GB
	10M40	2 GB
	10M04, 10M08	1 GB
	10M02	512 MB
MAX V	All	512 MB
MAX II	All	512 MB

Table 4. Memory Requirements for Processing Stratix® Designs

These requirements are the same for both Windows and Linux installations.

Family	Device	Recommended Physical RAM
Stratix® V	5SEEB, 5SGXAB, 5SGXB9, 5SGXBB	28 GB
	5SGXA9, 5SEE9	24 GB
	5SGTC7, 5SGXA7, 5SGSD8	20 GB
	5SGSD5, 5SGXA5, 5SGXB5, 5SGSD6, 5SGXB6	16 GB
	5SGXA3, 5SGSD4, 5SGXA4, 5SGTC5	12 GB
	5SGSD3	8 GB
Stratix IV	EP4SGX530, EP4SE530, EP4SE820, EP4S40G5, EP4S100G5	12 GB
	EP4SE360 EP4SGX360, EP4S100G3, EP4S100G4	8 GB
	EP4SGX290	6 GB
	EP4SE230 EP4SGX110, EP4SGX230, EP4S40G2, EP4S100G2	4 GB
	EP4SGX70	2 GB

Device Support and Pin-Out Status

All production devices currently have full compilation, simulation, timing analysis, and programming support.

Changes in Device Support

Timing Model, Power Model, and Device Status

Table 5. Timing Model, Power Model, and Device Status for Intel Arria 10 Devices

Device Family	Device	Timing Model Status	Power Model Status	Device Status
Intel Arria 10	10AX016, 10AS016, 10AX022, 10AS022, 10AX027, 10AS027, 10AX032, 10AS032	Final – 16.1 (3) (4)	Final – 17.0	Final – 17.0
	10AX048, 10AS048	Final – 16.0.2 (4)	Final – 17.0	Final – 17.0
	10AX057, 10AS057, 10AX066, 10AS066, 10AT090, 10AX090	Final – 16.0.1 (4)	Final – 16.0.1	Final – 16.0.1
	10AX115, 10AT115	Final – 16.0 (4)	Final – 16.0	Final – 16.0

Table 6. Timing Model, Power Model, and Device Status for Intel Cyclone 10 Devices

Device Family	Device	Timing Model Status	Power Model Status	Device Status
Intel Cyclone 10 LP	10CL006, 10CL010, 10CL016, 10CL025, 10CL040, 10CL055, 10CL080, 10CL120	Final – 17.0	Final – 17.1	Final – 17.1

Table 7. Timing Model, Power Model, and Device Status for Intel MAX 10 Devices

Device Family	Device	Timing Model Status	Power Model Status	Device Status
Intel MAX 10	10M02, 10M04, 10M08	Final – 15.1(5)	Final – 15.1	Final – 15.1
	10M16, 10M25, 10M40, 10M50	Final – 15.1.2	Final – 15.1	Final – 15.1

The current version of the Intel Quartus Prime software also includes final timing and power models for the Arria II GX, Arria II GZ, Arria V, Arria V GZ, Arria V SoC, Cyclone IV E, Cyclone IV GX, Cyclone V, Cyclone V SoC, MAX II, MAX II Z, MAX V, Stratix IV, and Stratix V device families. Timing models for these device families became final in the Intel Quartus Prime software versions 11.1 or earlier.

IBIS Models

Table 8. IBIS Model Status for the Intel Quartus Prime Standard Edition Software Release Version 22.1

Beginning in the Intel Quartus Prime Standard Edition software version 16.0, device families have IBIS model statuses that are either Advance, Preliminary, or Final.

Device Family	IBIS Model Status
Intel Arria 10	Final – 16.1.2
Arria V	Correlated with PHY device operation – 14.0
Arria II GX	Correlated with PHY device operation – 11.1
Arria II GZ	Correlated with PHY device operation – 11.1
Intel Cyclone 10 LP	Final – 17.0
Cyclone V	Correlated with PHY device operation – 14.0
Cyclone IV E	Correlated with PHY device operation – 11.1
Cyclone IV GX	Correlated with PHY device operation – 11.1
Intel MAX 10	Final – 16.0
MAX V	Correlated with PHY device operation – 11.1
Stratix V	Correlated with PHY device operation – 13.0 SP1
Stratix IV	Correlated with PHY device operation – 11.1

Updated IBIS models are available online on the IBIS Models for Intel FPGA Devices web page. This page is updated as IBIS models for devices become available or are updated.

EDA Interface Information

Table 9. Synthesis Tools Supporting the Intel Quartus Prime Standard Edition Software Release Version 22.1

Synthesis Tools	Version
Siemens EDA Precision*	Siemens EDA Precision versions that support the Intel Quartus Prime software are typically released after the release of the Intel Quartus Prime software. Contact Siemens EDA for versions of Siemens EDA Precision that support Intel Quartus Prime Standard Edition Software Release Version 22.1.
Synopsys* Synplify*, Synplify Pro*, and Synplify Premier	Synopsys Synplify, Synplify Pro, and Synplify Premier versions that support the Intel Quartus Prime software are typically released after the release of the Intel Quartus Prime software. Contact Synopsys for versions of Synopsys Synplify, Synplify Pro, and Synplify Premier that support Intel Quartus Prime Standard Edition Software Release Version 22.1.

Table 10. Simulation Tools Supporting the Intel Quartus Prime Standard Edition Software Release Version 22.1

The following simulation tools provide RTL and functional gate-level simulation. Only 64-bit simulation tools are supported.

Simulation Tools	Version
Aldec Active-HDL	13.0 (Windows only)
Aldec Riviera-PRO	2019.10
Cadence Xcelium* Parallel Logic Simulation	21.09.003 (Linux* only)
Questa-Intel FPGA Edition	2021.2
Siemens EDA ModelSim SE	2020.4
Siemens EDA Questa Advanced Simulator	2020.4
Synopsys VCS* and VCS MX	P-2019.06-SP2-5 (Linux only)

Questa-Intel FPGA Edition requires FlexLM licensing daemon version 11.16.4.0 (or later). You can obtain the licensing daemon from the FlexLM License Daemons for Intel FPGA Software web page. You can obtain Intel FPGA Edition of simulation tools from the Download Center for FPGAs.

Operating System Support for Questa-Intel FPGA Edition Version 2021.2

- Red Hat Enterprise Linux 7 (64-bit)
- Red Hat Enterprise Linux 8 (64-bit)
- SUSE Linux Enterprise Server 12 (64-bit)
- Windows 10 (64-bit)

Related Information

- Intel Quartus Prime Standard Edition Design Software for Linux
- Intel Quartus Prime Standard Edition Design Software for Windows
- Intel Quartus Prime Lite Edition Design Software for Linux
- Intel Quartus Prime Lite Edition Design Software for Windows

Antivirus Verification

The Intel Quartus Prime software release version 22.1 has been verified virus free with the following software:

Antivirus Verification Software

McAfee VirusScan Command Line for Linux64 Version: 7.0.0.477
AV Engine version: 6300.9389 for Linux64.
Dat set version: 10505 created Oct 19 2022

Software Issues Resolved

The following customer service requests were fixed or otherwise resolved in Intel Quartus Prime Standard Edition Version 22.1:

Table 11. Issues Resolved in the Intel Quartus Prime Standard Edition Version 22.1

Customer Service Request Numbers							
00421084	00451015	00476432	00501636	00529632	00540927	00541897	00550660
00553391	00573916	00630517	00641570	00644185	00647421	00649470	00661097
00668452	00669646	00675753	00683291	00689611	00690524	00693884	00696003
00698210	00698732	05129080	05465225	11396299			

Software Patches Included in this Release

Intel Quartus Prime Standard Edition Version 22.1 contains the following patches for previous versions of Intel Quartus Prime Standard Edition software:

Table 12. Software Patches included in Intel Quartus Prime Standard Edition Version 22.1

Software Version	Patch	Customer Service Request Number
Intel Quartus Prime Version 21.1	0.10std	—
Intel Quartus Prime Version 21.1	0.08std	00693884
Intel Quartus Prime Version 21.1	0.07std	00501636
Intel Quartus Prime Version 21.1	0.06std	00689611
Intel Quartus Prime Version 21.1	0.04stdp	—
Intel Quartus Prime Version 21.1	0.03std	—
Intel Quartus Prime Version 21.1	0.02std	—
Intel Quartus Prime Version 20.1.1	1.09std	00702107
Intel Quartus Prime Version 20.1	0.14std	00702107
Intel Quartus Prime Version 18.1.1	1.13std	—
Intel Quartus Prime Version 18.1.1	1.12std	—
Intel Quartus Prime Version 18.1.1	1.09std	—

Software Version	Patch	Customer Service Request Number
Intel Quartus Prime Version 18.1	0.23std	00698210
Intel Quartus Prime Version 18.1	0.21std	00669646
Intel Quartus Prime Version 18.1	0.20std	00689611

Latest Known Intel Quartus Prime Software Issues

Information about known issues that affect Intel Quartus Prime Standard Edition Version 22.1 is available in the Intel FPGA Knowledge Base.

For the latest information about issues that affect Intel Quartus Prime Standard Edition Version 22.1, review the Intel FPGA Knowledge Base articles that apply to Intel Quartus Prime Standard Edition Version 22.1.

Table 13. Important Known Issues Affecting Intel Quartus Prime Standard Edition Version 22.1

Description	Workaround
On Microsoft* Windows systems, SDI II Intel FPGA IP design example generation fails with the following error message:	For details and the availability of a fix, refer to Why does the SDI II Intel FPGA IP design example generation fail when using the Intel Quartus Prime Software for Windows? in the Intel FPGA Knowledge Base.
Error: Failed to generate example design example_design to: <design_directory>\sdi_ii_0_example_design	
On Microsoft Windows systems, the following error occurs when generating an Intel Arria 10 EMIF Example Design for simulation:	You can safely ignore these warning messages. Simulation file sets for Siemens EDA Questa and Aldec Riviera-PRO simulation software are generated and contain the relevant design files to run the simulation successfully.
Error: emif_0: An error has occurred when generating the simulation example design. See make_sim_design_errors.log for details.	
Error: Failed to generate example design <design_name> to: <example design directory>	
Generate Example Design: completed with errors	For more details and the availability of a fix, refer to Why does the Intel Arria 10 EMIF Example Design Generation Fail when using the Intel Quartus Prime Standard Edition Software Version 22.1 for Windows? in the Intel FPGA Knowledge Base.
When you use the Intel Arria 10 EMIF IP Skip Calibration mode, simulation of Intel Arria 10 EMIF IP with Siemens EDA Questa simulation software (Siemens EDA Questa Advanced Simulator or Questa-Intel FPGA Edition) can hang.	
	Use the Abstract PHY for fast simulation simulation option to prevent the hang. For more details and the availability of a fix, refer to Why does Simulation of Intel Arria 10 EMIF IP in Mentor simulators hang when using Intel Quartus Prime Standard Edition Software version 22.1 in the Intel FPGA Knowledge Base.

You can find known issue information for previous versions of the Quartus Prime software on the Intel FPGA Knowledge Base web page.

Information about known software issues that affect previous versions of the Quartus II software is available on the Intel Quartus Prime and Quartus II Software Support web page.

Information about issues affecting the Intel FPGA IP Library is available in the release notes for each IP. You can find the IP release notes on the Intel FPGA Documentation Index web page.

Related Information

- Intel FPGA Knowledge Base
- Intel Quartus Prime and Quartus II Software Support
- Intel FPGAs and Programmable Devices Release Notes


Intel Quartus Prime Standard Edition Software and Device Support Release Notes Archives

For the latest and previous versions of these release notes, refer to Intel Quartus Prime Standard Edition Software and Device Support Release Notes. If a software version is not listed, the release notes for the previous software version applies.

Document Version	Intel Quartus Prime Version	Changes
2022.11.07	22.1	<ul style="list-style-type: none"> Updated Latest Known Software Issues.
2022.10.31	22.1	<ul style="list-style-type: none"> Initial release.

Intel Quartus Prime Standard Edition: Version 22.1 Software and Device Support Release Notes

Documents / Resources

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References

- [intel 1. Answers to Top FAQs](#)
- [intel 1. Intel® Quartus® Prime Standard Edition Version 22.1std Software...](#)
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