Quartus Prime Standard Edition Software and Device Support Release Notes Version 16.0

2016.05.09

RN-01080-16.0.0 Subscribe Send Feedback

This document provides late-breaking information about the Altera® Quartus® Prime Standard Edition software release version 16.0.

For information about operating system support, refer to the **readme.txt** file in your **altera/*<version number>*/quartus directory**.

Related Information

Quartus Prime Pro Edition Software and Device Support Release Notes Version 16.0

New Features and Enhancements

The Quartus Prime Standard Edition software release version 16.0 includes the following new features and enhancements:

- Development kit setup feature that allows you to select a development kit and translate board specifications directly into the Quartus Prime assignments, including pin assignments, while initiating a new Quartus Prime project. This feature also provides a board-specific reference design to the selected development kit.
- DSP Register Packing Summary report for Arria 10 designs that lists the unpacked DSP registers and provides an explanation for each failed packing attempt.
- Significantly improved high-effort compilation time.
- Improved routability for Arria 10 designs.
- Full timing model support for Arria 10 devices.
- Improved TimeQuest Timing Analyzer timing report that includes all timing closure results.
- Improved TimeQuest Timing Analyzer capability that allows the inclusion of multiple `-through` constructs for all applicable Synopsys Design Constraints (SDC) commands and exceptions. This improvement enables more precise path filtering in the TimeQuest Timing Analyzer.
- Lower peak virtual memory requirements for Arria 10 designs.

Operating System Support

Information about OS support for the Quartus Prime Design Suite® is available on the Operating System Support page of the Altera website.

Related Information

Operating System Support

© 2016 Altera Corporation. All rights reserved. ALTERA, ARRIA, CYCLONE, ENPIRION, MAX, MEGACORE, NIOS, QUARTUS and STRATIX words and logos are trademarks of Altera Corporation and registered in the U.S. Patent and Trademark Office and in other countries. All other words and logos identified as trademarks or service marks are the property of their respective holders as described at www.altera.com/common/legal.html. Altera warrants performance of its semiconductor products to current specifications in accordance with Altera's standard warranty, but reserves the right to make changes to any products and services at any time without notice. Altera assumes no responsibility or liability arising out of the application or use of any information, product, or service described herein except as expressly agreed to in writing by Altera. Altera customers are advised to obtain the latest version of device specifications before relying on any published information and before placing orders for products or services.

ISO 9001:2008 Registered

101 Innovation Drive, San Jose, CA 95134

now part of Intel

Memory Recommendations

A full installation of the Quartus Prime software requires up to 24 GB of available disk space.

Altera recommends that your system be configured to provide virtual memory equal to the recommended physical RAM that is required to process your design.

Note: Peak virtual memory may 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 Designs

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

Family	Device	Recommended Physical RAM
Arria 10	10AT115, 10AX115	48 GB
	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

Family	Device	Recommended Physical RAM
Arria II GZ	EP2AGZ350	8 GB
	EP2AGZ300	6 GB
	EP2AGZ225	4 GB
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
Cyclone IV E	EP4CE115	1.5 GB
	EP4CE55, EP4CE75	1 GB
	EP4CE6, EP4CE10, EP4CE15, EP4CE22, EP4CE30, EP4CE40	512 MB
Cyclone IV GX	EP4CGX110, EP4CGX150	2 GB
	EP4CGX50, EP4CGX75	1.5 GB
	EP4CGX15, EP4CGX22, EP4CGX30	512 MB
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
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

Family	Device	Recommended Physical RAM
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

Changes in Device Support

Related Information

Altera Knowledge Base
For more information about known device issues and workarounds.

Changes to Software Behavior

This section documents instances in which the behavior and default settings of the Quartus Prime Standard Edition software have been changed from earlier releases of the Quartus Prime Standard Edition software.

Refer to the 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 Quartus Prime software.

Use Spectra-Q TimeQuest to analyze your Arria 10 designs

Only use Spectra-Q™ TimeQuest to analyze your Arria® 10 designs. Using previous versions of the TimeQuest Timing Analyzer to analyze an Arria 10 design is not allowed.

New naming scheme for clock buffer locations

The TimeQuest Timing Analyzer and Quartus Prime software-generated reports now show clock buffer locations in the following convention:

<clock name>_<source bank>_<clock type and region>_<clock tree index>

For example: CLKCTRL_2A_G_I31

Note: The Quartus Prime software offers backward compatibility for designs that you generated in a previous version of the Quartus Prime software. The location constraints in these designs will work in the current version of the software.

Device Support and Pin-Out Status

The Arria 10 ordering part number (OPN) list has been updated for the Quartus Prime software version 16.0.

Table 2: Full Device Support

Full compilation, simulation, timing analysis, and programming support is now available for the new devices listed in this table.

Device Family	Devices
MAX 10	10M02, 10M04, 10M08, 10M16, 10M25, 10M40, 10M50
Arria 10	10AS066ES, 10AX066ES, 10AX115ES, 10AX115E2, 10AT115E2, 10AX115E3, 10AX016, 10AS016, 10AX022, 10AS022, 10AX027, 10AS027, 10AX032, 10AS032, 10AX048, 10AS048, 10AX057, 10AS057, 10AX066, 10AS066, 10AX090, 10AX115, 10AT115

Timing and Power Models

Table 3: Timing and Power Model Status

Device Family	Device	Timing Model Status	Power Model Status
Arria 10	10AX016, 10AS016, 10AX022, 10AS022, 10AX027, 10AS027, 10AX032, 10AS032,10AX048, 10AS048, 10AX057, 10AS057, 10AX066, 10AS066, 10AX090	Preliminary	Preliminary
	10AX115, 10AT115	Final – 16.0	Final – 16.0
Arria V (1)	5AGXB5, 5AGXB7	Final – 12.1 SP1(2)	Final – 13.1
	5AGTD7		Final – 14.0
	5AGXA1, 5AGXA3, 5AGTC3	Final – 13.0 SP1 (2)	Final – 14.0
	5AGXA5, 5AGXA7	Final – 13.1 (2)	Final – 14.0
	5AGXB1, 5AGXB3, 5AGTD3	Final – 13.0 (2)	Final – 13.1
	5AGTC7	Final – 13.1 (2)	Final – 13.1
Arria V GZ	All	Final – 12.1 SP1 (3)	Final – 13.0
Arria V SoC (1)	5ASXB3, 5ASXB5, 5ASTD3, 5ASTD5	Final – 14.0 (2)	Final – 14.0

(1) Although these models were finalized in the Quartus Prime software version 14.0, they were updated again in the Quartus Primesoftware version 15.0.2.
(2) The timing model was updated in the Quartus Prime software version 15.1.
(3) The timing model was updated in the Quartus II software version 13.1.

Device Family	Device	Timing Model Status	Power Model Status
Cyclone V	5CEA2, 5CEA4, 5CEA7, 5CEA9, 5CGXC7, 5CGXC9, 5CGTD7, 5CGTD9	Final – 13.0 SP1	Final – 13.1
	5CEA5, 5CGXC4, 5CGXC5	Final – 13.1	Final – 13.1
	5CGXC3		Final – 14.0
Cyclone V SoC	5CSEA2, 5CSEA4, 5CSXC2, 5CSXC4	Final – 14.0	Final – 14.1
	5CSEA5, 5CSEA6, 5CSXC5, 5CSXC6, 5CSTD5, 5CSTD6		Final – 14.0
Stratix V	5SGXA7, 5SGXA5, 5SGTC5, 5SGTC7	Final – 12.1 (3)	Final – 13.0
	5SGSD3, 5SGSD4, 5SGSD5, 5SGXA3, 5SGXA4, 5SGXB5, 5SGXB6, 5SGXAB, 5SGXA9, 5SEE9, 5SEEB, 5SGXB9, 5SGXBB	Final – 12.1 SP1 (3)	Final – 13.0
	5SGSD6, 5SGSD8	Final – 13.0 SP1 (3)	Final – 13.0
MAX 10	10M02, 10M04, 10M08	Final – 15.1(4)	Final – 15.1
	10M16, 10M25, 10M40, 10M50	Preliminary	Final – 15.1

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

Related Information

System Design with Advance FPGA Timing Models

IBIS Models

Table 4: IBIS Model Status for the Quartus Prime Standard Edition Software Release Version 16.0

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

Device Family	IBIS Model Status
Arria 10	Preliminary - 16.0

(4) Timing model statuses for MAX 10 A6 speed grade parts remain as Preliminary.

Device Family	IBIS Model Status
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
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
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

EDA Interface Information

Table 5: Synthesis Tools Supporting the Quartus Prime Standard Edition Software Release Version 16.0

Synthesis Tools[5]	Version	NativeLink Support
Mentor Graphics® Precision	2015b	Yes
Synopsys® Synplify, Synplify Pro, and Synplify Premier	2015.09-SP1	Yes

Table 6: Simulation Tools Supporting the Quartus Prime Standard Edition Software Release Version 16.0

Simulation Tools	Version	NativeLink Support
Aldec Active-HDL	10.2 (Windows only)	Yes
Aldec Riviera-PRO	2015.10	Yes
Cadence Incisive Enterprise Simulator (IES)	14.2 (Linux only)	Yes
Mentor Graphics® ModelSim® PE	10.4d	Yes
Mentor Graphics ModelSim SE	10.4d	Yes
Mentor Graphics ModelSim-Altera	10.4d	Yes
Mentor Graphics Questa®	10.4d	Yes
Synopsys VCS and VCS MX	2014.12-SP1 (Linux only)	Yes

(5) EDA Synthesis tools that support the Quartus Prime software version 16.0 will be released by vendors shortly after the release of the Quartus Prime software. Contact your vendor account manager for details.

OS support for Mentor Graphics ModelSim-Altera version 10.4d (requires 32-bit libraries)

- Windows 7 SP1 (64-bit)
- Windows 8.0 (64-bit)
- Windows Server 2008 R2 SP1(64-bit)
- Red Hat Enterprise Linux 5.10 (64-bit)
- Red Hat Enterprise Linux 6.5 (64-bit)

Table 7: Formal Verification (Equivalence Checking) Tools Supporting the Stratix IV Devices with the Quartus Prime Software Release Version 16.0

Formal Verification Tools	Version	NativeLink Support
Cadence Encounter Conformal	8.1	—

Antivirus Verification

The Quartus Prime software release version 16.0 has been verified virus free using the following software:

Antivirus Verification Software for Windows

McAfee Agent Version: 5.0.1.516
McAfee VirusScan Enterprise + AntiSpyware Enterprise Version: 8.8.0 (8.8.0.1445)
Scan Engine Version (32 bit): 5800.7501
Scan Engine Version (64 bit): 5800.7501
DAT Version: 8124.0000

Antivirus Verification Software for Linux

McAfee VirusScan Enterprise for Linux Version 1.9.1
Engine Version: 5700.7163
DAT Version: 7720

Software Issues Resolved

Table 8: Issues Resolved in the Quartus Prime Software Release Version 16.0

Customer Service Request Numbers							
10849701	10927696	10935252	10966764	10990666	10992507	10994639	11008571
11033704	11035995	11037893	11038641	11045908	11056350	11056491	11057375
11066837	11068825	11072780	11085957	11087601	11088674	11090489	11092953
11094178	11097977	11102821	11102848	11103538	11114305	11120581	11120872
11121304	11125095	11125334	11125370	11125656	11126564	11128361	11130726
11134447	11134501	11134582	11135317	11137232	11137476	11140004	11141307
11142333	11142965	11143001	11143812	11143860	11144106	11144110	11144268

Customer Service Request Numbers							
11145783	11147547	11147632	11148262	11150381	11150606	11151412	11151761
11152009	11152106	11152381	11152833	11153010	11153016	11154055	11155051
11155971	11155997	11157314	11157851	11157896	11158674	11159954	11160092
11160362	11160589	11160746	11161579	11161678	11161890	11161915	11162107
11162378	11162424	11162776	11163004	11163206	11163311	11163450	11163486
11163503	11163525	11163654	11164603	11164745	11164767	11165251	11166098
11166873	11166897	11167255	11167272	11167291	11167460	11167541	11167595
11167848	11168676	11168690	11169395	11169449	11169573	11169616	11169627
11169827	11170123	11170409	11171120	11171432	11171684	11171842	11171851
11171857	11172256	11172509	11172699	11172773	11173117	11173121	11173189
11173271	11173412	11174029	11174085	11174109	11174255	11174601	11175102
11175193	11175473	11175809	11175845	11176094	11176349	11176355	11176427
11176489	11176593	11176773	11176862	11176876	11176894	11177174	11177448
11177843	11177994	11178075	11178247	11178374	11178507	11178556	11178581
11178594	11178634	11178697	11178935	11179093	11179470	11179500	11179666
11179698	11179777	11179835	11179905	11179949	11180248	11180288	11180300
11180377	11180799	11180850	11181279	11181450	11181465	11181605	11181608
11181610	11181697	11181737	11181750	11181776	11182002	11182038	11182278
11182450	11182736	11182821	11182954	11182968	11183151	11183672	11183845
11183940	11184141	11184167	11184179	11184277	11184388	11184426	11184544
11184632	11184702	11184821	11184915	11184939	11184952	11184960	11184995
11185068	11185363	11185559	11185593	11185651	11185799	11186232	11186259
11187147	11187556	11187561	11187625	11187802	11187959	11188015	11188017
11188043	11188069	11188088	11188227	11188274	11188368	11188572	11188664
11188754	11188770	11188978	11189033	11189055	11189057	11189247	11189300
11189721	11189773	11189775	11189979	11190109	11190410	11190431	11190871
11191107	11191193	11191225	11191540	11191555	11191746	11191820	11191836
11191881	11192030	11192035	11192178	11192192	11192661	11192821	11193033
11193079	11193099	11193100	11193122	11193240	11193450	11193702	11193761
11193870	11193886	11193944	11193957	11194129	11194179	11194217	11194225
11194353	11194357	11194433	11194749	11194934	11194954	11194987	11195076

Customer Service Request Numbers							
11195311	11195359	11195393	11195401	11195687	11195834	11195976	11196177
11196201	11196205	11196331	11196483	11196492	11196805	11196865	11197005
11197240	11197467	11197770	11197774	11197977	11197983	11198367	11198426
11198523	11198767	11198846	11199152	11199230	11199255	11199881	11199971
11199987	11200053	11200073	11200284	11200361	11200410	11200414	11200707
11200765	11200879	11200954	11200963	11201050	11201261	11201318	11201346
11201362	11201551	11201893	11201953	11202020	11202184	11202289	11202533
11202726	11202741	11202851	11203064	11203207	11203295	11203383	11203514
11203629	11203830	11203900	11203942	11204365	11204790	11204957	11205177
11205253	11205361	11205600	11205685	11205913	11206127	11206199	11206318
11206459	11206476	11206502	11206562	11206570	11206712	11206755	11206784
11206808	11207085	11207687	11207888	11207941	11208248	11208312	11208371
11208518	11208621	11208678	11208951	11209263	11209358	11209594	11209728
11209877	11209912	11209946	11210311	11210374	11210616	11210648	11210719
11210914	11211160	11211170	11211207	11211227	11211555	11211770	11211823
11211867	11211873	11211901	11212279	11212342	11212346	11212486	11212500
11212769	11213330	11213376	11213456	11213820	11213874	11214068	11215282
11215294	11216263	11216687	11216693	11217932	11218370	11219963	11221320
11221585	11222888	11222949	11223132	11223138	—	—	—

Software Patches Included in this Release

Table 9: Software Patches included in the Quartus Prime Standard Edition Software Release Version 16.0

Software Version	Patch	Customer Service Request Number
Quartus Prime software version 16.0eap2	0.01eap2	—
Quartus Prime software version 16.0	0.01eap	—
Quartus Prime software version 15.1.2	2.27	11213456
Quartus Prime software version 15.1.2	2.25	11206808

Software Version	Patch	Customer Service Request Number
Quartus Prime software version 15.1.2	2.24	11194433 11197977 11220883
Quartus Prime software version 15.1.2	2.21	11196201
Quartus Prime software version 15.1.2	2.18	11204790
Quartus Prime software version 15.1.2	2.17	11213376
Quartus Prime software version 15.1.2	2.16	11213330
Quartus Prime software version 15.1.2	2.14	—
Quartus Prime software version 15.1.2	2.09	11174109
Quartus Prime software version 15.1.2	2.08	11195076 11195359 11194353 11212279
Quartus Prime software version 15.1.2	2.05	11203936
Quartus Prime software version 15.1.2	2.02	—
Quartus Prime software version 15.1.2	2.01	11203936
Quartus Prime software version 15.1.1	1.13	11185363
Quartus Prime software version 15.1.1	1.11	11203444
Quartus Prime software version 15.1.1	1.09	11201346
Quartus Prime software version 15.1.1	1.08	11194433 11197977
Quartus Prime software version 15.1.1	1.02cl	—
Quartus Prime software version 15.1.1	1.01cl	11191386

Software Version	Patch	Customer Service Request Number
Quartus Prime software version 15.1	0.21	11210161
Quartus Prime software version 15.1	0.16	11194433 11197977
Quartus Prime software version 15.1	0.15	11190871
Quartus Prime software version 15.1	0.05eds2	11167848
Quartus II software version 15.0.2	2.20	—
Quartus II software version 15.0.2	2.18	11174109
Quartus II software version 15.0.2	2.10	—
Quartus II software version 14.0	0.44	11207085
Quartus II software version 14.0	0.41	11169537
Quartus II software version 13.1.1	1.26	11197731
Quartus II software version 13.1	0.121	11163525
Quartus II software version 11.0sp1	1.48	10966764

Latest Known Quartus Prime Software Issues

Information about known issues that affect the Quartus Prime software version 16.0 is available on the Altera Knowledge Base webpage .

Known Software Issues Affecting the Quartus Prime software version 16.0

You can find known issue information for previous versions of the Quartus Prime software on the Altera Knowledge Base webpage.

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

Information about issues affecting the Altera IP Library is available in the *Altera IP Release Notes*.

Related Information

- **Altera Knowledge Base**
- **Quartus Prime and Quartus II Software Support**
- **Altera IP Release Notes**

Document Revision History

Table 10: Quartus Prime Software Release Version 16.0 Document Revision History

Date	Version	Changes
May 2016	16.0.0	Initial release.