XILINX®

CoolRunner™-II

Enabling Product Differentiation In The Digital Consumer Market

Product Differentiation: Separating your product from the competition.
Enhancing Technology: Adding innovation to existing chipset features.
Enabling Technology: Add entirely new features to open new markets.

Xilinx. The Leader in Programmable logic.

Designers prefer CoolRunner-II CPLDs.

Based upon both supplier and component criteria, designers choose Xilinx as a preferred vendor for low-power CPLD products. Weighing competitors not only by price, but by reputation of product, delivery, quality, and attention to special needs, Xilinx comes out on top.

According to HTC, the device features were what tipped the scale. Not only did the base power consumption meet or exceed power budgets, but key low-power enhancements played a large role in part selection. "HTC has received a substantial amount of performance capabilities in Xilinx products," said Peter Chou, HTC's president. "Their combination of leading-edge technologies, complete programmable system design, and full technical service support are essential to the success of HTC."

TOC

Why Designers are Using CoolRunner-II CPLDs

The Benefits of Xilinx CoolRunner-II CPLDs

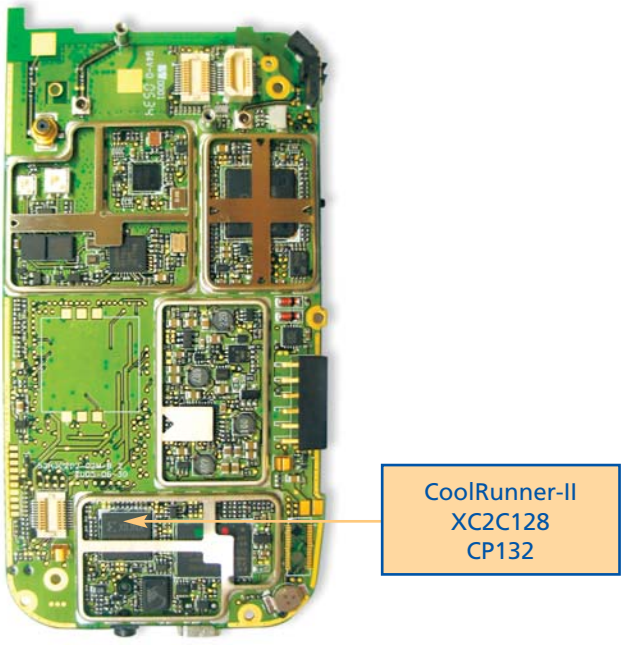
Much more than logic and flip-flops

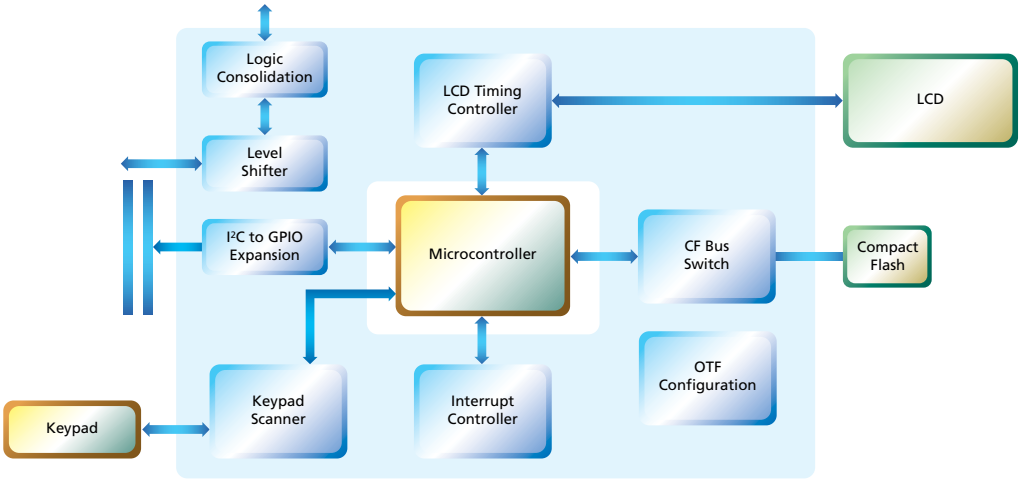
- **Product Differentiation.** Separating your product from the competition
  - Enhancing technology: adding an innovation to existing chipset features
  - Enabling technology: adding entirely new features to open up new markets
  - Increase brand awareness: give your product something memorable
- **Low Power RealDigital Advantage**
  - DataGATE: lower power; requires no external devices
- **Flexibility**
  - Easily integrate the components that best meet your needs
  - Support modular configurations
  - Easy System Customization
- **Time-to-Market Advantage**
  - Free efficient and proven development tools (WebPACK)
  - Standard off-the-shelf components
  - Free Reference Designs
- **Fully Programmable and Re-Programmable**
  - Reduced exposure to risk, bugs, component shortages, evolving standards
  - Field upgradeable hardware
- **System Cost Management**
  - Logic consolidation: reduce the number of devices in your design
- **Efficient Life-Cycle Product Management**
  - Extremely effective at enabling derivative designs
  - Exploit market opportunities before your competition
  - Expand the market base of your ROI
- **Combine Functionality**
  - Level Shifting and I/O Pin Expansion and Logic Consolidation
  - Keypad scanner and other features in one device

Handsets

Pocket PC Phone

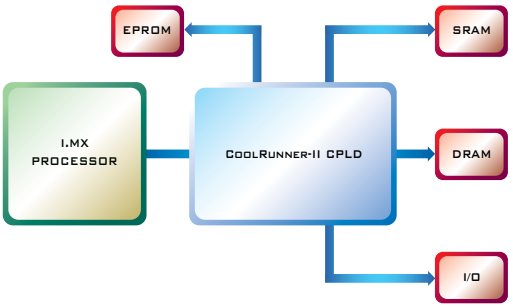
- **DataGATE**
- Level Shifter
- I^2C to GPIO Expansion
- OTF Configuration
- Interrupt Controller
- CF Bus Switch
- Keypad Scanner
- LCD Timing Controller
- Logic Consolidation

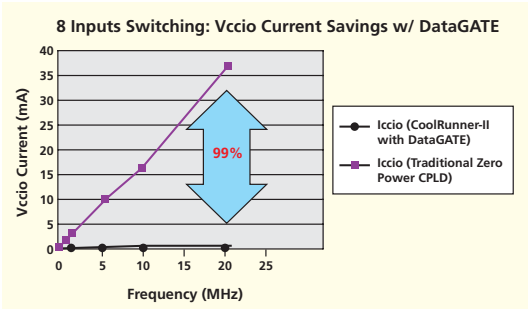




DataGATE Blocking

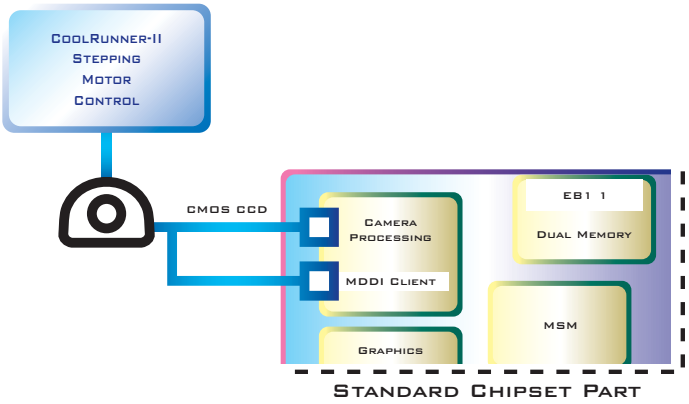
- XAPP395 Using DataGATE in CoolRunner-II CPLDs
- WP227 The Real Value of CoolRunner-II DataGATE





Cell Phone with Camera Zoom

- Focus Control for Stepping Motor.
- Chipset Differentiation.



CoolRunner-II
XC2C32
QF32

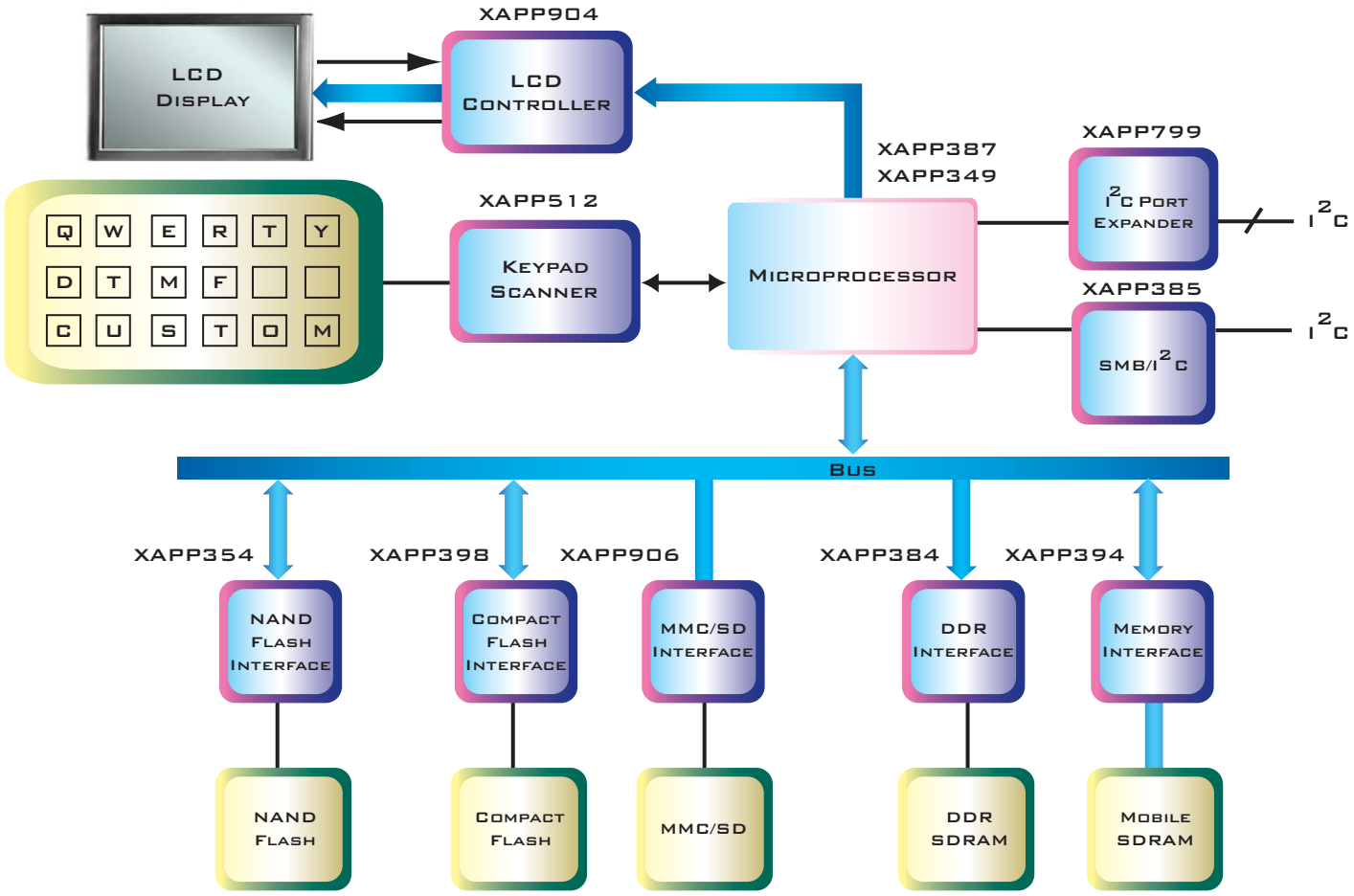
Pocket PC/Phone

- Keypad Scanner
- Logic Consolidation

CoolRunner-II
XC2C128
CP132

Handset Application Note Support

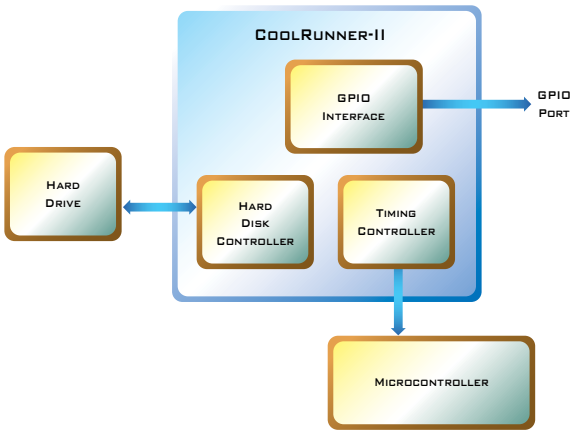
- Free HDL Design Files Accompany Application Notes
- Proven Customer Design Use and Support
- www.xilinx.com/support/library.htm

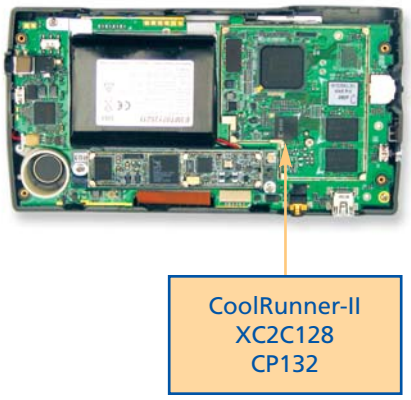


Portable Consumer

GPS Unit

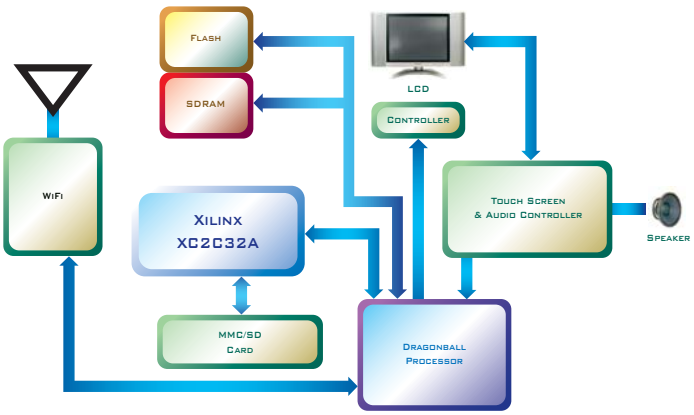
- Hard Disk Control
- GPIO Interface
- Timing Controller

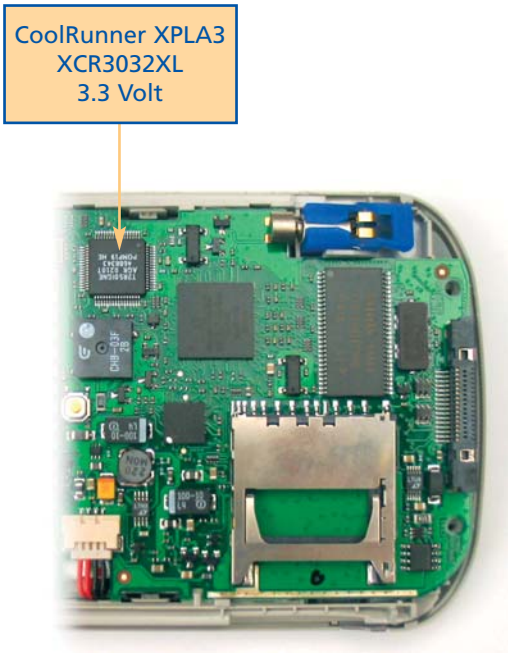




PDA Device

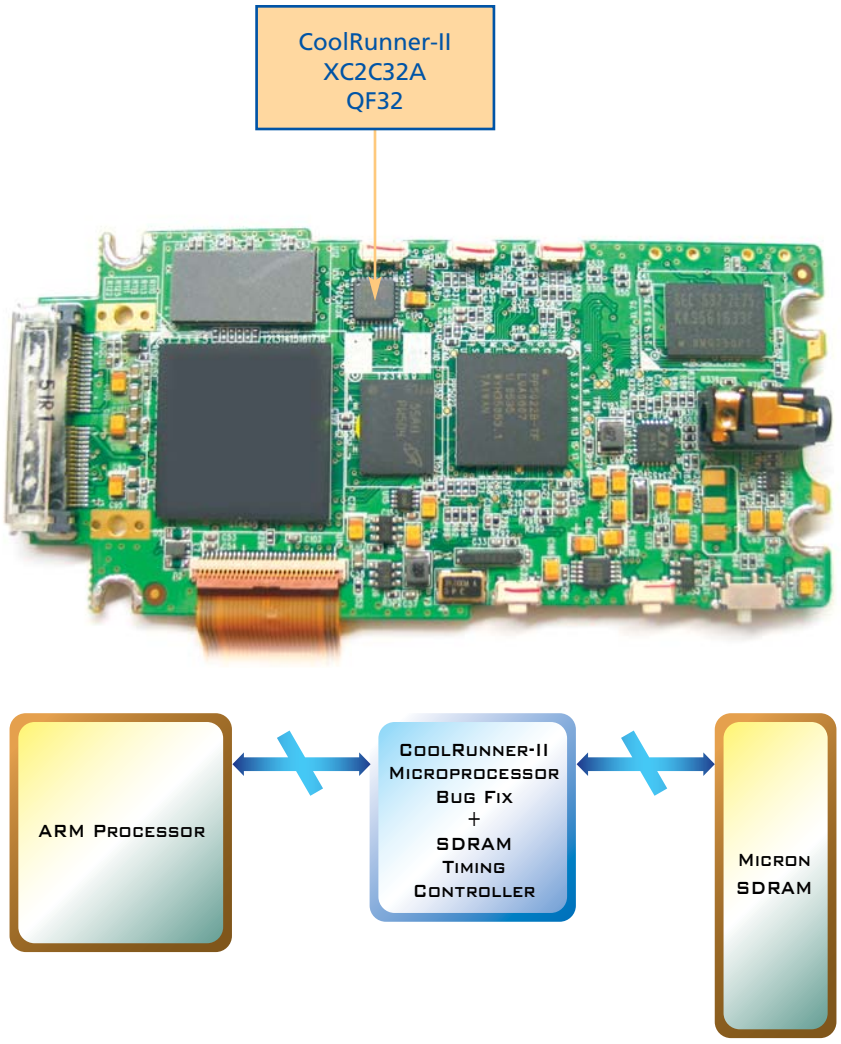
- SD Card Interface





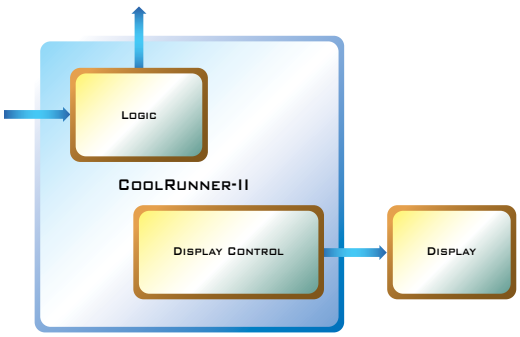
Portable Satellite Radio and MP3 Player

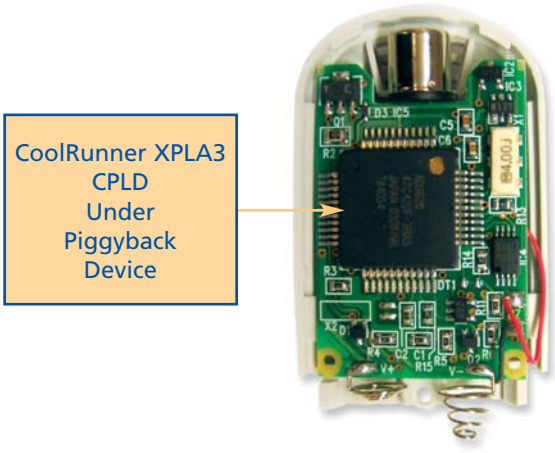
- Microprocessor Bug Fix
- SDRAM Timing Controller



Alcohol Analyzer

- Display Control
- Logic Consolidaton

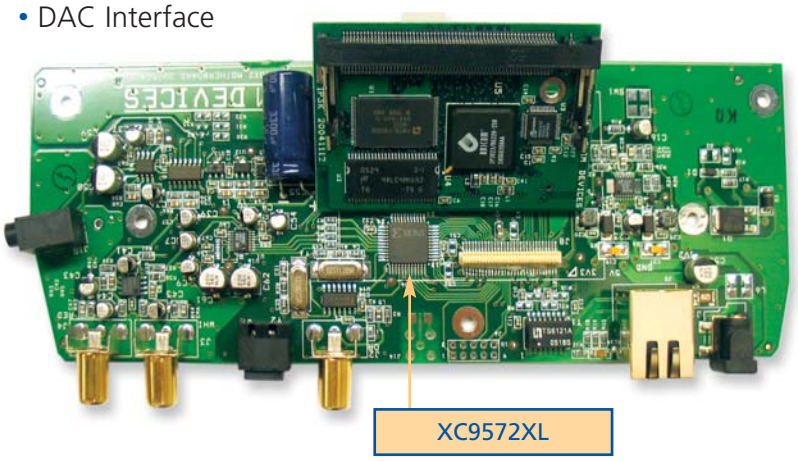


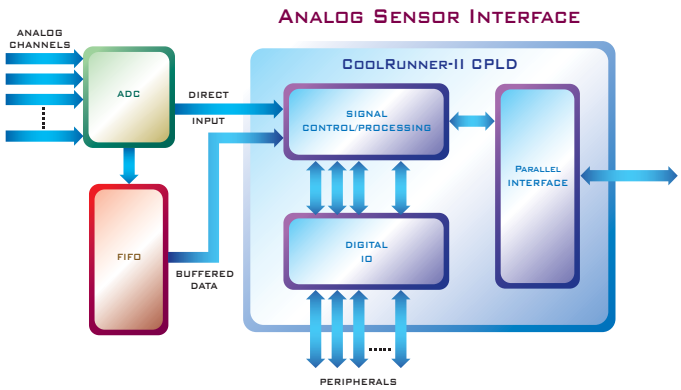


Wired Consumer

Digital Music Box

- Port Expander/Interface
- DAC Interface





Digital Wireless Interface

- Port Expander/Interface

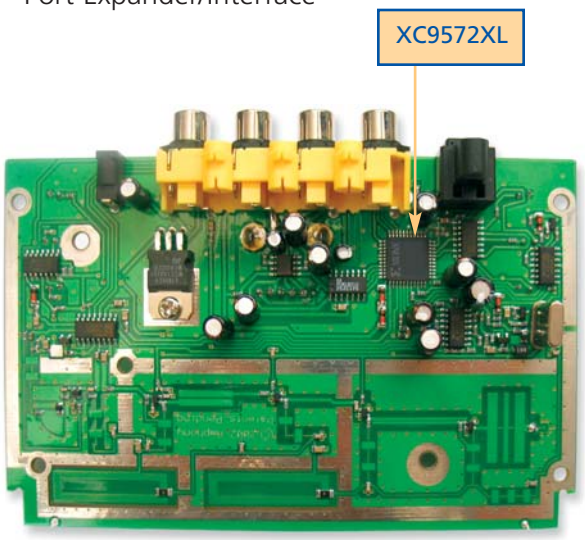
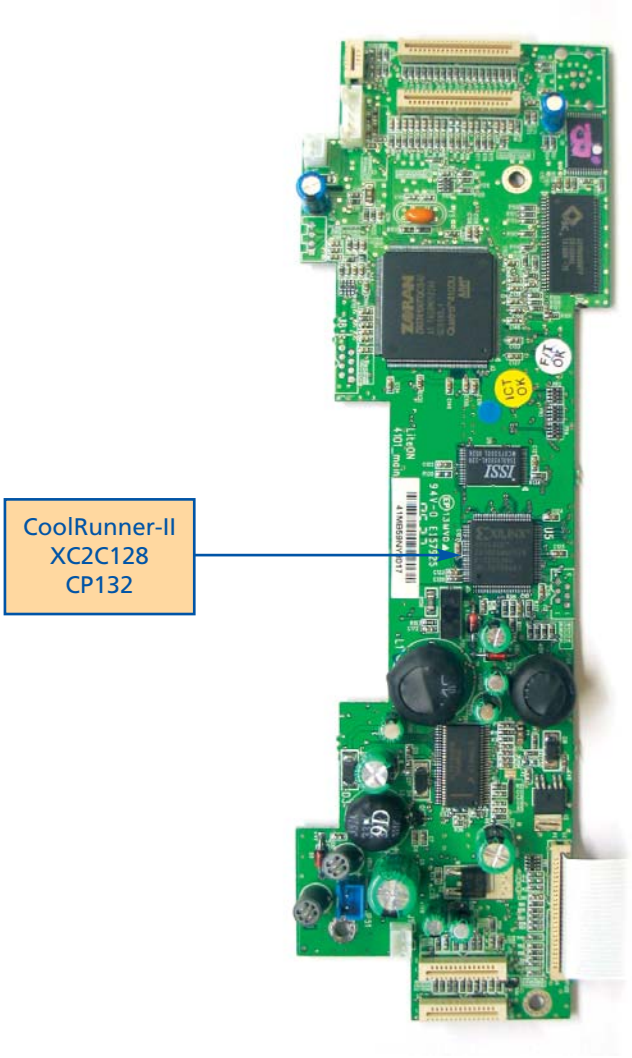
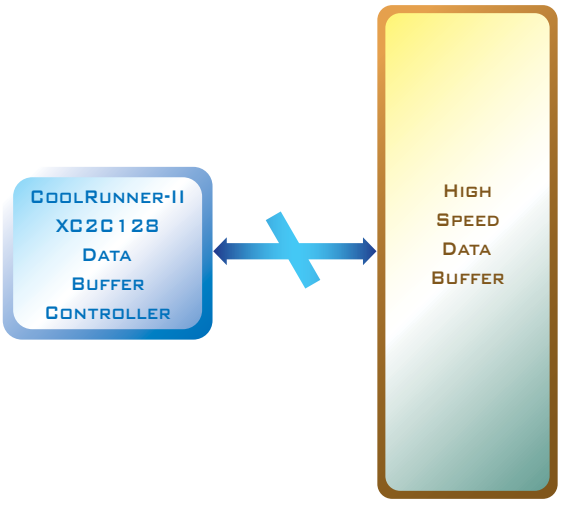


Photo Printer

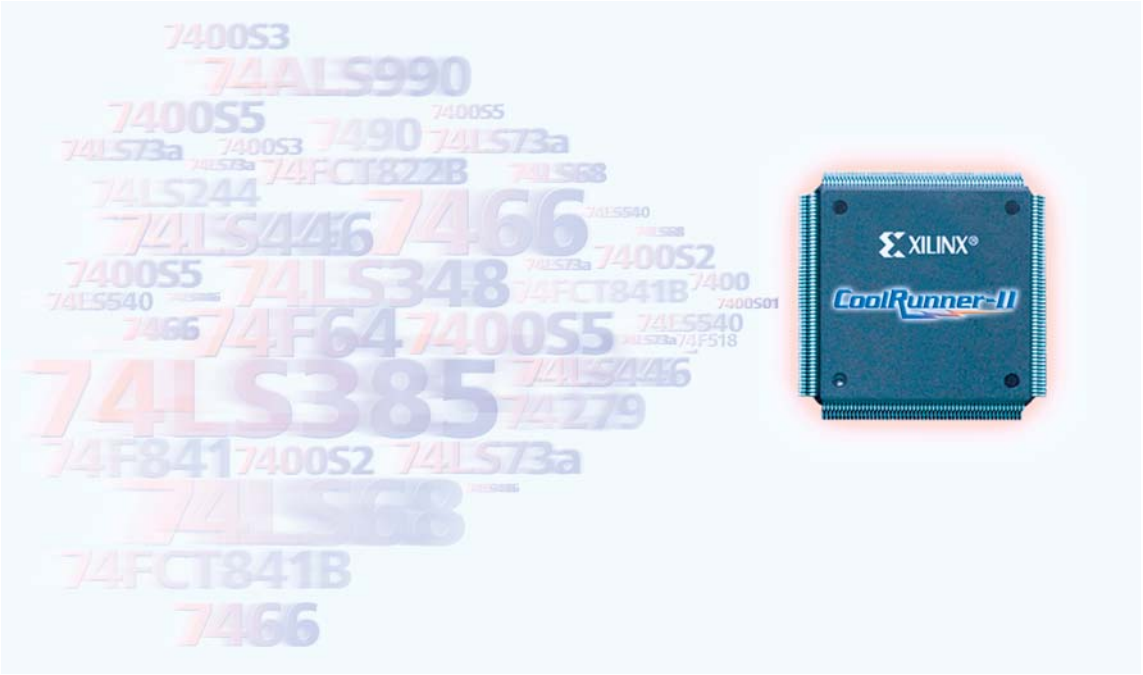
- High Speed SRAM Controller





Logic Consolidator

Xilinx CPLDs Offer More for Less



Get More

- Logic
- Features and Performance
- Security
- Flexibility

For Less

- Price
- Board area
- Power
- EMI

The Logic Consolidator demonstrates how Xilinx CPLDs can:

- Reduce component cost and manufacturing cost
- Reduce component count and PC board space
- Decrease time-to-market
- Increase reliability

Documentation

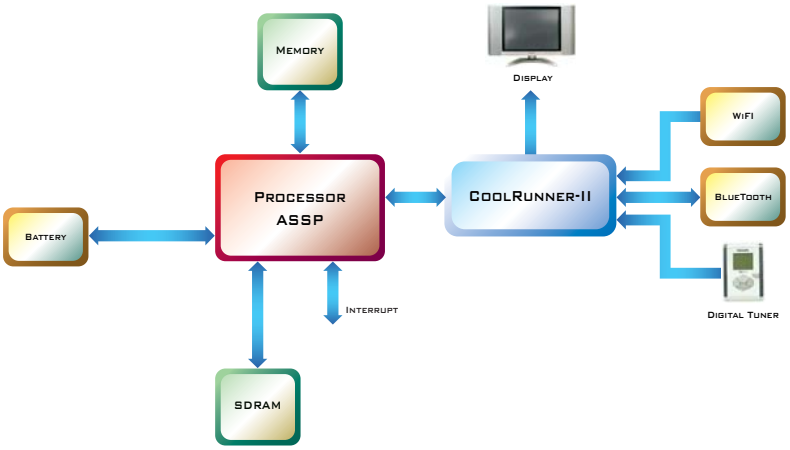
- **WP202:** The Advantages of Migrating from Discrete Logic Devices to CPLDs (PDF)
- **WP214:** TTL Burn Rate for Xilinx CPLDs (PDF)

Download the latest version of the CPLD Logic Consolidator now!
www.xilinx.com/products/silicon_solutions/cplds/cpld_logic_consolidator.htm

Documented Xilinx CPLD Applications

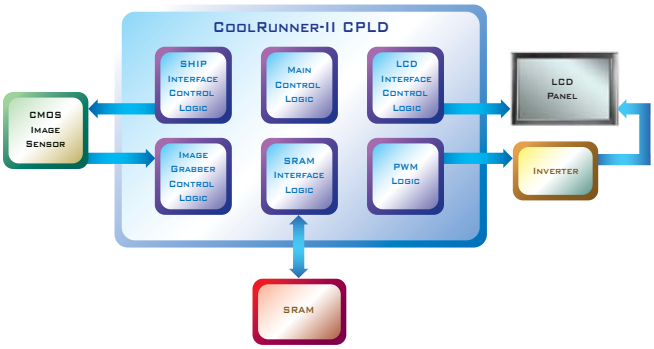
Digital Media Player

- XAPP328 Design of an MP3 Player Using a CoolRunner CPLD



Digital Camera

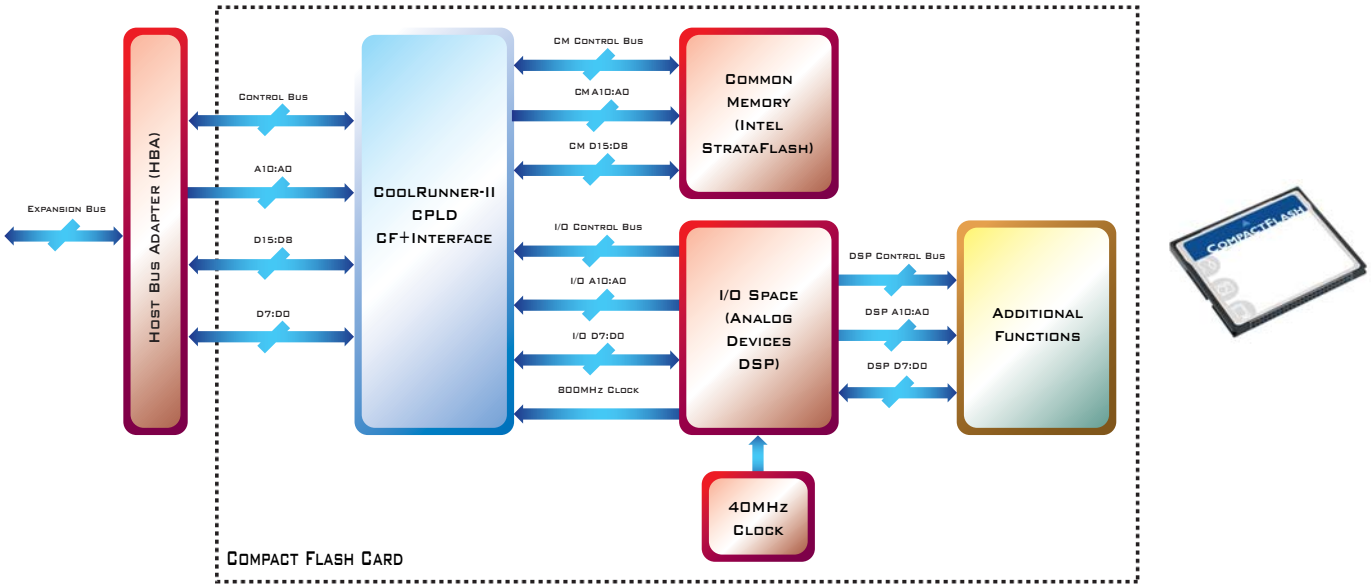
- XAPP390 Design of a Digital Camera with CoolRunner-II CPLDs



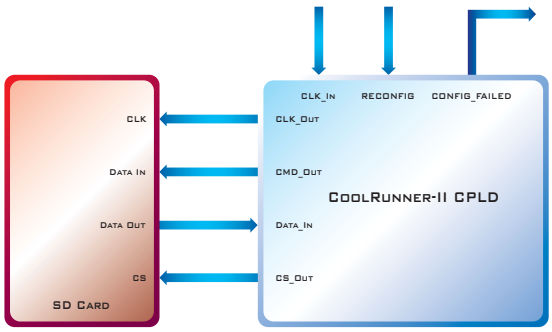
Memory Control

Compact Flash Card Interface and Control

- XAPP398 Compact Flash Interface for CoolRunner-II CPLDs

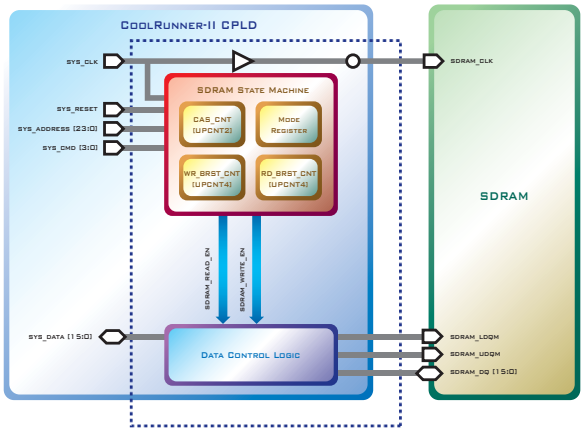


SD Card Interface



- XAPP906 Interfacing to Secure Digital Cards with CoolRunner-II CPLDs

SDRAM Controller

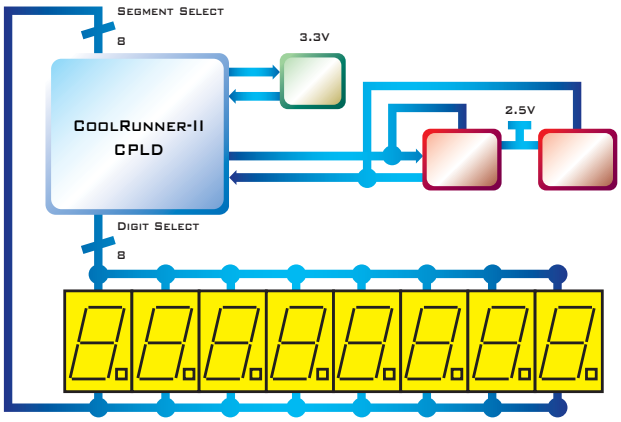


- XAPP384 Interfacing to DDR SDRAM with CoolRunner-II CPLDs
- XAPP394 Interfacing to Mobile SDRAM with CoolRunner-II CPLDs

Display Interface

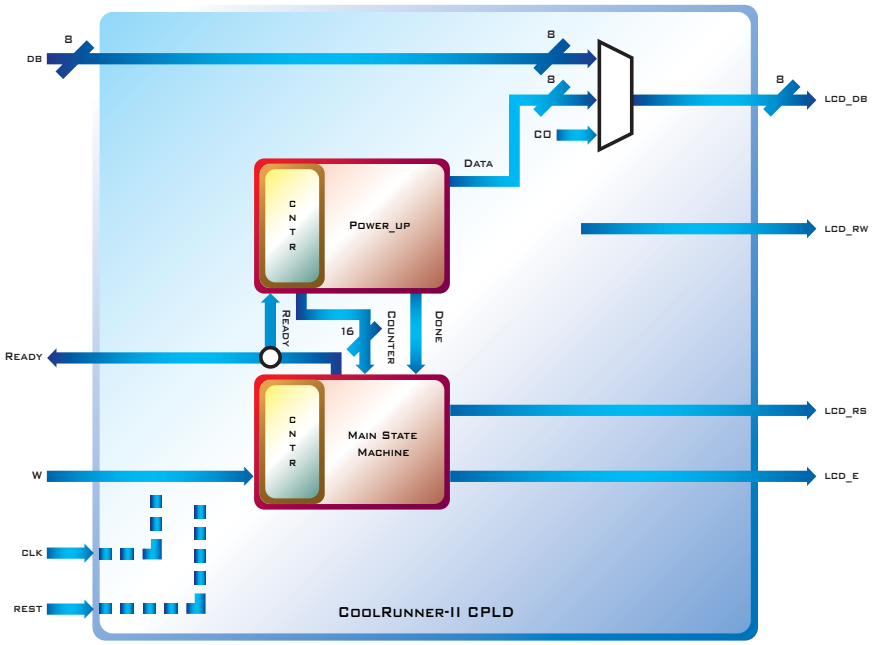
LED Driver Block

- XAPP805 Driving LEDs with Xilinx CPLDs



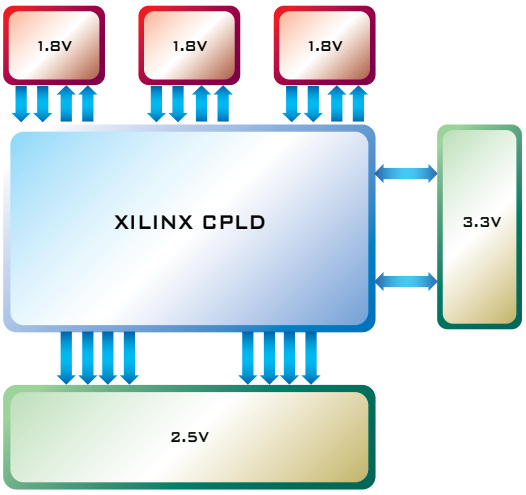
LCD Module

- XAPP904 CoolRunner-II Character LCD Module Interface



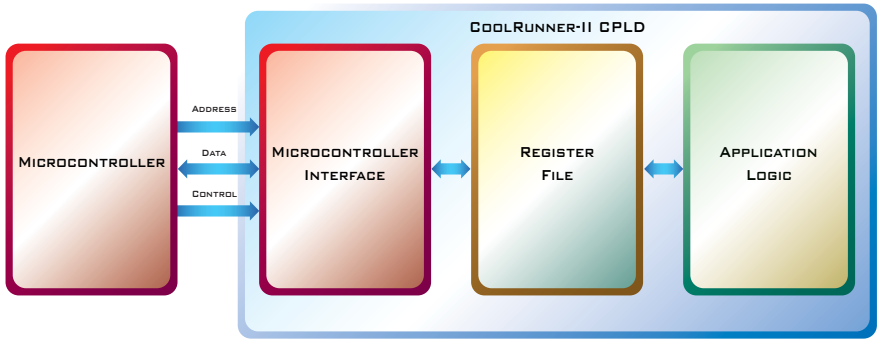
Level Shifting

- XAPP785 Level Translation Using Xilinx CPLDs



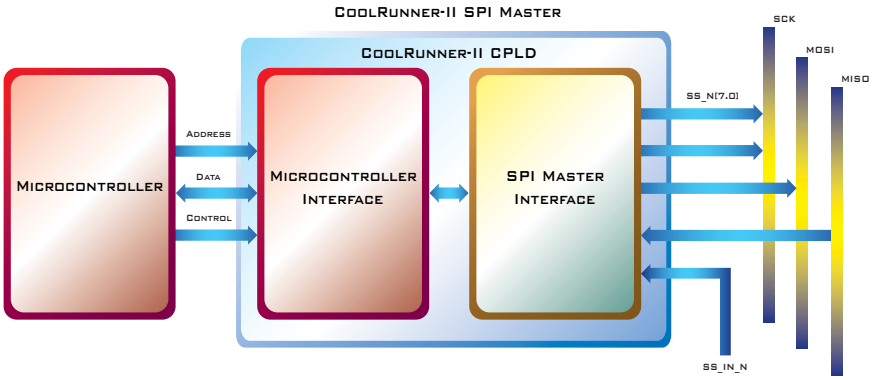
Microcontroller Interface

- XAPP393 CoolRunner-II CPLD 8051 Microcontroller Interface



Serial Peripheral Interface Master

- XAPP386 CoolRunner-II Serial Peripheral Interface Master
- XAPP800 Configuring Xilinx FPGAs with SPI Flash Memories Using CoolRunner-II CPLDs

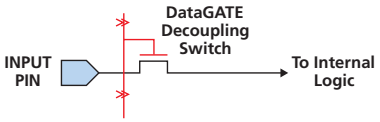


CoolRunner-II Advanced Features

DataGATE

Series switches on the inputs allow decoupling of internal logic from external "don't care" transitions. Outputs are held at the last valid state when DataGATE is enabled.

- Reduces power consumption by eliminating 'don't care' internal switching
- Supports hot plugging
- Reduces EMI
- Simplifies system debug



Advanced Security

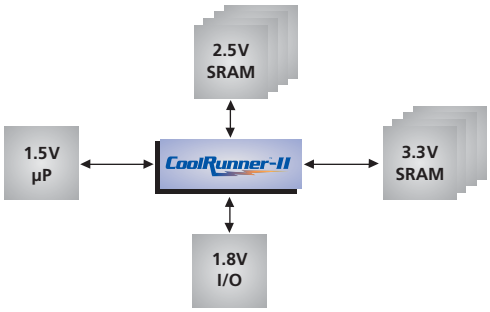
Four levels of design security

- Prevents design theft or accidental overwrite
- Ideal for mobile phones and PDAs and other wireless applications

I/O Banking

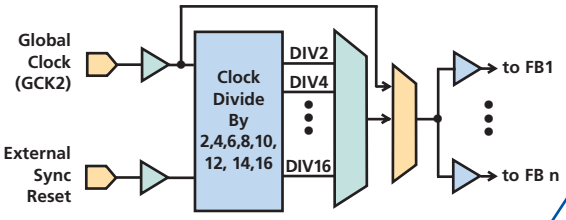
Multiple I/O banks, each with independently selectable voltage levels

- System voltage interfacing
- Bridging standards
- Bus multiplexing



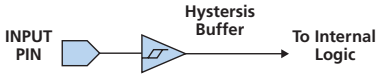
Clock Division

- Even/Odd clock generation
- Duty cycle correction
- Multiple clock nets



500mV Input Hysteresis

- Improved noise immunity
- Reduced power consumption (fewer false transitions)
- Superior signal integrity



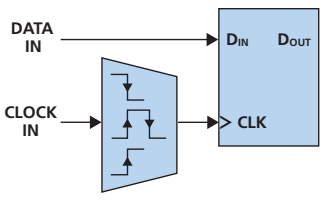
In System Programming and On The Fly Reconfiguration

- Reprogram the design post-deployment
- Reprogram the CPLD with a new pattern while the existing pattern is operational
- Multiple design patterns from a single CPLD

DualEDGE Flip Flops

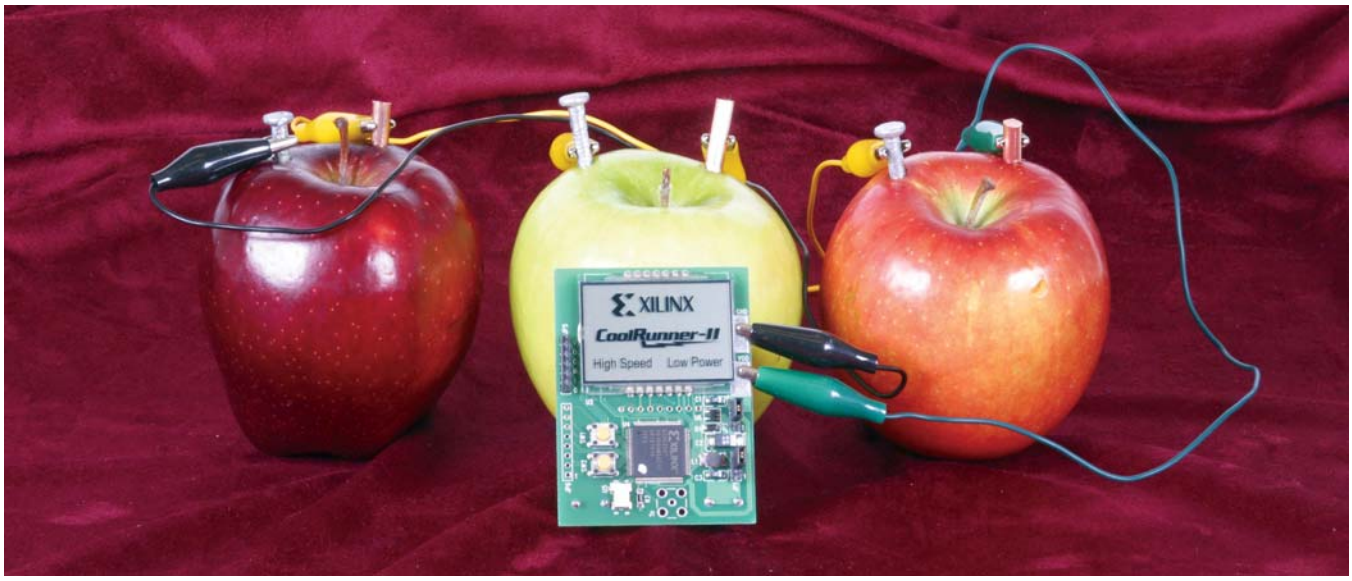
Each flip-flop can switch on the rising, falling or both edges of the clock

- Higher-resolution PWM
  - Motor control
  - LCD contrast
  - Power conversion
  - Position indication
- Increased timer resolution



Industry's Lowest Power CPLDs.

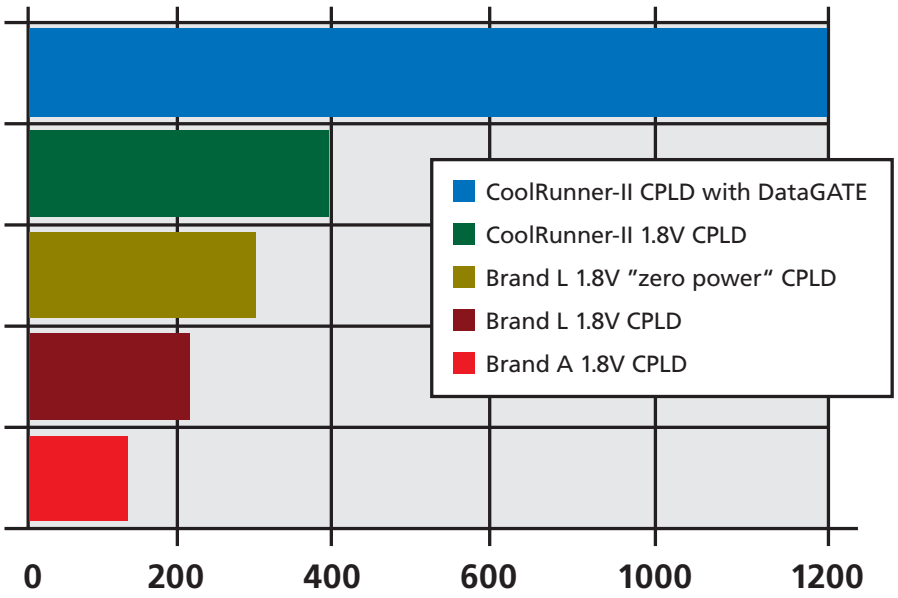
So low-power, CoolRunner-II CPLDs even run on Apples!



- XAPP381 CoolRunner-II Demo Board

CPLD Battery Life Comparison

- CoolRunner-II CPLDs with DataGATE dramatically extends battery life



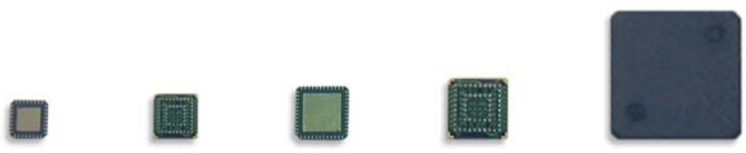
Hours of Dynamic Operation

Note: 256 macrocell devices at 100% duty cycle with 2 AA batteries, populated with 16 bit counters at 20 MHz.

CoolRunner-II CPLD Selection Guide

Device		XC2C32A	XC2C64A	XC2C128	XC2C256	XC2C384	XC2C512
System Gates		750	1500	3000	6000	9000	12000
Macrocells		32	64	128	256	384	512
Product Terms per Macrocell		56	56	56	56	56	56
Maximum I/O		33	64	100	184	240	270
Minimum Pin-to-Pin Logic Delay (ns)		3.8	4.6	5.7	5.7	7.1	7.1
DualEDGE Registers		Yes	Yes	Yes	Yes	Yes	Yes
Input Hysteresis		Yes	Yes	Yes	Yes	Yes	Yes
DataGATE and Clock Divide		—	—	Yes	Yes	Yes	Yes
Global Clocks		3	3	3	3	3	3
Product Term Clocks per Function Block		16	16	16	16	16	16
Packages	**Size**	**Maximum User I/O**					
QFG32	5x5 mm	21	—	—	—	—	—
VQ44	12x12 mm	33	33	—	—	—	—
PC44	17.5x17.5 mm	33	33	—	—	—	—
QFG48	7x7 mm	—	37	—	—	—	—
CP56	6x6 mm	33	45	—	—	—	—
VQ100	16x16 mm	—	64	80	80	—	—
CP132	8x8 mm	—	—	100	106	—	—
TQ144	22x22 mm	—	—	100	118	118	—
PQ208	30.6x30.6 mm	—	—	—	173	173	173
FT256	17x17 mm	—	—	—	184	212	212
FG324	23x23 mm	—	—	—	—	240	270

Low-cost Small Form-Factor Packaging



Package Type:	QF32	CP56	QF48	CP132	FT256
Dimensions:	5x5mm	6x6mm	7x7mm	8x8mm	17x17mm
Board Area:	25mm^2	36mm^2	49mm^2	64mm^2	289mm^2
Max. I/O:	21	45	37	106	212

(Actual Size)

Take the Next Step

The Xilinx CPLD Design Kit contains everything you need to design and debug your next CPLD design, including:

- ISE WebPACK software
- Prototype board with pre-programmed CoolRunner-II and XC9500XL CPLDs
- Download cable
- Training material
- Resource CD

www.xilinx.com

Design Faster with CoolRunner Reference Designs.

Xilinx CPLD reference designs make designing much easier than with other solutions. These drop-in, ready-to-use functions are comprised of HDL design code and application notes that allow to finish your design faster. You can also increase product flexibility and user advantages with our comprehensive reference designs.

www.xilinx.com/cpld/ref-designs

CPLD QuickStart Applications.

Xilinx CoolRunner-II CPLDs are shown in a wide range of design examples, with presentations and demonstrations to show how you can complete your design faster, with lower power and lower cost.

www.xilinx.com/cpld/quickstart

Corporate Headquarters
Xilinx, Inc.
2100 Logic Drive
San Jose, CA 95124
Tel: (408) 559-7778
Fax: (408) 559-7114
Web: www.xilinx.com

European Headquarters
Xilinx
Citywest Business Campus
Saggart,
Co. Dublin
Ireland
Tel: +353-1-464-0311
Fax: +353-1-464-0324
Web: www.xilinx.com

Japan
Xilinx, K.K.
Shinjuku Square Tower 18F
6-22-1 Nishi-Shinjuku
Shinjuku-ku, Tokyo
163-1118, Japan
Tel: 81-3-5321-7711
Fax: 81-3-5321-7765
Web: www.xilinx.co.jp

Asia Pacific
Xilinx, Asia Pacific Pte. Ltd.
No. 3 Changi Business Park Vista, #04-01
Singapore 486051
Tel: (65) 6544-8999
Fax: (65) 6789-8886
RCB no. 20-0312557-M
Web: www.xilinx.com

XILINX®
The Programmable Logic Company℠

Distributed By:

PN 0010928-1