XILINX®

Xilinx IQ Solutions:
Architecting Automotive Intelligence

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In-car electronics content is increasing at a phenomenal rate and includes such applications as navigation systems, entertainment systems, and communications devices. To address the needs of telematic designers Xilinx created a new family of devices with an extended Industrial temperature range option. This new "IQ" family consists of existing Xilinx Industrial grade (I) FPGAs and CPLDs with the addition of a new extended temperature grade (Q), available for selected devices. The new IQ product grade (-40°C to +125°C ambient for CPLDs and junction for FPGAs) is ideal for automotive and industrial applications. The wide range of device density and package combinations enable you to deliver high performance, cost effective, flexible solutions that meet all of your application needs.

Temperature Range	Xilinx Products
Commercial (C): 0° to +70°	See xilinx.com/partinfo/databook.htm
Industrial (I): -40° to +85°	See xilinx.com/partinfo/databook.htm
Extended (IQ): -40° to +125°	Selected Xilinx devices with extended temperature range (See tables)

Design-In Flexibility

With Xilinx IQ devices, you can design-in flexibility and get your product to market faster than ever before. Because many new standards are evolving (such as the MOST and FlexRay in-car bussing standards), you need the flexibility to quickly modify your designs at any time. With our unique Internet Reconfigurable Logic (IRL™) capability, you can remotely and automatically modify your designs, in the field, after your product has left the factory.
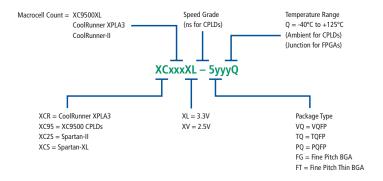
By combining our latest IQ programmable logic devices with our solutions infrastructure of high-productivity software, IP Cores, Design Services, and Customer Education, you can develop advanced, highly flexible products, faster than ever before.

Xilinx IQ Devices

For more information, visit: **www.xilinx.com/automotive**

Q Grade Ordering Information

Q Grade Ordering Information

Macrocell Count = XC9500XL
CoolRunner XPLA3
CoolRunner-II

Speed Grade
(ns for CPLDs)

Temperature Range
Q = -40°C to +125°C
(Ambient for CPLDs)
(Junction for FPGAs)

XCxxxXL – 5yyyQ

XCR = CoolRunner XPLA3
XC95 = XC9500 CPLDs
XC2S = Spartan-II
XCS = Spartan-XL

XL = 3.3V
XV = 2.5V

Package Type
VQ = VQFP
TQ = TQFP
PQ = PQFP
FG = Fine Pitch BGA
FT = Fine Pitch Thin BGA

IQ CPLD Selector

In today's ultra-competitive environment, designers need a CPLD that provides maximum flexibility, helping them achieve the quickest possible time-to-market with their products. Whether performing the simplest of PAL or discrete logic integration designs, need a fast 8-bit microcontroller co-processor or advanced, real time hardware field updates, Xilinx CPLDs provide designers with a complete range of CPLD products. Through leading performance, free internet-based WebPOWERED™ software and the industry's lowest power consumption, Xilinx has the right CPLD for every designer's need. Xilinx IQ Grade CPLDs are qualified to -40°C to +125°C Ambient. The range includes XC9500XL and CoolRunner™ XPLA3 3.3V CPLDs and CoolRunner-II ultra low power 1.8V families.

Part Number	Speed	Package	Voltage	Description
XC9500XL CPLD				
XC9536XL	10 ns/100 MHz	VQ44, VQ64	3.3V	36 Macrocells (800 Gates), ISP, JTAG, Bus Hold & I/P Hysteresis
XC9572XL	10 ns/100 MHz	VQ64, TQ100	3.3V	72 Macrocells (1,600 Gates), ISP, JTAG, Bus Hold & I/P Hysteresis
CoolRunner XPLA3				
XCR3032XL	10 ns/100 MHz	VQ44	3.3V	32 Macrocells (800 Gates), Low Power, Slew Rate Control, ISP & JTAG
XCR3064XL	10 ns/100 MHz	VQ44, VQ100	3.3V	64 Macrocells (1,600 Gates), Low Power, Slew Rate Control, ISP & JTAG
XCR3128XL	10 ns/100 MHz	VQ100, TQ144	3.3V	128 Macrocells (3,200 Gates), Low Power, Slew Rate Control, ISP & JTAG
XCR3256XL	10 ns/100 MHz	TQ144, PQ208	3.3V	256 Macrocells (6,400 Gates), Low Power, Slew Rate Control, ISP & JTAG
XCR3384XL	10 ns/100 MHz	PQ208	3.3V	384 Macrocells (9,600 Gates), Low Power, Slew Rate Control, ISP & JTAG
XCR3512XL	10 ns/100 MHz	PQ208	3.3V	512 Macrocells (12,800 Gates), Low Power, Slew Rate Control, ISP & JTAG
CoolRunner-II				
XC2C32	6 ns/145 MHz	VQ44	1.8V	32 Macrocells (800 Gates), 6 I/O Standards, Slew Rate Control, Clock Doubler, Bus Hold, I/P Hysteresis. Ultra low power.
XC2C64	7.5 ns/127 MHz	VQ44, VQ100	1.8V	64 Macrocells (1,600 Gates), 6 I/O Standards, Slew Rate Control, Clock Doubler, Bus Hold, I/P Hysteresis. Ultra low power.
XC2C128	7.5 ns/127 MHz	VQ44, VQ100	1.8V	128 Macrocells (3,200 Gates), 9 I/O Standards, Slew Rate Control, Clock Doubler, Clcok Divider, CoolClock, DataGate, Bus Hold, I/P Hysteresis. Ultra low power.
XC2C256	7.5 ns/127 MHz	VQ100, TQ144	1.8V	256 Macrocells (6,400 Gates), 9 I/O Standards, Slew Rate Control, Clock Doubler, Clcok Divider, CoolClock, DataGate, Bus Hold, I/P Hysteresis. Ultra low power.
XC2C384	10 ns/100 MHz	TQ144, PQ208	1.8V	384 Macrocells (9,600 Gates), 9 I/O Standards, Slew Rate Control, Clock Doubler, Clcok Divider, CoolClock, DataGate, Bus Hold, I/P Hysteresis. Ultra low power.
XC2C512	10 ns/100 MHz	PQ208	1.8V	512 Macrocells (12,800 Gates), 9 I/O Standards, Slew Rate Control, Clock Doubler, Clcok Divider, CoolClock, DataGate, Bus Hold, I/P Hysteresis. Ultra low power.

IQ FPGA Selector

FPGAs are ideal for replacing expensive fixed-logic gate arrays, Application Specific Integrated Circuits (ASICs), and Application Specific Standard Products (ASSPs) such as bus interface chip sets. Xilinx Spartan™ FPGAs are ideal for cost-optimized telematics applications. The IQ grade FPGAs are qualified to operate at -40˚C to +125˚C junction temperature.

The Spartan-IIE family offers some of the most advanced FPGA technologies available today, including:

- Programmable support for up to 19 I/O standards, including LVDS, SSTL, and HSTL.
- A wide range of IP (including advanced DSP and processor cores)
- On-chip blocks of fast RAM.
- Digital delay-lock loops for both chip-level and board-level clock management.

In addition, Spartan-IIE FPGAs provide superior value by integrating functions such as PLLs and FIFOs, reducing your total system cost and board area. The IQ range includes the Spartan-XL 3.3V, Spartan-II 2.5V, and Spartan-IIE 1.8V families.

Part Number	Speed Grade	Package	Voltage	Description
Spartan-XL				
XCS05XL	-4	VQ100	3.3V	Low cost FPGA with power down pin, 5V tol I/O, 5,000 Gate, 238 logic cells, 100 CLBs.
XCS10XL	-4	VQ100	3.3V	Low cost FPGA with power down pin, 5V tol I/O, 10,000 Gate, 466 logic cells, 196 CLBs.
XCS20XL	-4	TQ144, PQ208	3.3V	Low cost FPGA with power down pin, 5V tol I/O, 20,000 Gate, 950 logic cells, 400 CLBs.
XCS30XL	-4	TQ144, PQ208	3.3V	Low cost FPGA with power down pin, 5V tol I/O, 30,000 Gate, 1,368 logic cells, 576 CLBs.
XCS40XL	-4	PQ208, BG256	3.3V	Low cost FPGA with power down pin, 5V tol I/O, 40,000 Gate, 1,862 logic cells, 784 CLBs.
Spartan-II				
XC2S15	-5	TQ144	2.5V	High volume FPGA, on-chip RAM, 16 I/O standards, 15,000 Gate, 432 logic cells, 96 CLBs, 4 block RAM blocks, 4 DLLS.
XC2S30	-5	TQ144, PQ208	2.5V	High volume FPGA, on-chip RAM, 16 I/O standards, 30,000 Gate, 972 logic cells, 216 CLBs, 6 block RAM blocks, 4 DLLS.
XC2S50	-5	TQ144, PQ208, FG256	2.5V	High volume FPGA, on-chip RAM, 16 I/O standards, 50,000 Gate, 1,728 logic cells, 384 CLBs, 8 block RAM blocks, 4 DLLs.
XC2S100	-5	TQ144, PQ208, FG256	2.5V	High volume FPGA, on-chip RAM, 16 I/O standards, 100,000 Gate, 2,700 logic cells, 600 CLBs, 10 block RAM blocks, 4 DLLs.
XC2S150	-5	PQ208, FG256	2.5V	High volume FPGA, on-chip RAM, 16 I/O standards, 150,000 Gate, 3,888 logic cells, 864 CLBs, 12 block RAM blocks, 4 DLLs.
XC2S200	-5	PQ208, FG456	2.5V	High volume FPGA, on-chip RAM, 16 I/O standards, 200,000 Gate, 5,292 logic cells, 1,176 CLBs, 14 block RAM blocks, 4 DLLs.
Spartan-IIE				
XC2S50E	-6	TQ144, PQ208, FT256	1.8V	High volume FPGA, on-chip RAM, 19 I/O standards, 50,000 Gate, 1,728 logic cells, 384 CLBs, 8 block RAM blocks, 4 DLLs.
XC2S100E	-6	TQ144, PQ208, FT256	1.8V	High volume FPGA, on-chip RAM, 19 I/O standards, 100,000 Gate, 2,700 logic cells, 600 CLBs, 10 block RAM blocks, 4 DLLs.
XC2S150E	-6	PQ208, FT256	1.8V	High volume FPGA, on-chip RAM, 19 I/O standards, 150,000 Gate, 3,888 logic cells, 864 CLBs, 12 block RAM blocks , 4 DLLs.
XC2S200E	-6	PQ208, FT256	1.8V	High volume FPGA, on-chip RAM, 19 I/O standards, 200,000 Gate, 5,292 logic cells, 1,176 CLBs, 14 block RAM blocks, 4 DLLs.
XC2S300E	-6	PQ208, FG456	1.8V	High volume FPGA, on-chip RAM, 19 I/O standards, 300,000 Gate, 6,912 logic cells, 1,536 CLBs, 16 block RAM blocks, 4 DLLs.

Automotive IP Cores Selector

IP cores reduce your design time, significantly reducing your risk and your time-to-market. Plus, you can easily integrate several cores onto a single FPGA for a complete system solution. The cores listed below are a small selection of the telematics IP that is optimized for Xilinx FPGAs. For more information and the interactive IP cores search engine, visit **www.xilinx.com/ipcenter.**

IP Cores	Description	Type of Core	Usage
PCI132 (Industrial)	Standard PCI	Xilinx (LogiCORE™)	P
UART	11 Cores	Xilinx (FPGA and CoolCores for CPLD), Virtual IP Group Inc., Memec & Cast	P
USB	System, USB Function Controller, USB 1.1 Device Controller	(Alliance) Cast Inc. (Alliance), MemecCore	D
SPI	SPI SPI Slave	Xilinx (LogiCORE) Cast Inc. (Alliance)	P
FIR	Reference Design, 4 Cores	Xilinx Xilinxt & LogiCORE	P
IEEE1394B	Reference Design	Xilinx	D
SDRAM Controller	2 Reference Designs, 4 AllianceCORE™	Xilinx, Memec, Rapid Prototypes Inc., NMI Electronics Ltd., Eureka Technology Inc.	P
Bluetooth	2 AllianceCORE	Bluewave Bluetooth Base Controller, Wipro & BOOST Lite Bluetooth Base Band processor, NewLogic	D
I2C	2 CoolCores (CPLD), 1 LogiCORE, 6 AllianceCORE	Digital Core Design, Memec & Cast Inc.	P

D = Development   **P = Production**

Productivity Design Software

The Xilinx Integrated Software Environment (ISE) contains all the advanced tools you need to quickly and easily develop your designs. ISE provides support for today's most popular design entry methods including HDL and schematic entry, as well as advanced simulation capabilities. With ISE you can easily integrate our cores or reuse your own IP. There is no faster or easier way to create new designs.
For more information, visit: **www.xilinx.com/ise**

ISE WebPACK™ – Free downloadable software for devices up to 300k gates (PC only).

ISE BaseX – Stand-alone software for devices up to 300k gates; includes the Xilinx CORE Generator™, FPGA Editor with Probe, and timing improvement wizard (PC Only).

ISE Foundation™ – Stand-alone software supports all Xilinx devices (PC and UNIX).

ISE Alliance™ – Back-end tools for use with third-party software (PC and UNIX).

Third Party Solutions

Development boards help you get your ideas up and running quickly. One of our partners, Acunia, provides the XINGU 8002 board, designed for developing in-vehicle infotainment systems. These boards are based on the Intel® XScale™ processor, Xilinx Spartan-II FPGAs, and Xilinx CoolRunner CPLDs.

Standard interfaces allow you to easily integrate existing and re-usable components onto the Xilinx Spartan companion board, contributing to a low risk, cost effective, and rapid product launch. The Intel XScale Microarchitecture allows the XINGU 8000 series to reach its leading power-performance ratio and to meet the absolute processing power requirements of future embedded applications. For further details, visit: **http://www.acunia.com/aes**

Xilinx Development Boards

Xilinx Device	Manufacturer	Description	Part Number
XC9500	Memec	XC9572XL Development Board	DS-KIT-95XL
XC9500	Memec	XC9572XL Dev Board, JTAG Cable & WebPACK CD	DS-KIT-95XL-PAK
CoolRunner XPLA3	Memec	XPLA3 Development Board	DS-KIT-95XL-XPLA3
CoolRunner XPLA3	Memec	XPLA3 Dev Board, WebPACK CD & JTAG Cable	DS-KIT-95XL-XPLA3-PAK
CoolRunner XPLA3	Memec	Springboard Development Board	DS-KIT-SPRINGBOARD
CoolRunner XPLA3	Memec	Springboard Development Board, WebPACK CD, JTAG Cable, Pocket C Software	DS-KIT-SPRINGBOARD-PAK
CoolRunner-II	Memec	CoolRunner-II Development Kit	DS-KIT-2C64
CoolRunner-II	Memec	CoolRunner-II Development Kit, WebPACK CD & JTAG Cable	DS-KIT-2C64-PAK
CoolRunner XPLA3 (XCR3256XL)	Avnet/Silica	XPLA3 Evaluation Kit with JTAG Cable	ADS-XLX-X3-EVL
CoolRunner-II	Avnet/Silica	CoolRunner-II Evaluation Board – XC2C64 & XC2C256	ADS-XLX-SP2-EVL
All CPLDs & FPGAs	Xilinx	JTAG Parallel Cable	HW-JTAG-PC
Spartan-II	Avnet/Silica	Development board, XC2S100 device and design examples	ADS-XLX-SP2-EVL
Spartan-II	Memec	PCI Development board, XC2S200 and design examples	DS-KIT-PC132S-200
Spartan-IIE	Memec	Development board, PSU, XC2S300E device and reference designs	DS-KIT-2S300E
Spartan-IIE	Avent/Silica	Development board, XC2S200E device, design examples. (Also available with MicroBlaze™ license).	ADS-XLX-SP2E-EVL

Xilinx System Solution Boards

Xilinx and its partners have taken system solutions to the highest level. These development boards are fully compliant with the latest standards and protocols, while maintaining the flexibility to easily upgrade as the standards evolve. These system solutions include everything you need to manufacture your next generation consumer and telematics products today. For further details, visit: **www.xilinx.com/preference_boards/index.htm**

System Solution Board	Partner	Description
1394 to DV	Divio	Digital Video (DV)/IEEE 1394 solution for applications requiring both input/output
Centauri	Convergent Designs	Digital Video (DV) over IEEE 1394 solution for decoding the DV format
USB 2.0	Kawasaki LSI & Mentor Graphics	UTMI compliant upgradeable platform
VOIP	Insight Electronics	Single chip low cost
1355	4Links	Eight port IEEE 1355 switch, using a single XC2S300E Spartan-IIE FPGA
Bluetooth	Broadcom	Cardbus to Bluetooth solution

Xilinx Design Services

To help bridge the technology gap, associated with the latest telematics designs Xilinx offers a full range of expert design services. Your concepts will quickly become reality, with less effort and less cost than ever before because we've already solved most of your design challenges for you. Xilinx programmable logic, along with our support services, gives you the competitive edge.

With Xilinx Design Services you get:

- Professional project management.
- System-level expertise, anywhere in the world.
- Experienced FPGA design engineers.
- FPGA hardware and software experts.
- Access to ready-made intellectual property (IP).

System Architecture Consulting
Xilinx provides engineering services to help you define the optimum system architecture and then we'll help you integrate your design into the most appropriate devices.

Custom Design Solutions
Xilinx experts are available to help you develop, optimize, modify, integrate, and verify your design, using your own intellectual property (IP) as well as third-party IP. Using Xilinx IP is the fastest and safest way to get your design to market.

Design Conversions
Xilinx will help you convert your old FPGA and ASIC designs into the latest Xilinx devices, for cost savings, increased performance, or added functionality.

Technical Support

Xilinx provides comprehensive technical support including tech tips, answers databases, user forums, and techXclusives, along with on line problem solving and trouble shooting expertise, all available through support.xilinx.com.

Customer Education

Xilinx offers a comprehensive range of Web-based and instructor-led education classes, including free public and on-site technical courses taught by our Authorized Training Providers (ATPs), worldwide.

Participate in Xilinx Education Services courses and you will reduce your time-to-knowledge and increase your skills as you learn how to:

- Boost your system clock speeds.
- Fit more functionality into smaller devices.
- Shorten your design cycle.
- Maximize your productivity.

For more information, visit: www.xilinx.com/support/education-home.htm

Xilinx Quality and Reliability

All aspects of the Xilinx Quality Assurance Program have been designed to eliminate the root causes of defects – we design-in reliability. Our quality management system is fully compliant with all ISO 9001 requirements, and in 1997 we became fully qualified as a QML supplier because we meet all of the requirements for MIL standard 38535. We manufacture all of our products through manufacturing subcontractors who are fully QS9000 certified. Currently we are not QS9000 certified, however we are confident that our quality and reliability meet the automotive industry's stringent requirements.