Intel - 10M04DAF256A7G Datasheet





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Understanding <u>Embedded - FPGAs (Field</u> <u>Programmable Gate Array)</u>

Embedded - FPGAs, or Field Programmable Gate Arrays, are advanced integrated circuits that offer unparalleled flexibility and performance for digital systems. Unlike traditional fixed-function logic devices, FPGAs can be programmed and reprogrammed to execute a wide array of logical operations, enabling customized functionality tailored to specific applications. This reprogrammability allows developers to iterate designs quickly and implement complex functions without the need for custom hardware.

Applications of Embedded - FPGAs

The versatility of Embedded - FPGAs makes them indispensable in numerous fields. In telecommunications.

Details

Product Status	Active
Number of LABs/CLBs	250
Number of Logic Elements/Cells	4000
Total RAM Bits	193536
Number of I/O	178
Number of Gates	-
Voltage - Supply	1.15V ~ 1.25V
Mounting Type	Surface Mount
Operating Temperature	-40°C ~ 125°C (TJ)
Package / Case	256-LBGA
Supplier Device Package	256-FBGA (17x17)
Purchase URL	https://www.e-xfl.com/product-detail/intel/10m04daf256a7g

Email: info@E-XFL.COM

Address: Room A, 16/F, Full Win Commercial Centre, 573 Nathan Road, Mongkok, Hong Kong



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1. Overview

1.1. Intel Automotive-Grade Devices

Intel automotive-grade devices are certified to AEC-Q100 (Grade 2 level) and are available in CPLD, FPGA, system on a chip (SoC), and Intel[®] Enpirion[®] PowerSoCs. You can use these devices in high-temperature environments, such as in automotive sectors.

1.2. Intel Automotive Qualifications

The automotive grade devices are designed and developed per a quality management system (QMS) that is registered to ISO 9001:2015. The scope of the ISO 9001:2015 registration includes design, development, and provision of semiconductor components, intellectual properties, and software tools. All the foundry, assembly, and test sites that manufacture the automotive devices are operating a QMS that is registered to IATF 16949 in addition to ISO 9001:2015.

Selected Intel devices are complied to the following Functional Safety (FuSa) standards:

- ISO-26262
- IEC-61508

Intel provides certified Automotive Functional Safety Data Package (AFSDP) for devices that are complied to ISO-26262. AFSDP delivers the framework, methodology, tools, and IP to assist you in building a safe system with cost and time savings. AFSDP typically saves you 12-18 man-months in certifying your safety critical applications at system level.

AFSDP includes:

- Intel FPGA (automotive-grade Cyclone[®] V, Cyclone V SoC)
- Software development tools, including the Intel Quartus[®] Prime software version 14.1
- FMEDA tool
- Diagnostic and standard intellectual property (IP)
- Safety manual
- Certificate

Related Information

- Accelerate Automotive with Intel FPGAS, Intel page Provides more information about Intel automotive solutions.
- AN 704: FPGA-based Safety Separation Design Flow for Rapid Functional Safety Certification

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2. Supported Automotive-Grade Devices

2.1. Intel Cyclone 10 LP Devices

2.1.1. Supported Automotive-Grade Devices

Table 2. Automotive-Grade in Intel Cyclone 10 LP Devices

Other automotive-grade product line/package combinations or ordering codes might be available upon request. Consult your Intel sales representative to submit your request.

Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
10CL006YE144A7G	10CL006	144-pin EQFP	-40°C to 125°C	-7
10CL006YU256A7G	10CL006	256-pin UBGA	-40°C to 125°C	-7
10CL010YE144A7G	10CL010	144-pin EQFP	-40°C to 125°C	-7
10CL010YM164A7G	10CL010	164-pin MBGA	-40°C to 125°C	-7
10CL010YU256A7G	10CL010	256-pin UBGA	-40°C to 125°C	-7
10CL016YE144A7G	10CL016	144-pin EQFP	-40°C to 125°C	-7
10CL016YM164A7G	10CL016	164-pin MBGA	-40°C to 125°C	-7
10CL016YU256A7G	10CL016	256-pin UBGA	-40°C to 125°C	-7
10CL025YE144A7G	10CL025	144-pin EQFP	-40°C to 125°C	-7
10CL025YU256A7G	10CL025	256-pin UBGA	-40°C to 125°C	-7
10CL025YU484A7G	10CL025	484-pin UBGA	-40°C to 125°C	-7
10CL040YU484A7G	10CL040	484-pin UBGA	-40°C to 125°C	-7
10CL055YU484A7G	10CL055	484-pin UBGA	-40°C to 125°C	-7
10CL080YU484A7G	10CL080	484-pin UBGA	-40°C to 125°C	-7

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2.3.3. Device Ordering Codes

Figure 2. Automotive-Grade Ordering Information for Intel MAX 10 Devices



2.4. Cyclone V SoC Devices

2.4.1. Supported Automotive-Grade Devices

Table 8. Automotive-Grade in Cyclone V SoC Devices

Other automotive-grade product line/package combinations or ordering codes might be available upon request. Consult your Intel sales representative to submit your request.

Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
5CSEBA2U19A7N	5CSEBA2	484-pin UBGA	-40°C to 125°C	-7
5CSEBA2U23A7N	5CSEBA2	672-pin UBGA	-40°C to 125°C	-7
5CSEMA2U23A7N	5CSEMA2	672-pin UBGA	-40°C to 125°C	-7
5CSEBA4U19A7N	5CSEBA4	484-pin UBGA	-40°C to 125°C	-7
5CSEBA4U23A7N	5CSEBA4	672-pin UBGA	-40°C to 125°C	-7
5CSEMA4U23A7N	5CSEMA4	672-pin UBGA	-40°C to 125°C	-7
5CSEBA5U19A7N	5CSEBA5	484-pin UBGA	-40°C to 125°C	-7
5CSEBA5U23A7N	5CSEBA5	672-pin UBGA	-40°C to 125°C	-7
5CSEMA5U23A7N	5CSEMA5	672-pin UBGA	-40°C to 125°C	-7
5CSEMA5F31A7N	5CSEMA5	896-pin FBGA	-40°C to 125°C	-7
				continued

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2. Supported Automotive-Grade Devices AUT5V1 | 2018.10.01



Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
5CSEBA6U19A7N	5CSEBA6	484-pin UBGA	-40°C to 125°C	-7
5CSEBA6U23A7N	5CSEBA6	672-pin UBGA	-40°C to 125°C	-7
5CSEMA6U23A7N	5CSEMA6	672-pin UBGA	-40°C to 125°C	-7
5CSEMA6F31A7N	5CSEMA6	896-pin FBGA	-40°C to 125°C	-7
5CSXFC2C6U23A7N	5CSXFC2	672-pin UBGA	-40°C to 125°C	-7
5CSXFC4C6U23A7N	5CSXFC4	672-pin UBGA	-40°C to 125°C	-7
5CSXFC5C6U23A7N	5CSXFC5	672-pin UBGA	-40°C to 125°C	-7
5CSXFC6C6U23A7N	5CSXFC6	672-pin UBGA	-40°C to 125°C	-7
5CSXFC6D6F31A7N	5CSXFC6	896-pin FBGA	-40°C to 125°C	-7

2.4.2. Package Options and Maximum User I/Os

Table 9. Package Options and Maximum User I/Os in Cyclone V SE Devices

Package Type/ E Pin Count	Ball Spacing	Dimensions	Product Line			
	(mm)	(mm)	5CSEA2	5CSEA4	5CSEA5	5CSEA6
			(25K LEs)	(40K LEs)	(85K LEs)	(110K LEs)
			FPGA I/Os / HPS I/Os			
UBGA-484	0.8	19 x 19	66 / 151	66 / 151	66 / 151	66 / 151
UBGA-672	0.8	23 x 23	145 / 181	145 / 181	145 / 181	145 / 181
FBGA-896	1	31 x 31	_	_	288 / 181	288 / 181

Table 10. Package Options and Maximum User I/Os in Cyclone V SX Devices

Package Type/	Ball Spacing	Dimensions	Product Line			
Pin Count	(1111)	(mm)	5CSXC2	5CSXC4	5CSXC5	5CSXC6
			(25K LEs)	(40K LEs)	(85K LEs)	(110K LEs)
			FPGA I/Os / HPS I/Os / XCVRs			
UBGA-672	0.8	23 x 23	145 / 181 / 6	145 / 181 / 6	145 / 181 / 6	145 / 181 / 6
FBGA-896	1	31 x 31	-	—	_	288 / 181 / 9





2.4.3. Device Ordering Codes

Figure 3. Automotive-Grade Ordering Information for Cyclone V SE Devices



* All Cyclone V SoC devices include one hard memory controller dedicated to the processor and which can be shared by the FPGA.

Figure 4. Automotive-Grade Ordering Information for Cyclone V SX Devices



Note:

* All Cyclone V SoC devices include one hard memory controller dedicated to the processor and which can be shared by the FPGA.





2.5. Cyclone V Devices

2.5.1. Supported Automotive-Grade Devices

Table 11. Automotive-Grade in Cyclone V Devices

Other automotive-grade product line/package combinations or ordering codes might be available upon request. Consult your Intel sales representative to submit your request.

Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
5CEBA2F17A7N	5CEBA2	256-pin FBGA	-40°C to 125°C	-7
5CEFA2U19A7N	5CEFA2	484-pin UBGA	-40°C to 125°C	-7
5CEBA4F17A7N	5CEBA4	256-pin FBGA	-40°C to 125°C	-7
5CEFA4U19A7N	5CEFA4	484-pin UBGA	-40°C to 125°C	-7
5CEFA5U19A7N	5CEFA5	484-pin UBGA	-40°C to 125°C	-7
5CEFA7U19A7N	5CEFA7	484-pin UBGA	-40°C to 125°C	-7
5CEFA9U19A7N	5CEFA9	484-pin UBGA	-40°C to 125°C	-7
5CGXFC3B6U15A7N	5CGXFC3	324-pin UBGA	-40°C to 125°C	-7
5CGXFC3B6U19A7N	5CGXFC3	484-pin UBGA	-40°C to 125°C	-7
5CGXFC4C6U19A7N	5CGXFC4	484-pin UBGA	-40°C to 125°C	-7
5CGXFC5C6U19A7N	5CGXFC5	484-pin UBGA	-40°C to 125°C	-7
5CGXFC5C6F23A7N	5CGXFC5	484-pin FBGA	-40°C to 125°C	-7
5CGXFC7C6U19A7N	5CGXFC7	484-pin UBGA	-40°C to 125°C	-7
5CGXFC7D6F31A7N	5CGXFC7	896-pin FBGA	-40°C to 125°C	-7
5CGXFC9A6U19A7N	5CGXFC9	484-pin UBGA	-40°C to 125°C	-7

2.5.2. Package Options and Maximum User I/Os

Table 12. Package Options and Maximum User I/Os in Cyclone V E Devices

Package	Ball Spacing	Dimensions	Product Line				
Count (mm)	(mm)	5CEA2	5CEA4	5CEA5	5CEA7	5CEA9	
			(25K LEs)	(49K LEs)	(77K LEs)	(149.5K LEs)	(301K LEs)
					I/Os		
FBGA-256	1	17 x 17	128	128	-	—	-
UBGA-484	0.8	19 x 19	224	224	224	240	240





Package	Ball Spacing	Dimensions	Product Line				
Count	(mm)	(mm)	5CGXC3	5CGXC4	5CGXC5	5CGXC7	5CGXC9
			(36K LEs)	(50K LEs)	(77K LEs)	(149.5K LEs)	(301K LEs)
					I/Os / XCVRs		
UBGA-324	0.8	15 x 15	144 / 3	-	-	_	-
UBGA-484	0.8	19 x 19	208 / 3	224 / 6	224 / 6	240 / 6	240 / 5
FBGA-484	1	23 x 23	_	-	240 / 6	_	-
FBGA-896	1	31 x 31	_	-	-	480 / 9	-

Table 13. Package Options and Maximum User I/Os in Cyclone V GX Devices

2.5.3. Device Ordering Codes

Figure 5. Automotive-Grade Ordering Information for Cyclone V E Devices



A9: 301K logic elements



Figure 6. Automotive-Grade Ordering Information for Cyclone V GX Devices



2.6. Cyclone IV Devices

2.6.1. Supported Automotive-Grade Devices

Table 14. Automotive-Grade in Cyclone IV Devices

Other automotive-grade product line/package combinations or ordering codes might be available upon request. Consult your Intel sales representative to submit your request.

Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
EP4CE6F17A7N	EP4CE6	256-pin FBGA	-40°C to 125°C	-7
EP4CE6E22A7N	EP4CE6	144-pin EQFP	-40°C to 125°C	-7
EP4CE10F17A7N	EP4CE10	256-pin FBGA	-40°C to 125°C	-7
EP4CE10E22A7N	EP4CE10	144-pin EQFP	-40°C to 125°C	-7
EP4CE15F17A7N	EP4CE15	256-pin FBGA	-40°C to 125°C	-7
EP4CE15F23A7N	EP4CE15	484-pin FBGA	-40°C to 125°C	-7
EP4CE15U14A7N	EP4CE15	256-pin UBGA	-40°C to 125°C	-7
EP4CE22F17A7N	EP4CE22	256-pin FBGA	-40°C to 125°C	-7
EP4CE22E22A7N	EP4CE22	144-pin EQFP	-40°C to 125°C	-7
EP4CE22U14A7N	EP4CE22	256-pin UBGA	-40°C to 125°C	-7
EP4CE30F19A7N	EP4CE30	324-pin FBGA	-40°C to 125°C	-7
EP4CE30F23A7N	EP4CE30	484-pin FBGA	-40°C to 125°C	-7
EP4CE40F19A7N	EP4CE40	324-pin FBGA	-40°C to 125°C	-7
EP4CE40F23A7N	EP4CE40	484-pin FBGA	-40°C to 125°C	-7
				continued





Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
EP4CE40U19A7N	EP4CE40	484-pin UBGA	-40°C to 125°C	-7
EP4CE55F23A7N	EP4CE55	484-pin FBGA	-40°C to 125°C	-7
EP4CGX15BF14A7N	EP4CGX15	169-pin FBGA	-40°C to 125°C	-7

2.6.2. Package Options and Maximum User I/Os

Table 15. Package Options and Maximum User I/Os in Cyclone IV E Devices

Package	Ball	l Dimensio		Product Line					
Count ((mm)	ns (mm)	EP4CE6 (6.3K LEs)	EP4CE10 (10.3K LEs)	EP4CE15 (15.4K LEs)	EP4CE22 (22.3K LEs)	EP4CE30 (28.8K LEs)	EP4CE40 (39.6K LEs)	EP4CE55 (55.9K LEs)
						I/Os			
EQFP-144	0.5	22 x 22	91	91	-	79	-	-	_
UBGA-25 6	0.8	14 x 14	_	-	165	153	-	-	_
FBGA-256	1	17 x 17	179	179	165	153	-	-	-
UBGA-48 4	0.8	19 x 19	-	-	-	-	-	328	_
FBGA-324	1	19 x 19	-	-	-	-	193	193	_
FBGA-484	1	23 x 23	_	_	343	_	328	328	324

Table 16. Package Options and Maximum User I/Os in Cyclone IV GX Devices

Package Type/ Pin Count	Ball Spacing (mm)	Dimensions (mm)	Product Line
			EP4CGX15 (14.4K LEs)
			I/Os
FBGA-169	1	14 x 14	72 / 2





Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
5M160ZE64A5N	5M160Z	64-pin EQFP	-40°C to 125°C	-5
5M160ZT100A5N	5M160Z	100-pin TQFP	-40°C to 125°C	-5
5M240ZT100A5N	5M240Z	100-pin TQFP	-40°C to 125°C	-5
5M570ZT100A5N	5M570Z	100-pin TQFP	-40°C to 125°C	-5
5M1270ZF256A5N	5M1270Z	256-pin FBGA	-40°C to 125°C	-5
5M1270ZT144A5N	5M1270Z	144-pin TQFP	-40°C to 125°C	-5

2.7.2. Package Options and Maximum User I/Os

Table 18. Package Options and Maximum User I/Os in MAX V Devices

Package	Ball	Ball Dimension	Product Line						
Count (r	(mm)	s (mm)	5M40Z (40K LEs)	5M80Z (80K LEs)	5M160Z (160K LEs)	5M240Z (240K LEs)	5M570Z (570K LEs)	5M1270Z (1270K LEs)	
			I/Os						
EQFP-64	0.5	7 x 7	54	54	54	_	_	_	
TQFP-100	0.5	14 x 14	-	79	79	79	74	_	
TQFP-144	0.5	20 x 20	-	-	-	_	_	114	
FBGA-256	1	17 x 17	_	-	-	_	_	211	

2.7.3. Device Ordering Codes

Figure 9. Automotive-Grade Ordering Information for MAX V Devices





2.8. MAX II Devices

2.8.1. Supported Automotive-Grade Devices

Table 19. Automotive-Grade in MAX II Devices

Other automotive-grade product line/package combinations or ordering codes might be available upon request. Consult your Intel sales representative to submit your request.

Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
EPM240T100A5N	EPM240	100-pin TQFP	-40°C to 125°C	-5
EPM570F100A5N	EPM570	100-pin FBGA	-40°C to 125°C	-5
EPM570T100A5N	EPM570	100-pin TQFP	-40°C to 125°C	-5
EPM570T144A5N	EPM570	144-pin TQFP	-40°C to 125°C	-5
EPM1270T144A5N	EPM1270	144-pin TQFP	-40°C to 125°C	-5
EPM1270F256A5N	EPM1270	256-pin FBGA	-40°C to 125°C	-5
EPM2210F256A5N	EPM2210	256-pin FBGA	-40°C to 125°C	-5
EPM2210F324A5N	EPM2210	324-pin FBGA	-40°C to 125°C	-5

2.8.2. Device Ordering Codes









2.10. Cyclone II Devices (Legacy Support)

2.10.1. Supported Automotive-Grade Devices

Table 21.Automotive-Grade in Cyclone II Devices

Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
EP2C5AT144A7N	EP2C5	144-pin TQFP	-40°C to 125°C	-7
EP2C5AF256A7N	EP2C5	256-pin FBGA	-40°C to 125°C	-7
EP2C8AF256A7N	EP2C8	256-pin FBGA	-40°C to 125°C	-7
EP2C15AF256A7N	EP2C15	256-pin FBGA	-40°C to 125°C	-7
EP2C15AF484A7N	EP2C15	484-pin FBGA	-40°C to 125°C	-7
EP2C20AF256A7N	EP2C20	256-pin FBGA	-40°C to 125°C	-7
EP2C20AF484A7N	EP2C20	484-pin FBGA	-40°C to 125°C	-7

2.10.2. Device Ordering Codes

Figure 12. Automotive-Grade Ordering Information for Cyclone II Devices



2.11. Cyclone Devices (Legacy Support)

2.11.1. Supported Automotive-Grade Devices

Table 22. Automotive-Grade in Cyclone Devices

Device Ordering Code	Device	Package	Junction Temperature Range	Speed Grade
EP1C3T100A8N	EP1C3	100-pin TQFP	-40°C to 125°C	-8
EP1C3T144A8N	EP1C3	144-pin TQFP	-40°C to 125°C	-8





2.12.2. Device Ordering Codes

Figure 14. Automotive-Grade Ordering Information for MAX 7000A Devices







3. Intel Quartus Prime Software Support

The Intel Quartus Prime design software supports the automotive-grade devices in the automotive temperature range. The Intel Quartus Prime software provides a comprehensive environment for SoC design. It also includes HDL and schematic design entry, compilation and logic synthesis, full simulation and advanced timing analysis, Signal Tap II logic analyzer, and device configuration.

To target an automotive-grade device in your design in the Intel Quartus Prime software, follow these steps:

- 1. Click **Assignments > Device**. The **Settings** dialog box appears.
- 2. In the **Family** drop-down list, select your device.
- 3. Under Target device, select Specific device selected in 'Available devices' list.
- 4. In the **Available devices** list, select the appropriate ordering code.
 - Note: The Intel Quartus Prime software does not show the "N" suffix, which indicates a lead-free device. For example, the 5CGXFC3B6U15A7N device is shown only as 5CGXFC3B6U15A7.
- 5. Click **OK**.

The following automotive-grade devices are from the legacy device families and are not recommended for new automotive designs.

- Cyclone III
- Cyclone II
- Cyclone
- MAX 7000AE



5. DC and Timing Specifications

The automotive-grade devices have the same values for the following specifications as published in the respective device datasheets :

- Absolute maximum ratings
- Recommended operating conditions
- DC electrical characteristics
- Timing specifications over the automotive temperature range

For the maximum power-up current (I_{CCINT}) required to power up an automotivegrade Cyclone device, use the value specified for the corresponding industrial-grade device.

The on-chip series termination (R_S OCT) specifications for the following automotivegrade devices are as follows:

- Automotive-grade Cyclone III, Cyclone IV, Cyclone V, Cyclone V SoC, Intel Cyclone 10 LP, and Intel MAX 10 devices—same as the corresponding industrialgrade devices
- Automotive-grade Cyclone II devices—same as the corresponding extendedtemperature devices

The switching characteristics of the automotive-grade Cyclone III, Cyclone IV, Cyclone V, and Cyclone V SoC devices are the same as the devices with -8 speed grade as published in the respective device datasheets.

Related Information

- Intel Cyclone 10 LP Device Datasheet
- Intel MAX 10 FPGA Device Datasheet
- Cyclone V Device Datasheet
- Cyclone IV Device Datasheet
- DC and Switching Characteristics for MAX V Devices
- DC and Switching Characteristics chapter, MAX II Device Handbook
- Cyclone III Device Datasheet
- DC Characteristics and Timing Specifications chapter, Cyclone II Device Handbook
- DC and Switching Characteristics chapter, Cyclone Device Handbook
- MAX 7000A Programmable Logic Device Data Sheet

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7. Package and Board Layout Information

Intel provides information on package and PCB design guidelines.

Related Information

- Package and Thermal Resistance page, Intel website
 Provides more information about the package-related information and Package
 Information Datasheet for Intel Devices.
- AN 114: Board Design Guidelines for Intel Programmable Device Packages Provides more information about the PCB design guidelines.
- Schematic Symbols (Cadence Capture CIS and Allegro DE-HDL (Concept Software)) page

Provides more information about designing PCBs with the Cadence OrCAD capture component information system and symbols libraries.

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A. Document Revision History for the Automotive-Grade Device Handbook

Document Version	Changes
2018.10.01	 Updated the Intel Automotive-Grade Devices and Intel Automotive Qualifications sections. Updated Intel Cyclone 10 devices to Intel Cyclone 10 LP devices. Changed Enpirion to Intel Enpirion. Removed Intel Arria 10 devices from the Intel Automotive-Grade Device Families table. Removed Intel Arria 10 devices from the Supported Automotive-Grade Device Families table. Removed ES optional suffix from the Automotive-Grade Device Families table. Updated the description for Intel MAX 10 in the Intel Automotive-Grade Device Families table. Removed ES optional suffix from the Automotive-Grade Ordering Information for Intel Cyclone 10 UP Devices diagram. Updated the Automotive-Grade in Intel Enpirion Devices. Replaced Device column with Maximum Output Current column. Renamed the column Ambient Temperature Range as Ambient Operating Temperature Range. Added the Junction Temperature Range column. Removed the following devices from the Automotive-Grade in Intel MAX 10 Devices table. 10M025CM153A7G 10M045CM153A7G 10M045CM153A7G 10M045CM153A7G 10M085CM153A7G 10M35DCF672A7G 10M35DCF672A7G 10M35DCF672A7G 10M35DCF672A7G 10M50DAF484A7G 10M50DCF672A7G 1
	MAX 10 Dual Power Supply Devices table.

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Document Version	Changes
	 Updated the Automotive-Grade Ordering Information for Intel MAX 10 Devices diagram. — Removed V and M package types.
	 Removed WLCSP (36 and 81), MBGA (153), and FBGA (672) package types. Removed DF feature option.
	Removed notes from the following tables:
	— Package Options and Maximum User I/Os in Cyclone V SE Devices
	— Package Options and Maximum User I/Os in Cyclone V SX Devices
	Removed the resource count for FBGA-896 package in 5CSXC5 device.
	Updated the Automotive-Grade in Cyclone V Devices table.
	 Added 5CGXFC7D6F31A7N
	 Removed Cyclone V GT devices: 5CGTFD5C5U19A7N, 5CGTFD7C5U19A7N, and 5CGTFD9A5U19A7N
	 Removed resources for packages that are not currently available in automotive-grade for Cyclone V E and GX devices.
	Updated the description for embedded hard IPs in the following diagrams:
	 Automotive-Grade Ordering Information for Cyclone V E Devices
	 Automotive-Grade Ordering Information for Cyclone V GX Devices
	• Removed QFN-148 package in the <i>Package Options and Maximum User I/Os in Cyclone IV GX Devices</i> table.
	• Removed resources for packages that are not currently available in automotive-grade for Cyclone IV E and GX devices.
	• Updated the Package Options and Maximum User I/Os in MAX V Devices table.
	 Corrected QFP-100 to TQFP-100 and DFP-144 to TQFP-144.
	 Removed MBGA-64, MBGA-68, MBGA-100, and FBGA-324 packages.
	 Removed resources for packages that are not currently available in automotive-grade.
	• Updated the description for the legacy device families in the <i>Intel Quartus Prime Software Support</i> section.
	• Added Intel Cyclone 10 LP and Intel MAX 10 devices in the <i>DC and Timing Specifications</i> section.

Date	Version	Changes
December 2017	2017.12.15	 Removed Intel Cyclone 10 GX devices. Removed Intel Cyclone 10 GX devices from Automotive-Grade in Intel Cyclone 10 GX Devices table. Removed Package Options and Maximum User I/Os in Intel Cyclone 10 GX Devices table. Removed Automotive-Grade Ordering Information for Intel Cyclone 10 GX Devices diagram. Intel rebranding.
July 2017	2017.07.13	Corrected the automotive temperature range in the figure showing the available options for the Intel Arria 10 GX devices from "-40°C to 100°C" to "-40°C to 125°C".
May 2017	2017.05.08	Updated links.Rebranded as Intel.
February 2017	2017.02.13	Added Intel Arria 10, Cyclone 10, and Intel Enpirion devices.Removed PowerPlay text from tool name.
May 2016	2016.05.03	 Updated the Overview topic to remove ASIC devices. Updated footnote in Automotive-Grade in MAX 10 Devices table. Added new automotive-grade devices for the following device families: MAX 10—10M08SAU169A7G Cyclone V SoC—5CSXFC6D6F31A7N Cyclone IV—EP4CE15U14A7N, EP4CE22U14A7N, and EP4CE55F23A7N
		continued



Date	Version	Changes
		 Added new automotive-grade devices for the following device families: Cyclone V—5CGXFC5C6F23A7N Cyclone IV—EP4CE40U19A7N and EP4CGX15BF14A7N MAX V—5M40ZE64A5N, 5M80ZT100A5N, and 5M160ZT100A5N Added Cyclone IV GX ordering information diagram. Updated HPS I/O count for Cyclone V SE and SX devices.
September 2013	3.4	 Updated Table 3–2, Table 3–3, and Table 3–4. Updated Figure 3–1, Figure 3–2, and Figure 3–3.
June 2013	3.3	Updated Table 3–1 and Table 3–5.
May 2013	3.2	 Updated Figure 3–2, Figure 3–3, Figure 4–1, and Figure 5–1. Updated Table 3–1, Table 3–5, Table 4–2, Table 5–1, and Table 5–3.
February 2013	3.1	Updated Table 2-2, Table 2-3, Table 3–2, Table 3–3, Table 3–4, Table 4–2, Table 4–3, and Table 5–2.
January 2013	3.0	 Added Cyclone V and Cyclone V SoC devices. Added Table 4-2, Table 4-3, and Table 5-2. Updated Table 4-1, Table 4-4, Table 6-1, and Table 6-2. Updated Figure 4-1. Listed the following devices under legacy support: Cyclone III Cyclone II Cyclone MAX 7000A
May 2011	2.0	 Added MAX V devices. Updated part number for Cyclone III, Cyclone IV, and HardCopy II devices. Template conversion. Minor text edits.
March 2010	1.2	Added Cyclone IV devices. Removed Referenced Documents section.
October 2008	1.1	Updated DC and Timing Specifications section.Converted to new template.
February 2008	1.0	Initial release.



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