

ALTERA DEVELOPMENT TOOLS

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2013

ARROW
Five Years Out



Boost Your Productivity with Our Powerful Partnership

Welcome to the 3rd edition of the Arrow Electronics Development Tools brochure. In a global and collaborative effort, we have teamed up once again with Altera and Linear Technology, as well as Samtec, Micron, and Silicon Labs. Since 2009, through our development tool brochures, we've delivered, verified, and optimized power and analog solutions for a wide range of programmable devices.

We are excited about the addition of the new 28-nm devices to the brochure. As system performance, power, and cost requirements continue to expand and conflict, you'll be able to find the devices that meet your new levels of performance, integration, and power consumption.

Linear Technology has worked closely with Altera and their strategic partners to provide you with approved and tested solutions for your FPGA and CPLD-based systems. This brochure gives you the means to evaluate their powerful development tools and tap into technology leadership. Arrow's experts will help you select the right tools for your new design.

Arrow will help guide you at every step of your product's development. Our factory-certified FAEs support Altera and Linear Technology while also designing and working across a broad range of applications. Arrow's world-class design services, training, and tools keep your project on track and minimize your time to market.

To purchase the development tools you need listed in this brochure, visit www.arrow.com/alteratools.



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The industry's most advanced FPGA and CPLD technologies



The Stratix FPGA series enables you to deliver high-performance, state-of-the-art products to market faster with lower risk and higher productivity. With its high density, high performance, and rich feature set, you can integrate more functions and maximize performance. Using the Quartus II design software suite, along with a broad portfolio of IP, you can gain the highest level of productivity for large and complex team-based designs. Also contributing to the total solution are HardCopy ASICs, which provide a seamless migration path to low-cost volume production. Backed by Altera's track record as a reliable and high-quality supplier, the Stratix FPGA series delivers the technology resources you need to design with confidence.

Key features

- Industry's biggest and fastest FPGAs
- Lowest power high-end FPGAs
- Only FPGAs with integrated 11.3 Gbps transceivers
- Flexible and high-performance I/O pins
- Highest DSP and memory capabilities
- Path to low-cost, lowest risk HardCopy ASICs, including transceiver option
- Volatile and non-volatile design security
- Quartus II design software for highest performance and productivity



Arria series FPGAs optimize power, performance, and cost for applications requiring 3G transceivers. This series is ideal for a wide range of applications using mainstream protocols such as PCIe, CPRI, SDI, GbE, and more. With the integrated Quartus II design environment, IP, reference designs, design examples, and development kits, you'll get your design up and running in no time.

Key features

- Optimized power, performance, and cost for 3G applications
- Proven transceiver architecture with best-in-class signal integrity
- Highly productive, easy-to-use common design environment
- Ready-to-use reference designs, design examples, and IP



For your cost-sensitive, high-volume applications, Altera offers the Cyclone FPGA series—the industry's only FPGAs designed from the ground up for low cost. Each family member is individually optimized for cost, and delivers a high-volume solution that's competitive with ASICs and ASSPs. This series of FPGAs—including the 60-nm Cyclone IV, 65-nm Cyclone III, 90-nm Cyclone II, and 130-nm Cyclone families—delivers a customer-defined feature set, industry-leading performance, and the lowest power consumption.

Key features

- The lowest cost, lowest power FPGAs in their class
- Integrated transceiver I/Os and PCIe hard IP
- High-performance DSP
- Low-cost embedded processing
- Free Quartus II Web Edition software support
- Free ModelSim®-Altera Web Edition software support
- Available in commercial, industrial, extended industrial, and automotive temperature grades



Altera's market-leading MAX series of CPLDs are world-class, low-cost devices designed for virtually any digital and some analog control functions. As non-volatile, single-chip solutions, MAX CPLDs are easy to incorporate into your system. With the devices, you can solve board-level issues such as insufficient I/O pins on a processor; manage analog I/Os for light, sound, and motion; apply level-shifting signals or buses between components; and inexpensively convert incompatible interfaces (a.k.a. "glue logic"). Designed to be hassle-free with intuitive device behavior and software, MAX CPLDs give you the freedom to focus on your more complex design challenges.

Key features

- Low cost
- Zero-power options
- Ultra-small packages
- Instant-on and non-volatile
- In-system programmability (ISP)
- Free Quartus II Web Edition software support
- Free ModelSim-Altera Web Edition software support

Visit www.arrow.com/alteratools or call your local Arrow representative.

Altera Cyclone V E Development Kit

Altera's Cyclone® V E Development Kit offers a comprehensive general-purpose development platform for many markets and applications, such as industrial communications and automation applications. The kit features a Cyclone V FPGA and a multitude of on-board resources including multiple banks of DDR3 and LPDDR memory, LCD character display, LEDs, user switches, and USB and RJ45 connectors. The Cyclone V E Development Kit gives industrial equipment designers greater flexibility in implementing real-time Ethernet communications with Industrial Ethernet intellectual property (IP) cores.

Development Kit Contents

Altera device

- DK-DEV-5CEA7N

Configuration

- On Board Blaster II (USB, PHY, Max V)
- JTAG direct via JTAG header

General user input/output

- User control
- Three pushbuttons
- Eight LEDs
- Four dip switches (8 typical)
- 2x resets (CPU reset, Dev Clear)
- LCD: character LCD (16x2)

Memory devices

- DDR3 x64 with ECC @ 400 MHz
- DDR3 x32 with ECC (soft memory controller)
- LPDDR2 x16 (soft memory controller)

Components and interfaces

- USB connector for configuration or connect
- RJ45 for Ethernet

Quartus II design software included with kit

- Quartus II Web Edition Software

Cyclone V



Linear Technology Components

LTC3608 18 V, 8 A monolithic synchronous step-down DC/DC converter

LTC3600 15 V, 1.5 A synchronous rail-to-rail single resistor step-down regulator

LTC3026 1.5 A low input voltage VLDO linear regulator

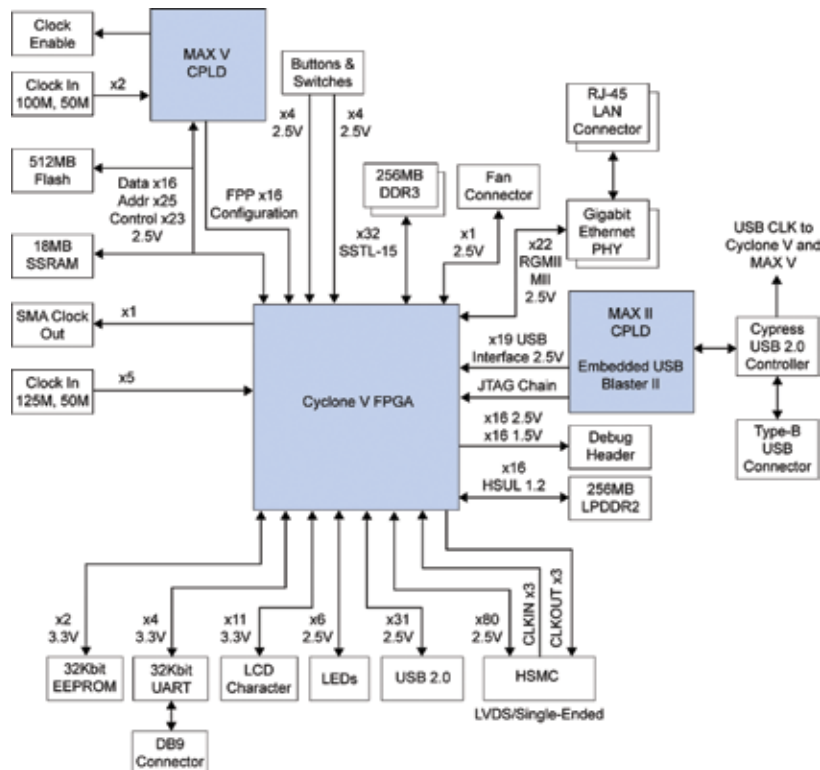
LT3009 3 μ A I_o , 20 mA low dropout linear regulators

LTC3025 One 500 mA micropower VLDO linear regulators

LTC3103 1.8 μ A quiescent current, 15 V, 300 mA synchronous step-down DC/DC converter

Part Number	Price
DK-DEV-5CEA7N	\$1,099.00

Visit www.arrow.com/alteratools for kit availability.



Altera Stratix IV E FPGA Development Kit

The Altera Stratix IV E FPGA Development Kit delivers a complete system-level design environment that includes both the hardware and software needed to immediately begin developing FPGA designs. You can use this development kit to develop and test memory subsystems consisting of DDR3 DIMMs, QDR II+, and RLDRAM II memory interfaces.

Development Kit Contents

Altera device

- Stratix IV E EP4SE530H35C2N FPGA

Configuration

- Fast passive parallel (FPP) configuration via a MAX II EPM2210 CPLD and flash memory
- On-board USB-Blaster download cable using Quartus II Programmer

General user input/output

- User push buttons, DIP switches and LEDs
- Graphics and character LCD

Memory devices

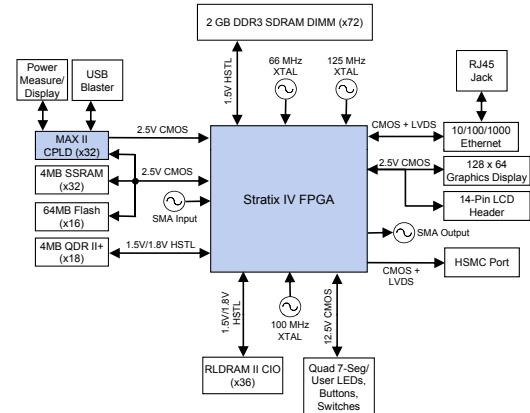
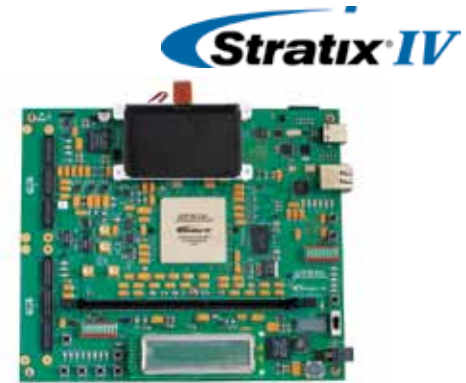
- 2 GB DDR3 SDRAM DIMM with a 72-bit data bus
- 72 Mb QDR II+ SRAM device with a 18-bit data bus
- 576 Mb RLDRAM II CIO device with a 36-bit data bus
- 18 Mb SSRAM with a 36-bit data bus
- 512 Mb flash with a 16-bit data bus

Components and interfaces

- 10/100/1000BASE-T Ethernet PHY with RJ-45 connector
- Two HSMC interfaces — Samtec mate ASP-122952-01

Quartus II design software included with kit

- Quartus II Development Kit Edition Software, one-year license



Linear Technology Components

- LTM4601** 12 A DC/DC μ Modules with PLL, output tracking and margining
LT1764 3 A, fast transient response, low noise, LDO regulators
LTC6902 Multiphase oscillator with spread spectrum frequency modulation
LTM4604 Low-voltage, 4 A DC/DC μ Module with tracking
LTC4151 High-voltage I²C current and voltage monitor

Part Number	Price
DK-DEV-4SE530N	\$5,495.00

Terasic TR4 Stratix IV Board

The TR4 Development Kit provides the ideal hardware platform for system designs that demand high-performance, serial connectivity, and advanced memory interfacing. The TR4 is powered by the Stratix IV GX device and supported by industry-standard peripherals, connectors and interfaces that offer a rich set of features that is suitable for a wide range of compute-intensive applications. For large-scale ASIC prototype development, multiple TR4s can be stacked together to create an easily-customizable multi-FPGA system.

Development Kit Contents

Altera device

- Stratix IV GX EP4SGX230/EP4SGX530

Configuration

- On-board USB-Blaster using Quartus II Programmer

General user input/output

- Four user-controllable LEDs
- Four push-buttons
- Four slide switches

Memory devices

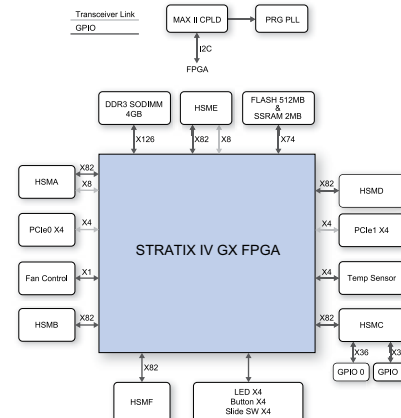
- 64 MB flash
- 2 MB SSRAM
- DDR3 SO-DIMM socket

Components and interfaces

- 6 HSMC connectors
- Two 40-pin expansion headers
- Two PCI Express x4 connectors

Quartus II design software included with kit

- Quartus II Web Edition Software



Linear Technology Components

- LT1117** 800 mA low dropout positive regulators adjustable and fixed 2.85 V, 3.3 V, 5 V
LTM4601 12 A μ Module regulator with PLL, output tracking and Margining
LT1963 1.5 A, low-noise, fast transient response LDO regulator
LT3080 Adjustable 1.1 A single resistor low dropout regulator
LTC3025 300 mA micropower VLDO linear regulator
LTM4628 Dual 8 A/Single 16 A DC/DC μ Module
LTM4612 Ultralow-noise, 36 V_{IN}, 15 V_{OUT}, 5 A, DC/DC μ Module regulator

Part Number	Price
P0107	\$2,895.00

Terasic DE2i-150 Cyclone IV Board

Combining the Intel Atom Processor and Altera Cyclone IV GX, the DE2i-150 FPGA Development Kit fuses together the world of high performance processing and unbelievably high configurability. Linked together through two high-speed PCIe lanes, the processor and FPGA have access to high-speed communication between each other, leading to a powerful hardware-software co-development environment with truly unlimited potential.

Development Kit Contents

Altera device

- Cyclone IV GX EP4CGX150 FPGA

Configuration

- On-board USB-Blaster using Quartus II Programmer

General user input/output

- Eighteen slide switches and four push-buttons
- Eighteen red LEDs, nine green LEDs and six 7-segment displays
- 16x2 Character LCD

Memory devices

- 128 MB SDRAM and DDR3 SODIMM slot
- 4 MB SSRAM
- SD card socket
- 64 MB solid state drive and SATA Port

Components and interfaces

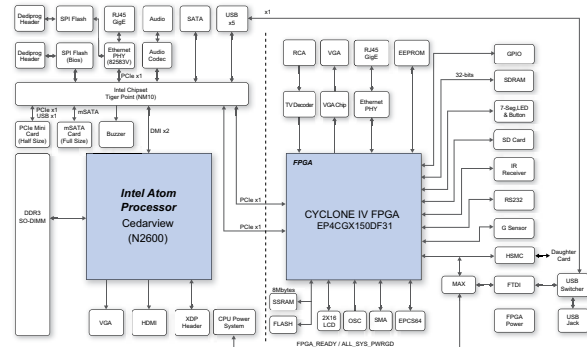
- Intel Atom N2600
- Video and audio input/output
- Ethernet, USB, and RS-232 communication ports
- HSMC connector and 40-pin expansion header

Quartus II design software included with kit

- Quartus II Web Edition Software

Linear Technology Components

- LTC3026** 1.5 A low input voltage VLDO linear regulator
LTC3855 Dual, multiphase synchronous DC/DC controller with differential remote sense
LT3023 Dual 100 mA, low dropout, low-noise, micropower regulator
LTM4628 Dual 8 A/Single 16 A DC/DC μ Module
LTC3609 32 V, 6 A monolithic synchronous step-down DC/DC converter
LT3083 Adjustable 3 A single resistor low dropout regulator



Part Number	Price
P0126	Call Arrow for pricing

Visit www.arrow.com/alteratools for kit availability.

Altera Cyclone III FPGA Starter Kit

The Cyclone III FPGA Starter Kit is easy to use and an ideal introduction for users who have never designed with FPGAs before. Experienced FPGA designers can build systems leveraging the design examples included in the kit for a quick "out-of-the-box" evaluation experience.

Development Kit Contents

Altera device

- Cyclone III EP3C25N FPGA

Configuration

- On-board USB-Blaster using Quartus II Programmer

General user input/output

- Six push buttons total, four user controlled
- Seven LEDs total, four user controlled

Memory devices

- 16 MB of DDR SDRAM
- 1 MB of synchronous SRAM
- 16 MB of Intel P30/P33 flash

Components and interfaces

- HSMC — Samtec mate ASP-122952-01
- USB Type B

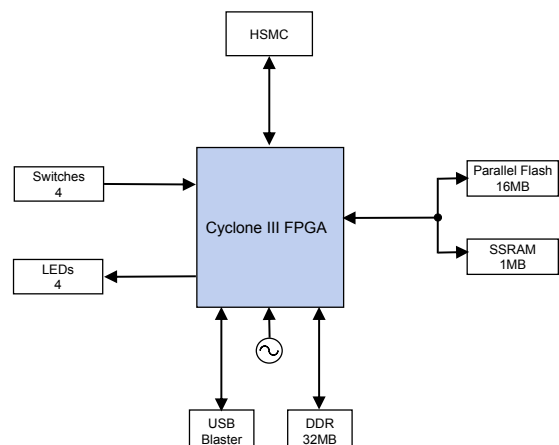
Quartus II design software included with kit

- Quartus II Web Edition software

Linear Technology Components

- LTM4603** 6 A μ Module DC/DC system
LTC3413 3 A, 2 MHz regulator for memory termination
LT1959 500 kHz step-down switching regulator
LT1117 800 mA low-dropout positive regulator

Cyclone III



Part Number	Price
DK-START-3C25N	\$199.00

Altera Cyclone III FPGA Development Kit

The Altera Cyclone III FPGA Development Kit combines the largest density low-cost, low-power FPGA available with a robust set of memories and user interfaces. Inside this development kit, you'll find everything you need to begin Cyclone III FPGA development.

Development Kit Contents

Altera device

- Cyclone III EP3C120F780 FPGA

Configuration

- On-board USB-Blaster using Quartus II Programmer

General user input/output

- 128 x 64 graphics LCD
- 2-line x 16-character LCD

Memory devices

- 256 MB of dual-channel DDR2 SDRAM with ECC
- 8 MB of synchronous SRAM
- 64 MB of flash

Components and interfaces

- HSMC — Samtec mate ASP-122952-01
- USB 2.0 type B
- 10/100/1000 Ethernet

Quartus II design software included with kit

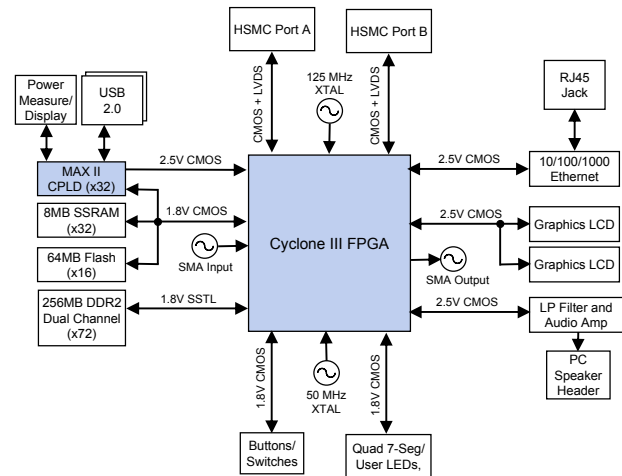
- Quartus II Web Edition software

Linear Technology Components

- LTM4601** 12 A μ Module DC/DC system
LT1963 1.5 A, low-noise, fast transient response LDO regulator
LT3481 6 V, 2 A, 2.8 MHz step-down switching regulator
LT1761 100 mA, low-noise, LDO micropower regulators
LTC3418 8 A, 4 MHz, synchronous step-down regulator
LT1931 1.2 MHz/2.2 MHz inverting DC/DC converter
LTC2402 1 or 2 channel 24-bit μ Power no latency A/D converter

Part Number	Price
DK-DEV-3C120N	\$1,195.00

Cyclone III



Altera Cyclone III LS FPGA Development Kit

The Altera Cyclone III LS FPGA Development Kit combines the largest density, low-power FPGA available with a complete suite of security features implemented at the silicon, software, and intellectual property (IP) levels. These security features provide passive and active protection of your IP from tampering, reverse engineering, and counterfeiting.

Development Kit Contents

Altera device

- Cyclone III EP3CLS200F780C7N FPGA

Configuration

- On-board USB-Blaster download cable using Quartus II Programmer

General user input/output

- Various buttons, switches, and LEDs
- 2-line x 16-character LCD

Memory devices

- 2 MB synchronous SRAM from ISSI
- 64 MB of flash from Intel
- Two 512 MB DDR2 SDRAMs

Components and interfaces

- 10/100/1000 Ethernet
- Two HSMC connectors — Samtec mate ASP-122952-01
- USB type B

Quartus II design software included with kit

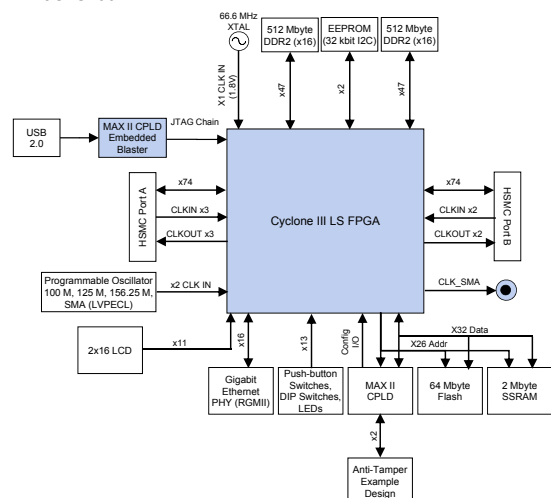
- Quartus II Development Kit Edition Software, one-year license

Linear Technology Components

- LTC2418** 8-/16-channel 24-bit no latency delta sigma A/D converter
LTC3414 4 A, 4 MHz, monolithic step-down regulator
LT1761 100 mA, low-noise, LDO micropower regulator
LTC3853 Triple output, multiphase synchronous step-down controller
LTC3418 8 A, 4 MHz, monolithic synchronous step-down regulator
LT3203 500 mA low-noise dual mode step-up charge pumps

Part Number	Price
DK-DEV-3CLS200N	\$3,495.00

Cyclone III



Altera MAX II Development Kit

The Altera MAX II Development Kit comes with a complete design environment. The kit enables you to evaluate the MAX II feature set or begin prototyping a design prior to receiving custom hardware. It includes all software, cables, and accessories needed to ensure an easy and productive evaluation of the MAX II CPLD.

Development Kit Contents

Altera device

- MAX II EPM1270F256C5N CPLD

Configuration

- USB-Blaster download programming cable

General user input/output

- 4-channel AD converter (8-bit resolution)
- 16x2 character LCD module
- Temperature gauge with serial peripheral interface (SPI)
- Onboard power meter
- Active I/O sense circuitry
- Four user-defined, push-button switches
- Four user-defined LEDs

Memory devices

- SRAM (128 K x 8-bit)

Components and interfaces

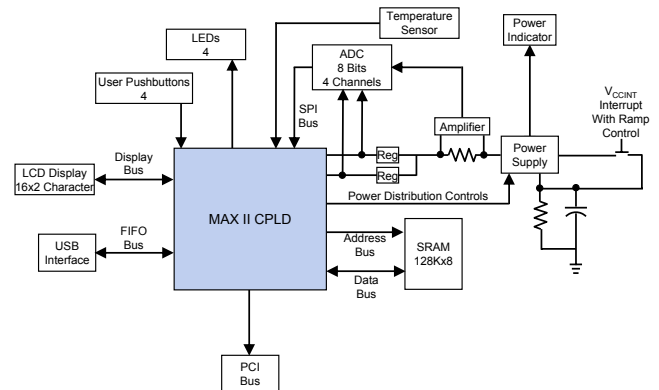
- PCI edge form-factor (3.3 V and 5.0 V tolerant)
- JTAG connectors
- USB connector (Type B)
- One 3.3 V-tolerant expansion/prototype header (41 user I/O pins)

Quartus II design software included with kit

- Quartus II Web Edition software

Part Number	Price
DK-MAXII-1270N	\$150.00

MAX II



Terasic MAX II Micro Development Kit

A complete digital design lab at your fingertips. Equipped with an Altera MAX II EPM2210F324C3 device and on-board USB-Blaster circuit, the MAX II Micro Kit provides users the best and largest CPLD design resource. MAX II Micro board can also be used as a USB-Blaster cable (JTAG mode programming only) by leveraging its on-board USB-Blaster circuit.

Development Kit Contents

Altera device

- MAX II EPM2210F324C3 CPLD

Configuration

- On-board USB-Blaster using Quartus II Programmer

General user input/output

- Four push-button switches
- One DIP switch
- Eight user LEDs

Memory devices

- None

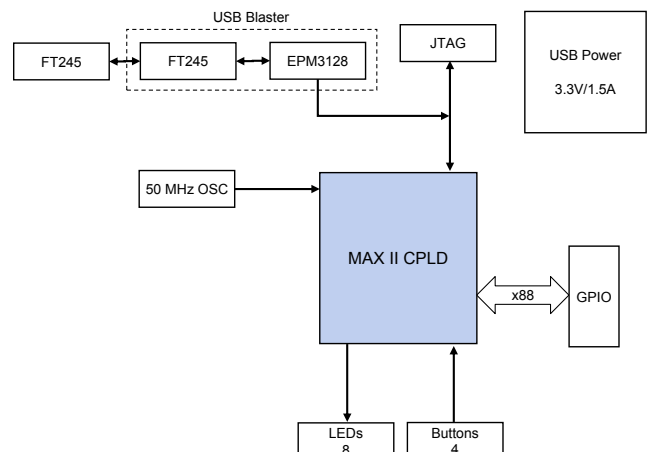
Components and interfaces

- PCI edge form-factor (3.3 V and 5.0 V tolerant)
- JTAG connectors
- USB connector (Type B)
- One 3.3 V-tolerant expansion/prototype header (41 user I/O pins)

Quartus II design software included with kit

- Quartus II Web Edition software

MAX II



Linear Technology Components

LT1963 1.5 A, low-noise, fast transient response LDO

Part Number	Price
P0305	\$69.00

Arrow BeMicro SDK Evaluation Kit

The Arrow BeMicro SDK enables quick and easy evaluation of soft-core processors by both embedded software developers and hardware engineers. The kit builds on the success of the original BeMicro SDK evaluation kit by adding features such as mobile DDR memory, Ethernet, and even the option of using a file system by slotting in a micro-SD card. The BeMicro SDK connects to a PC via a USB connection, which is used for power, programming and debug. Arrow has a number of reference designs and pre-built software templates that can be downloaded for this kit that will highlight the benefits of building embedded systems in FPGAs.

Development Kit Contents

Altera device

- Cyclone IV EP4CE22F17C6N FPGA

Configuration

- On-board USB-Blaster download cable using Quartus II Programmer
- Altera EPCS serial configuration device

General user input/output

- LEDs
- Pushbuttons and switches

Memory devices

- 512 MB Mobile DDR SDRAM
- Micro-SD card socket

Components and interfaces

- 10/100BASE-T Ethernet PHY with RJ-45 connector
- Temperature sensor
- 80-pin edge connector — Samtec mate MEC-140-02-L-D-RA1

Quartus II design software included with kit

- Quartus II Web Edition software

Cyclone IV



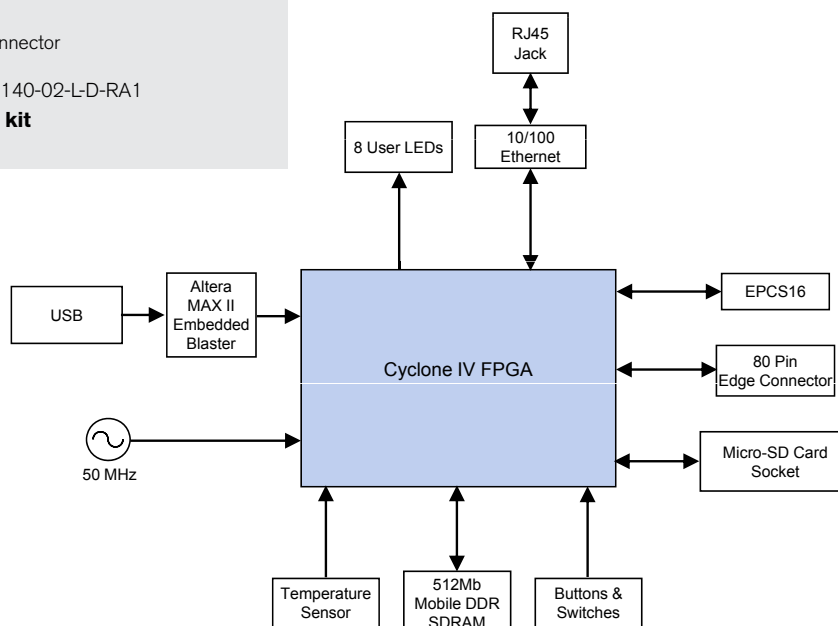
Linear Technology Components

LTC3545-1
LT3085

Triple 800 mA synchronous step-down regulator

Adjustable 500 mA single resistor low dropout regulator

Part Number	Price
BeMicro-SDK	\$79.00



Arrow BeUSB 3.0 Daughtercard

The new interface board, BeUSB 3.0, utilizes Cypress' EZ-USB FX3 controller to implement the new SuperSpeed USB 3.0 standard. The interface board connects to a USB 3.0 PC host through a SuperSpeed Micro B connector, delivering a data rate of up to 5 Gbps, which is 10 times faster than the USB 2.0 rate. The BeUSB 3.0 must be used in conjunction with BeMicro SDK sold separately.

Features

Device

- Cypress FX3 – CYUSB3014-BZXI Super Speed USB device

Configuration

- Used in conjunction with the BeMicro SDK Evaluation Kit

General user input/output

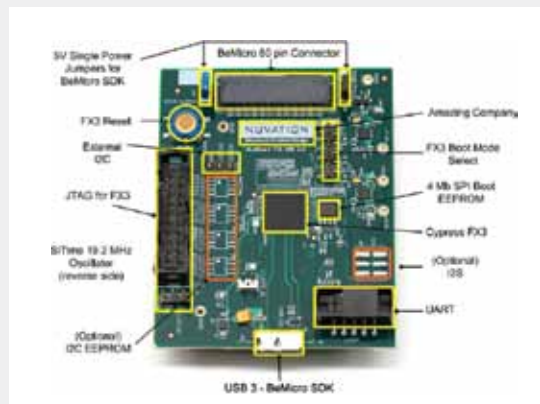
- BeMicro SDK 80-pin mating connector
- USB 3.0 Micro B connector, supporting both USB 2.0 and 3.0
- UART interface

Memory devices

- 4 Mb SPI boot EEPROM

Components and interfaces

- SiTime 19.2 MHz oscillator
- JTAG interface connector for FX3
- External I²C connection



Part Number	Price
BeUSB 3.0	\$149.00

(see above for Arrow BeMicro SDK information)

Altera Embedded Systems Development Kit, Cyclone III Edition

The Altera Embedded System Development Kit, Cyclone III Edition is a complete development platform for prototyping embedded systems on Altera's low-cost, low-power FPGAs. As part of this development kit, you'll find everything you need; hardware, example processor systems, software applications, FPGA and software development tools and documentation to accelerate embedded system development.

Development Kit Contents

Altera device

- Altera Cyclone III EP3C120 FPGA

Configuration

- On-board USB-Blaster using Quartus II Programmer

General user input/output

- 128 x 64 graphics LCD and a 2-line x 16-character LCD
- 800 x 480 touch-screen LCD display

Memory devices

- 256 MB of dual-channel DDR2 SDRAM with ECC
- 8 MB of pseudo SRAM
- 64 MB of flash

Components and interfaces

- 10/100/1000 Ethernet
- 2 HSMC connectors — Samtec mate ASP-122952-01, USB connector
- 24-bit CD-quality audio codec
- SD/MMC card connector
- Composite video input and VGA out (10-bit DAC)
- RS-232 and PS/2 mouse/keyboard
- USB 2.0/Mictor debug daughtercard

Quartus II design software included with kit

- Quartus II Web Edition software

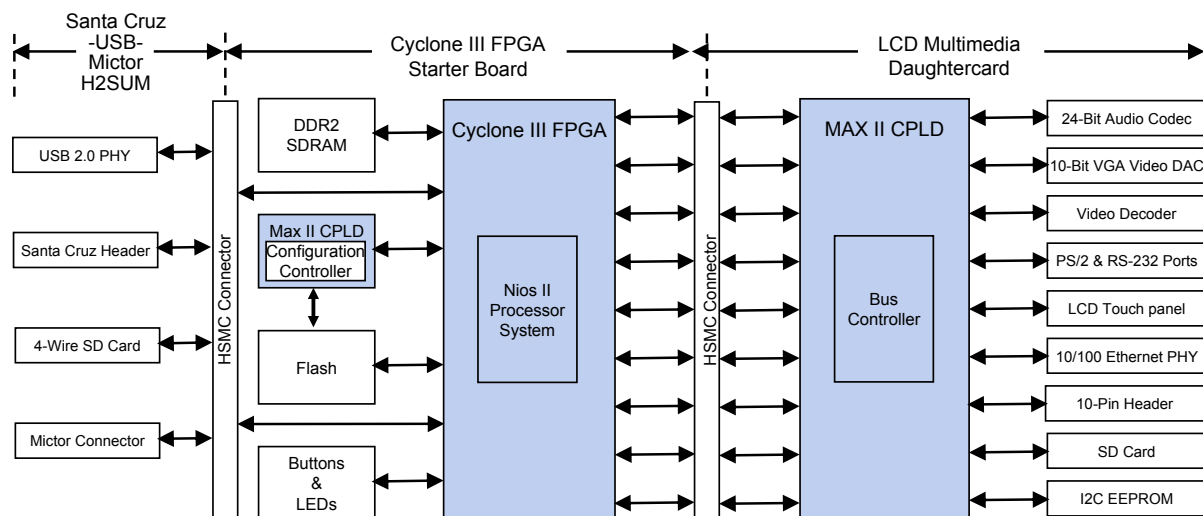
Cyclone III Nios II



Linear Technology Components

LTM4601	12 A DC/DC μ Module
LT3481	36 V, 2 A, 2.8 MHz step-down switching regulator
LT1761	100 mA, low-noise, LDO micropower regulators
LTC3418	8 A, 4 MHz, monolithic synchronous step-down reg
LTC2402	1-/2-channel 24-bit μ Power no latency converters
LT1963	1.5 A, low-noise, fast transient response LDO
LT1931	1.2 MHz/2.2 MHz inverting DC/DC converter

Part Number	Price
DK-EMB-3C120N	\$1,595.00



Altera Nios II Embedded Evaluation Kit, Cyclone III Edition

The Nios II Embedded Evaluation Kit, Cyclone III Edition makes evaluating Altera's embedded solutions easier than ever. A dozen different processor systems targeting the low-cost, low-power Cyclone III FPGA can be evaluated by simply using the LCD color touch panel to scroll through and load your demo of choice. The Nios II Embedded Evaluation Kit, Cyclone III Edition comes with a comprehensive suite for software development—the Nios II Embedded Design Suite (EDS) — as well as sample Nios II processor systems that include full source code. The Nios II Evaluation Kit, Cyclone III Edition is composed of the Cyclone III FPGA Starter Kit and an LCD/VGA HSMC daughtercard.

Development Kit Contents

Altera device

- Altera Cyclone III EP3C25F324 FPGA

Configuration

- On-board USB-Blaster using Quartus II Programmer

General user input/output

- 800 x 480 color LCD touch-screen display
- Six push buttons total, four user controlled
- Seven LEDs total, four user controlled

Memory devices

- 32 MB of DDR SDRAM
- 1 MB of synchronous SRAM
- 16 MB of Intel P30/P33 flash

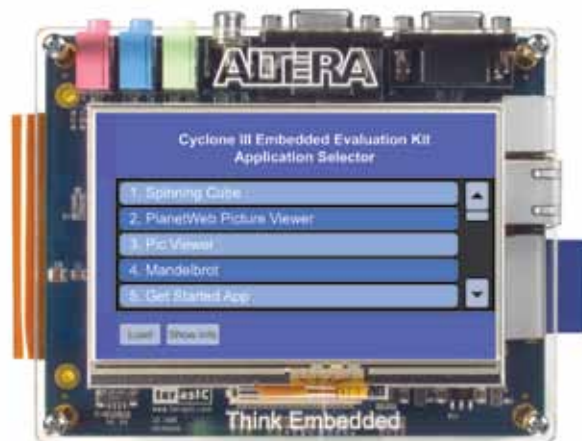
Components and interfaces

- VGA output
- Composite TV-in
- Audio-out, audio-in, and microphone-in
- Secure Digital (SD) card
- Serial connector (RS-232 DB9 port)
- PS/2
- 24-bit CD-quality audio CODEC with line-in, line-out, and microphone-in jacks
- 10/100 Ethernet physical layer/media access control (PHY/MAC)

Quartus II design software included with kit

- Quartus II Web Edition software
- ModelSim-Altera Web Edition
- Nios II Embedded Design Suite
- MicroC/OS-II real-time operating system evaluation
- Nios II C-to-Hardware acceleration compiler evaluation
- NicheStack TCP/IP Network Stack - Nios II Edition evaluation
- MegaCore® IP Library (library of intellectual property cores)

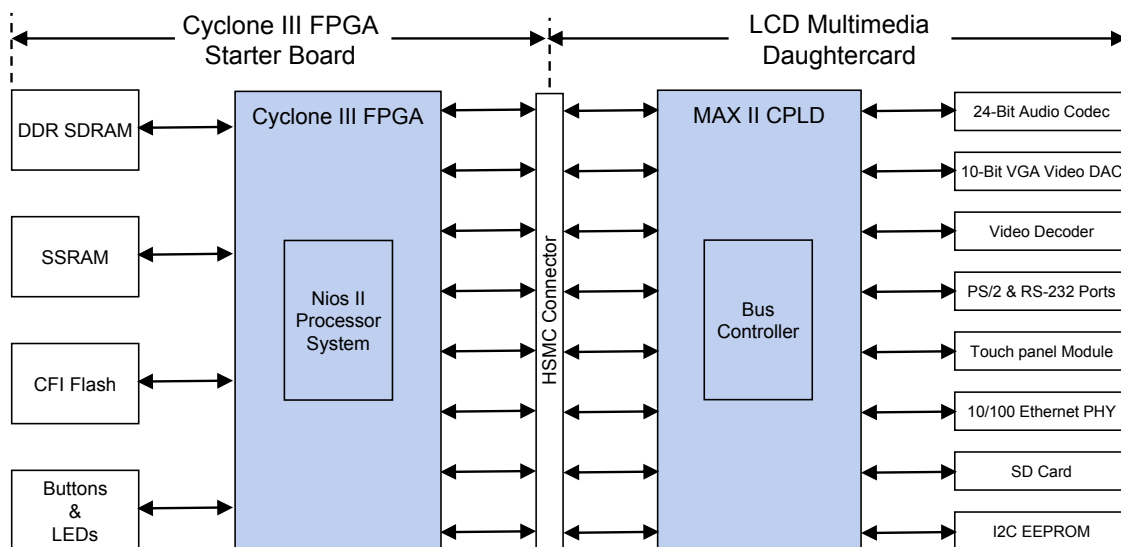
Cyclone III Nios II



Linear Technology Components

LTM4603	6 A μ Module DC/DC system
LTC3413	3 A, 2 MHz regulator for memory termination
LT1959	500 kHz step-down switching regulator
LT1117	800 mA low dropout positive regulator
LT1963	1.5 A, low-noise, fast transient response LDO
LT3461	1.3 MHz/3 MHz step-up DC/DC converter

Part Number	Price
DK-N2EVAL-3C25N	\$499.00



Altera Stratix V GX FPGA Development Kit



The Altera Stratix V GX FPGA Development Kit provides a complete design environment that includes all the hardware and software you need to begin developing FPGA designs immediately.

Development Kit Contents

Altera device

- Stratix V GX 5SGXEA7K2F40C2N FPGA

Configuration

- Fast passive parallel (FPP) configuration via MAX[®] II device and flash memory
- On-board USB-Blaster[™] II cable

General user input/output

- LEDs
- LCD display
- Pushbutton and DIP switches

Memory devices

- DDR3 SDRAM (1,152 MB, x72-bit wide)
- QDR II+ SRAM (4.5 MB, 2 Mb x18-bit wide)
- (Footprint compatible to QDR II 4 Mb x18-bit wide)

Components and interfaces

- PCIe x8 edge connector
- Two HSMC connectors
- SMB for serial digital interface (SDI) input and output
- QSFP optical cage
- 10/100/1000Mbps Ethernet PHY (SGMII) with RJ-45 (copper) connector

Quartus II design software included with kit

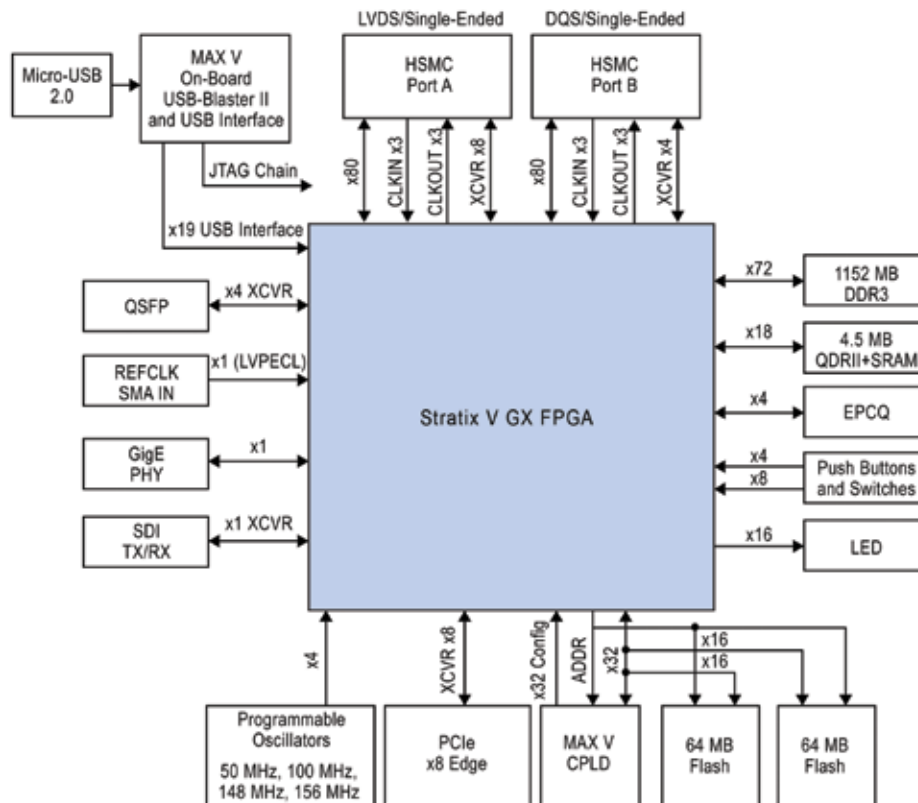
- Quartus II Development Kit Edition Software, one-year license



Linear Technology Components

- LTC3880** Dual output PolyPhase step-down DC/DC controller with digital power system management
- LTM4614** Dual 4 A per channel low V_{IN} DC/DC μ Module regulator
- LT3080** Adjustable 1.1 A single resistor low dropout regulator
- LTM4628** Dual 8 A or Single 16 A DC/DC μ Module regulator
- LTC3855** Dual, multiphase synchronous DC/DC controller with differential remote sense

Part Number	Price
DK-DEV-5SGXEA7N	\$6,995.00



Altera Transceiver Signal Integrity Kit, Stratix V GX Edition

The Altera Stratix V GX Transceiver Signal Integrity (SI) Development Kit provides a platform for electrical compliance testing and interoperability analysis. The accessibility to multiple channels allows for real-world analysis as implemented in the system with transceiver channels available through SMA and popular backplane connectors.

Development Kit Contents

Altera device

- Stratix V GX 5SGXEA7N2F40C2N FPGA

Configuration

- Fast passive parallel (FPP) configuration via MAX[®] II device and flash memory
- On-board USB-Blaster[™]

General user input/output

- 10/100/1000 Mbps Ethernet PHY (RGMII) with RJ-45 (copper) connector
- 16x2 character LCD
- One 8-position dipswitch
- Eight user LEDs
- Four user pushbuttons

Memory devices

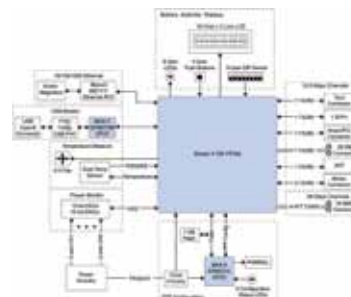
- 128 MB sync flash memory (primarily to store FPGA configurations)

Components and interfaces

- Four 28 Gbps TX/RX channels to MMPX connectors (for Stratix V GT FPGA only)
- Seven 12.5 Gbps TX/RX channels to SMA connectors
- One 12.5 Gbps TX/RX channel to SFP+ cage
- One 12.5 Gbps TX/RX channel to XFP cage
- Five 12.5 Gbps TX/RX channels to Molex backplane connectors
- Seven 12.5 Gbps TX/RX channels to Amphenol backplane connectors
- Seven 12.5 Gbps TX/RX channels to Tyco backplane connectors
- USB type-B connector
- Gigabit Ethernet port and RJ-45 jack
- LCD header

Quartus II design software included with kit

- Quartus II Subscription Edition Software is not included and is not required for kit evaluation



Linear Technology Components

- LTC3855** Dual, multiphase synchronous DC/DC controller with differential remote sense
- LTM4608** 8 A, low V_{IN} DC/DC μ Module with tracking, margining, multiphase and frequency synchronization
- LTC3026** 1.5 A low input voltage VLDO linear regulator
- LTC2978** Octal digital power supply manager with EEPROM

Part Number	Price
DK-SI-5SGXEA7N	\$4,995.00

Altera 100G Development Kit, Stratix V Edition

The Altera 100G Development Kit, Stratix V GX Edition enables a thorough evaluation of 100G designs. It supports 10G/40G and 100G line interfaces through optical modules and the ability to verify a variety of high-speed protocols.

Development Kit Contents

Altera device

- Stratix V GX 5SGXEA7N2F45C2N FPGA

Configuration

- Fast Passive Parallel (FPP) configuration
- 1 Gb flash storage for two configuration images (factory and user)
- On-board USB-Blaster[™] II cable for use with the Quartus[®] II Programmer, Nios[®] II software and System Console
- JTAG header for external USB-Blaster cable

General user input/output

- Four user push buttons
- Two DIP switches
- Eight user LEDs
- Two-line character LCD
- Ten configuration status LEDs

Memory devices

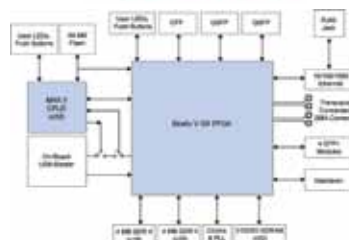
- Twelve 2 Gb DDR3 SDRAM
- Two 72 Mb QDR II SRAM

Components and interfaces

- 10/100/1000 Ethernet PHY and RJ-45 jack
- Two transceiver channels for SMA interface
- Four transceiver channels for SFP+ interface
- Eight transceiver channels for QSFP interface
- 10 transceiver channels for CFP interface
- 24 transceiver channels for Interlaken interface

Quartus II design software included with kit

- Quartus II Development Kit Edition Software, one-year license



Linear Technology Components

- LTM4627** 15 A DC/DC μ Module regulator
- LTM4601** 12 A μ Module regulator with PLL, output tracking and margining
- LT3070** 5 A, low-noise, programmable output, 85 mV dropout linear regulator
- LTC3026** 1.5 A low input voltage VLDO linear regulator
- LTM4600** 10 A high-efficiency DC/DC μ Module

Part Number	Price
DK-100G-5SGXEA7N	\$24,995.00

Altera Stratix IV GX FPGA Development Kit



The Altera Stratix IV GX FPGA Development Kit delivers a complete system-level design environment that includes both the hardware and software needed to immediately begin developing FPGA designs. With this PCI-SIG-compliant board and a one-year license for Quartus II design software, you can develop and test PCI Express 2.0 (up to x8 lane) endpoint and rootpoint designs. Develop and test memory subsystems consisting of DDR3 and/or QDR II+ memory or add other Stratix IV GX supported protocol interfaces such as 10-Gigabit Ethernet, CPRI, OBSAI, SAS/SATA, Serial RapidIO, and many others through the high-speed mezzanine connectors (HSMC).

Development Kit Contents

Altera device

- Stratix IV GX EP4SGX230KF40C2N FPGA

Configuration

- Fast passive parallel (FPP) configuration via a MAX II CPLD EPM2210 and flash memory
- On-board USB-Blaster download cable using Quartus II Programmer

General user input/output

- LEDs
- LCD display
- Pushbutton and DIP switches

Memory devices

- 512 MB DDR3 SDRAM with a 64-bit data bus
- 128 MB DDR3 SDRAM with a 16-bit data bus
- Two 4 MB QDR II+ SRAMs with 18-bit data buses
- 64 MB sync flash and 2 MB SSRAM

Components and interfaces

- USB 2.0
- PCI Express x8 edge connector
- 10/100/1000BASE-T Ethernet PHY with RJ-45 connector
- Two HSMC connectors — Samtec mate ASP-122952-01
- HDMI video output
- 3G SDI video input and output
- Power measurement circuitry
- Temperature measurement circuitry

Quartus II design software included with kit

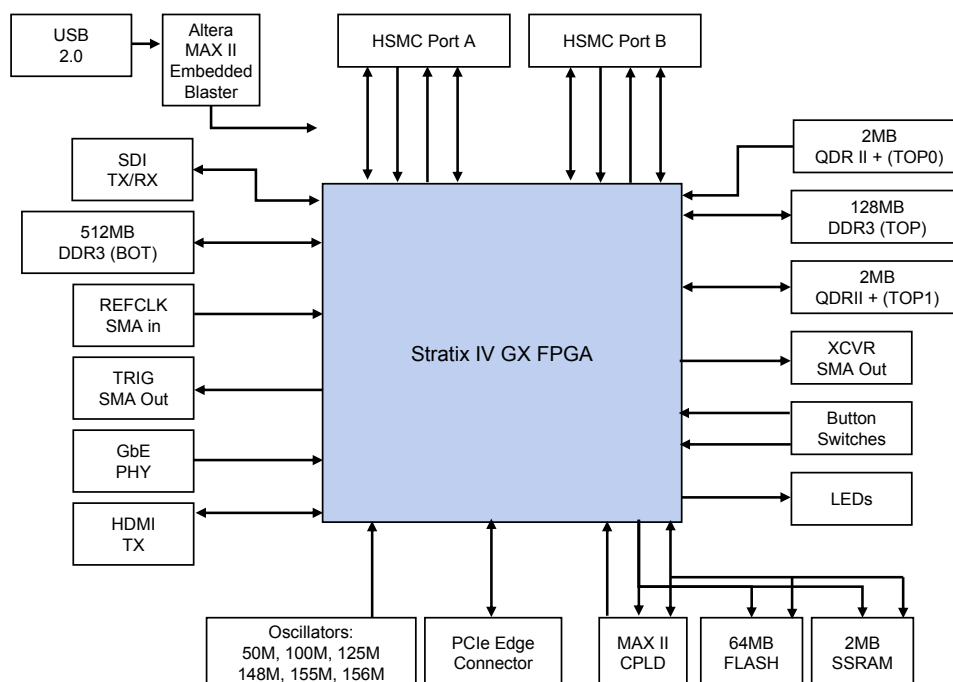
- Quartus II Development Kit Edition Software, one-year license



Linear Technology Components

LTM4601	12 A DC/DC μ Module with PLL, output tracking
LTM4614	Dual 4 A per channel output μ Module
LTM8021	36 V _{IN} , 500 mA step-down DC/DC μ Module
LT3080-1	Adjustable 1.1 A single resistor LDO
LTC3025-1	500 mA μ Power VLDO linear regulator
LTC3727-1	2-phase synchronous step-down regulator
LT3010	50 mA, 3 V to 80 V low dropout μ Power regulator
LTC3414	4 A, 4 MHz, monolithic step-down regulator
LTC2418	8-/16-channel 24-bit no latency delta sigma A/D converter
LTC6902	Multiphase oscillator with spread spectrum
LTC4357	Positive high-voltage ideal diode controller
LTC4358	5 A ideal diode
LTC4352	Low-voltage ideal diode controller with monitoring
LTC4151	High-voltage I ² C current and voltage monitor

Part Number	Price
DK-DEV-4SGX230N	\$4,495.00



Terasic DE5-Net Stratix V Board

The DE5-Net Stratix V FPGA Development Kit is perfectly suited for extreme high powered needs including cloud computing, high frequency trading, and security networks. Featuring an ultra-high bandwidth memory architecture, low-latency SFP+ interfaces, expandable memory, and PCIe communication, the DE5-Net allows for maximum flexibility in terms of low-power, speed, and performance.

Development Kit Contents

Altera device

- Stratix V GX 5SGXE7 FPGA

Configuration

- On-board USB-Blaster II using Quartus II Programmer

General user input/output

- Four LEDs and one LED Array
- Four push-buttons
- Four slide switches
- Two 7-segment displays

Memory devices

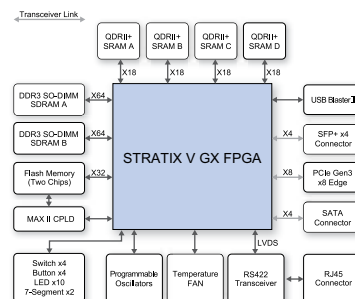
- Two DDR3 SO-DIMM slots
- 32 MB QDRII+ SRAM
- 256 MB flash

Components and interfaces

- Four SFP+ connectors
- Four SATA ports
- PCI Express (PCIe) x8 edge connector
- One RS422 transceiver with RJ45 connector

Quartus II design software included with kit

- Quartus II Web Edition Software



Linear Technology Components

- LTM4601** 12A μ Module regulator with PLL, output tracking and margining
LT3080 Adjustable 1.1 A single resistor low dropout regulator
LTC3025 300 mA micropower VLDO linear regulator
LTC4357 Positive high-voltage ideal diode controller
LTC2855 3.3 V 20 Mbps RS485/RS422 transceiver with integrated switchable termination
LTM4628 Dual 8 A/Single 16 A DC/DC μ Module

Altera Transceiver Signal Integrity Kit, Stratix IV GX Edition

The Transceiver SI Development Kit, Stratix IV GX Edition enables a thorough evaluation of Stratix IV GX transceiver interoperability and serializer/deserializer (SERDES) signal integrity (SI) and performance from 600 Mbps to 8.5 Gbps.

Development Kit Contents

Altera device

- Stratix IV GX EP4SGX230KF40C2N FPGA

Configuration

- Fast Passive Parallel (FPP) configuration via a MAX II CPLD
- EPM2210 and flash memory
- On-board USB-Blaster™ download cable using Quartus II Programmer

General user input/output

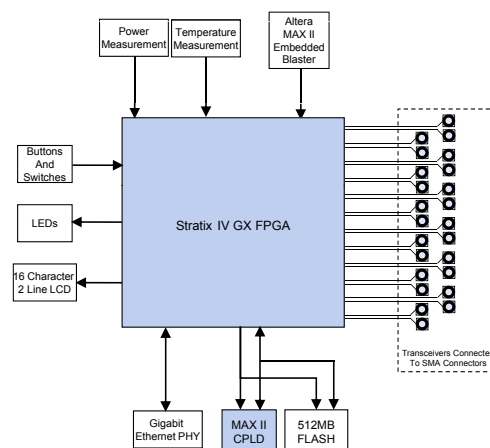
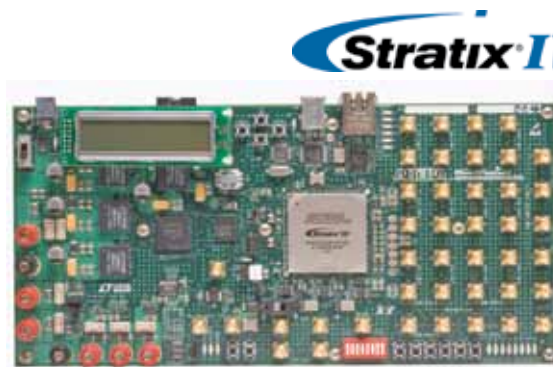
- LEDs, buttons, DIP switches and LCD display

Memory devices

- 64 MB Sync flash

Components and interfaces

- Eight full duplex transceiver channels routed to SMA connectors, including a "Golden Channel" routed on a micro-strip, six strip-line channels from the same transceiver block, all the trace lengths are matched across channels and a "Backplane Channel" ~34" trace length on transmit and ~6" trace length on receive to simulate the degradation associated with backplanes or long traces
- 10/100/1000BASE-T Ethernet PHY



Linear Technology Components

- LTM4601** 12 A DC/DC μ Module with PLL, output tracking
LTM4616 Dual 8 A per channel low V_{IN} DC/DC μ Module
LT3080 LDO adjustable 1.1 A single resistor
LTC3025 LDO 500 mA μ Power VLDO linear regulator
LT1761 LDO 100 mA, low noise
LTC2418 8- or 16-channel 24-bit no latency delta sigma A/D converter

Part Number	Price
DK-SI-4SGX230N	\$2,995.00

Visit www.arrow.com/alteratools for kit availability.

Altera Arria V GT FPGA Development Kit



The Altera Arria V GT FPGA Development Kit provides a complete design environment that includes all the hardware and software that you need to develop full FPGA designs and test them within a system environment. The development kit is RoHS compliant.

Development Kit Contents

Altera device

- Arria V GT 5AGTD7H3F40I3N FPGA

Configuration

- Fast passive parallel (FPP) configuration via MAX[®] II device and flash memory
- On-board USB-Blaster[™] II cable

General user input/output

- Three User Pushbuttons (per FPGA)
- Eight dip switches (per FPGA)
- Sixteen User LEDs (per FPGA)
- 16x2 Character LCD

Memory devices

- DDR3 SDRAM (1152 Mb, x72-bit wide)
- DDR3 SDRAM (1024 Mb, x64+B132-bit wide)
- QDR II+ SRAM (4.5 MB, 1 Mb x36-bit wide)

Components and interfaces

- PCIe x8 edge connector
- Two HSMC connectors
- One FMC connector
- Bulls eye connector
- SMB for serial digital interface (SDI) input and output
- Two SFP+ optical cages
- 10/100/1000Mbps Ethernet PHY (SGMII) with RJ-45 (copper) connector

Quartus II design software included with kit

- Quartus II Development Kit Edition Software, one-year license

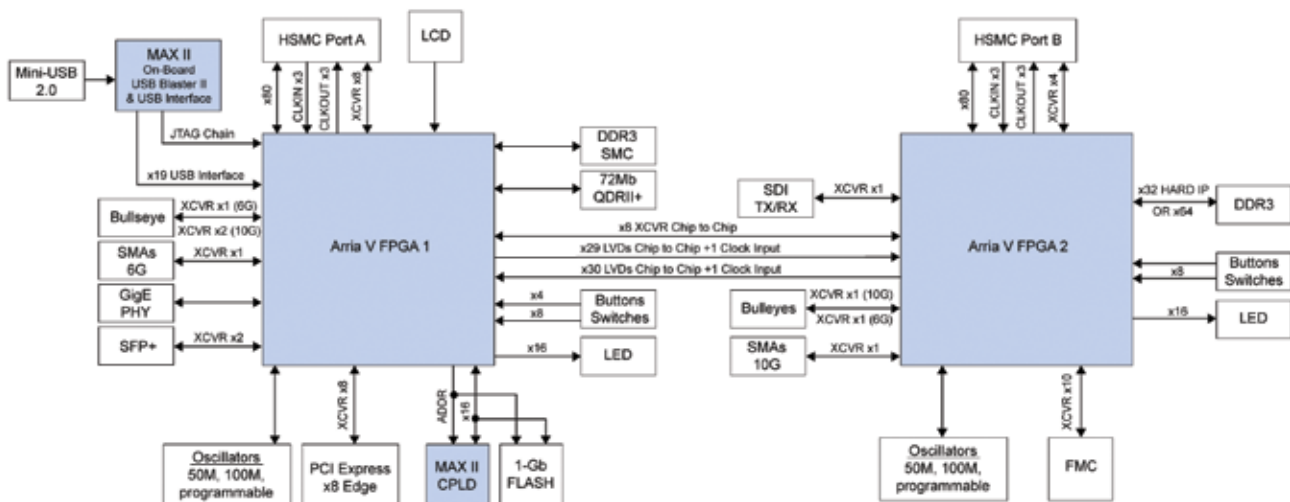


Linear Technology Components

- LTC3880** Dual output PolyPhase step-down DC/DC controller with digital power system management
- LTM4628** Dual 8 A or single 16 A DC/DC μ Module regulator
- LTC3026** 1.5 A low input voltage VLDO linear regulator
- LTM4618** 6 A DC/DC μ Module regulator with tracking and frequency synchronization
- LTC3855** Dual, multiphase synchronous DC/DC controller with differential remote sense
- LTM4601** 12 A μ Module regulator with PLL, output tracking and margining

Part Number	Price
DK-DEV-5AGTD7N	\$3,995.00

Visit www.arrow.com/alteratools for kit availability.



Altera Arria V GX Starter Kit

The Altera Arria V GX Starter Kit provides a complete design environment that includes all the hardware and software you need to develop cost-sensitive FPGA applications immediately. The development kit is RoHS compliant.

Development Kit Contents

Altera device

- Arria V GX 5AGXFB3H4F35C4N FPGA

Configuration

- Fast passive parallel (FPP) x16 mode through parallel flash loader (PFL)
- Embedded USB-Blaster™ II: MAX II EPM570GM100C4N

General user input/output

- LCD character
- x4 DIP switch
- x3 PB
- x4 LED

Memory devices

- Micron MT41J64M16JT-15E DDR3 SDRAM 8MX16X8
- SSRAM: 1024k x18, 18 Mb ISSI IS61VPS102418A, shared address or data with flash

Components and interfaces

- PCI Express
- 10/100/1000 Ethernet
- HSMC
- SDI video output/input
- HDMI video output

Quartus II design software included with kit

- Quartus II Development Kit Edition Software, one-year license

Arria V



Linear Technology Components

LTC3880 Dual output PolyPhase step-down DC/DC controller with digital power system management

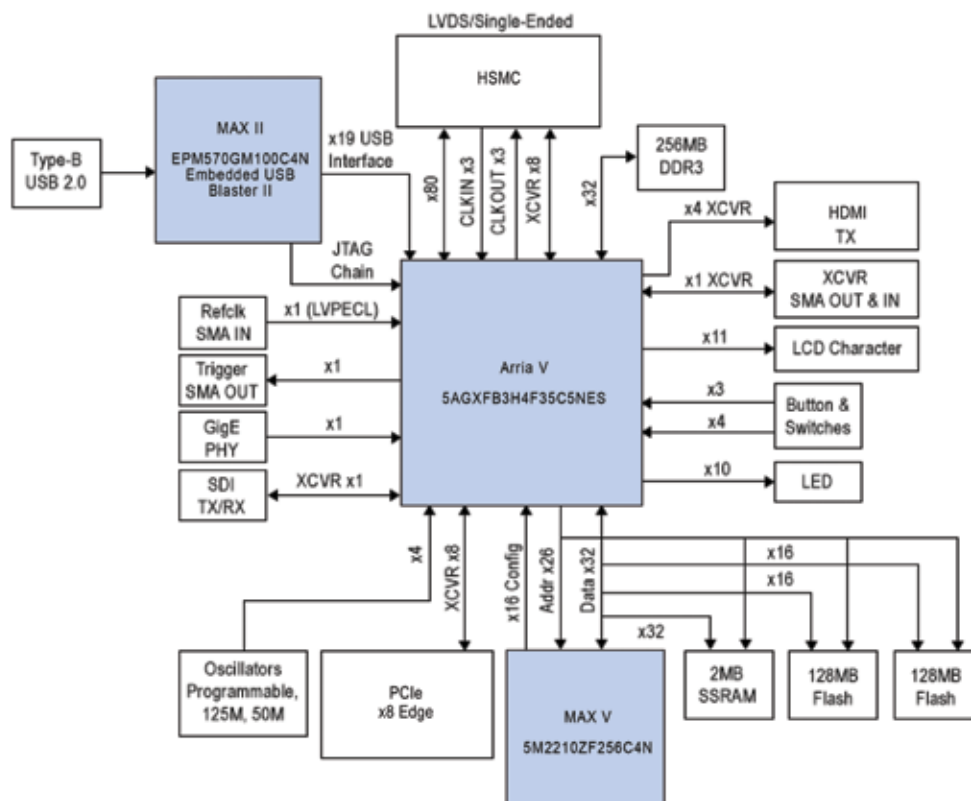
LTC3633 Dual-channel 3 A, 15 V monolithic synchronous step-down regulator

LTC3025 300 mA micropower VLDO linear regulator

LTC3605 15 V, 5 A synchronous step-down regulator

Part Number	Price
DK-START-5AGXB3N	\$850.00

Visit www.arrow.com/alteratools for kit availability.



Altera Cyclone V GX Development Kit

The Altera Cyclone V GX FPGA Development Kit provides a comprehensive, best-in-class design environment to quickly begin developing low-cost and low-power FPGA system-level designs. This kit helps to shorten your product's development cycle so that you can meet your product's time to market and production milestones.

Development Kit Contents

Altera device

- Cyclone V GX 5CGXFC7D6F31C7NES FPGA

Configuration

- Fast passive parallel (FPP) configuration via MAX[®] V device and flash memory
- On-board USB-Blaster[™] II cable

General user input/output

- 10/100/1000 Mbps Ethernet PHY (SGMII) with RJ-45 (copper) connector
- 16x2 character LCD
- Four user dual in-line package (DIP) switch
- Four user LEDs
- Three user push buttons

Memory devices

- DDR3 SDRAM (1.28 Gb, 2 x40-bit wide interfaces)

Components and interfaces

- PCIe x4 edge connector
- One HSMC connector
- SMB for serial digital interface (SDI) input and output
- 10/100/1000Mbps Ethernet PHY (RGMII) with RJ-45 (copper) connector

Quartus II design software included with kit

- Quartus II Web Edition Software

Cyclone V

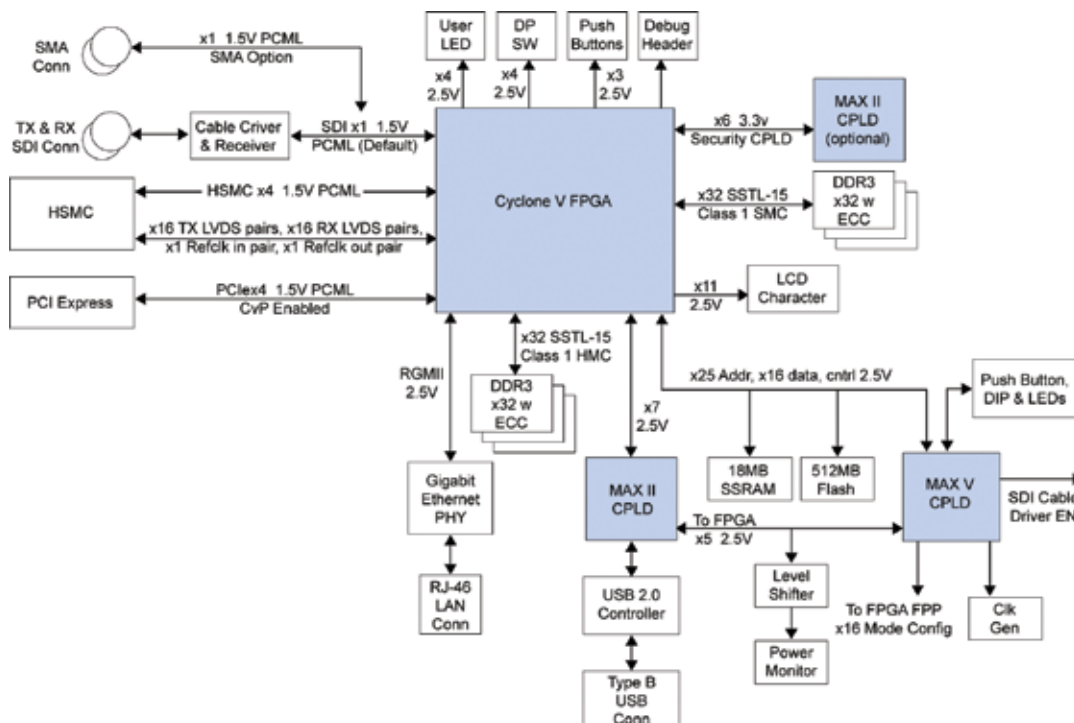


Linear Technology Components

- LTC3855** Dual, multiphase synchronous DC/DC controller with differential remote sense
- LTC3605** 1.5 V, 5 A synchronous step-down regulator
- LTC3603** 2.5 A, 15 V monolithic synchronous step-down regulator
- LTC4352** Low voltage ideal diode controller with monitoring

Part Number	Price
DK-DEV-5CGXC7NES	\$1,199.00

Visit www.arrow.com/alteratools for kit availability.



Altera Cyclone IV GX Transceiver Starter Kit

The Altera Cyclone IV FPGA family extends the Cyclone FPGA series leadership in providing the market's lowest cost, lowest power FPGAs, including a transceiver variant. Ideal for high-volume, cost-sensitive applications, Cyclone IV FPGAs enable you to meet increasing bandwidth requirements while lowering costs. The Altera Cyclone IV GX Transceiver Starter Kit offers you a platform for developing transceiver I/O-based FPGA designs. This kit provides complete hardware and software to enable you to develop your FPGA design, measure FPGA static and dynamic power consumption, test signal quality of the FPGAs transceiver I/O (up to 2.5 Gbps) and develop and test PCI Express 1.0 endpoint x1 lane designs (~250 MB per second transfer rate).

Development Kit Contents

Altera device

- Cyclone IV GX EP4CGX15BF14C8N FPGA

Configuration

- MAX II CPLD EPM2210 System Controller enabling passive serial (PS) configuration from flash
- On-board USB-Blaster download cable using Quartus II Programmer
- JTAG header for external USB Blaster
- Altera EPCS serial configuration device

General user input/output

- LEDs
- LCD display
- Push buttons

Memory devices

- 16 MB flash
- 2 MB synchronous SRAM

Components and interfaces

- PCI Express edge connector
- 10/100/1000BASE-T Ethernet PHY with RJ-45 connector or one transceiver to SMA connectors (requires a minor board modification)
- On-board power measurement circuitry

Quartus II design software included with kit

- Quartus II Web Edition software

Cyclone[®] IV



Linear Technology Components

LTC2418 8-/16-channel 24-bit no latency delta sigma A/D converter

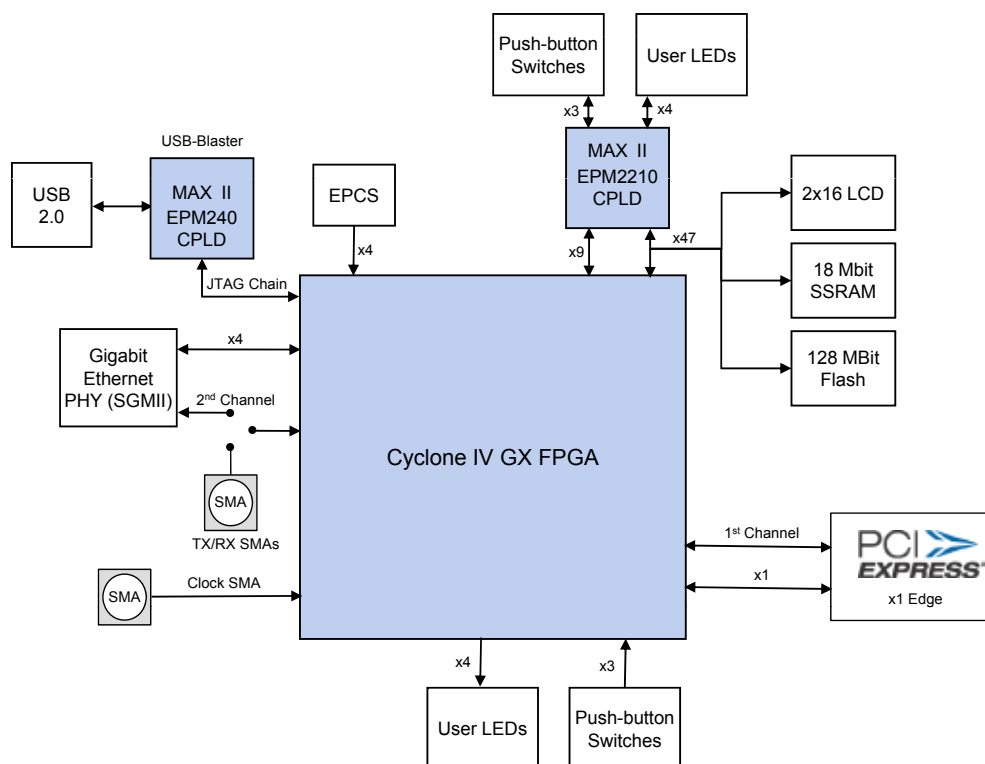
LT3510 Dual tracking 2 A step-down switching regulator

LT3027 Dual 100 mA, low dropout, low-noise, micropower regulator

LTC4412 Low loss PowerPath controller

LT3023 Dual 100 mA, low dropout, low-noise, micropower regulator

Part Number	Price
DK-START-4CGX15N	\$395.00



Altera DSP Development Kit, Stratix V Edition



The DSP Development Kit, Stratix V Edition provides a complete design environment that includes all the hardware and software you need to begin developing DSP-intensive FPGA designs immediately.

Development Kit Contents

Altera device

- Stratix V GS 5SGSMD5K2F40C2N FPGA

Configuration

- Fast passive parallel (FPP) configuration via MAX[®] V device and flash memory
- On-board USB-Blaster[™] II cable

General user input/output

- 10/100/1000 Mbps Ethernet PHY (SGMII) with RJ-45 (copper) connector
- 16x2 character LCD
- One 8-position dual in-line package (DIP) switch
- Sixteen user LEDs
- Three user push buttons

Memory devices

- DDR3 SDRAM (1,152 MB, x72-bit wide)
- QDR II+ SRAM (4.5 MB, 2 Mb x18-bit wide)
- Footprint compatible to QDR II 4 Mb x18-bit wide
- RLDRAM II (72 MB CIO RLDRAM II with an 18-bit data bus)

Components and interfaces

- PCIe x8 edge connector
- Two HSMC connectors
- SMB for serial digital interface (SDI) input and output
- QSFP optical cage
- 10/100/1000 Mbps Ethernet PHY (SGMII) with RJ-45 (copper) connector

Quartus II design software included with kit

- Quartus II Development Kit Edition Software, one-year license



Linear Technology Components

LTC3880 Dual output PolyPhase step-down DC/DC controller with digital power system management

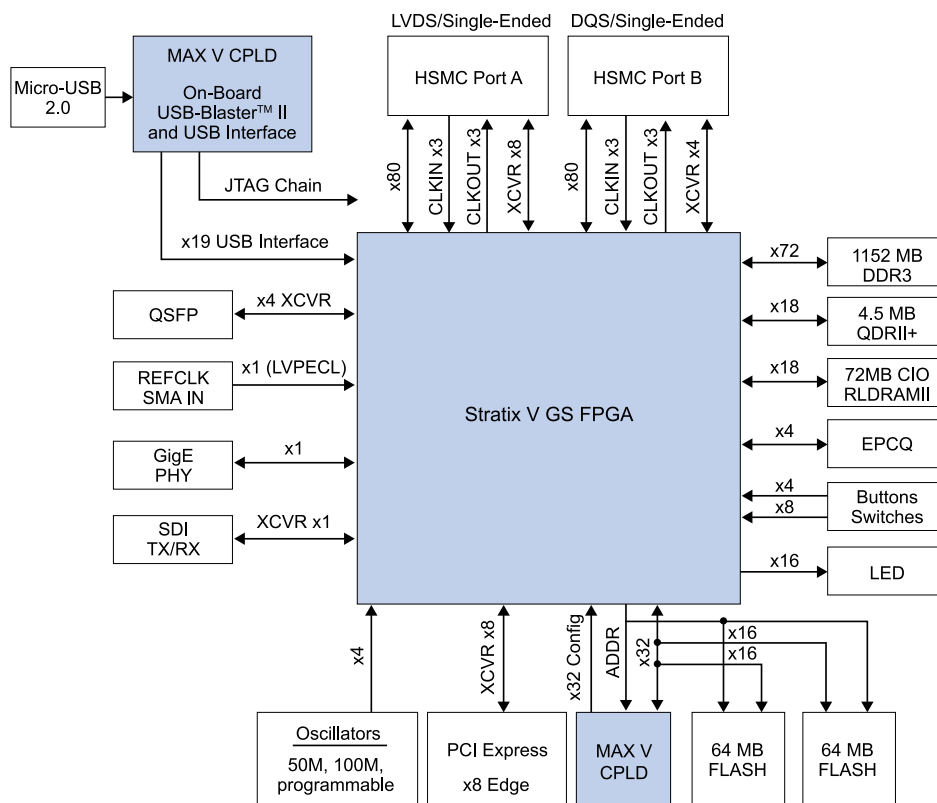
LTM4614 Dual 4 A per channel low V_{IN} DC/DC μ Module regulator

LT3080 Adjustable 1.1 A single resistor low dropout regulator

LTM4628 Dual 8 A or single 16 A DC/DC μ Module regulator

LTC3855 Dual, multiphase synchronous DC/DC controller with differential remote sense

Part Number	Price
DK-DEV-5SGSMD5N	\$6,995.00



Altera Audio Video Development Kit, Stratix IV GX Edition



The Audio Video Development Kit, Stratix IV GX Edition, delivers a complete video and image processing development environment for design engineers. The kit facilitates the entire design process, from design conception through hardware implementation. This kit includes the Stratix IV EP4SGX230 FPGA development board, the transceiver serial digital interface (SDI) high-speed mezzanine card (HSMC), Quartus II development software, evaluation intellectual property (IP) cores — including the Video and Image Processing Suite—the serial digital interface (SDI) reference design, as well as power supplies, cables, and documentation.

Development Kit Contents

Altera device

- Stratix IV GX EP4SGX230KF40C2N FPGA

Configuration

- Fast passive parallel (FPP) configuration via a MAX II CPLD and flash memory
- On-board USB-Blaster download cable using Quartus II Programmer

General user input/output

- 8 LEDs
- LCD display
- Push button and DIP switches

Memory devices

- 512 MB DDR3 SDRAM with a 64-bit data bus
- 128 MB DDR3 SDRAM with a 16-bit data bus
- Two 4 MB QDR II+ SRAMs with 18-bit data buses
- 64 MB sync flash and 2 MB SSRAM external memory

Components and interfaces

- USB 2.0
- PCI Express x8 edge connector
- 10/100/1000BASE-T Ethernet PHY with RJ-45 connector
- Two HSMC connectors — Samtec mate ASP-122952-01
- HDMI video output on the FPGA host board
- Power measurement circuitry
- Temperature measurement circuitry
- One 3G-SDI video input and output on the FPGA host board
- Two additional SDI inputs and outputs for triple-rate SDI supporting 3G, and high-definition (HD) and standard-definition (SD) standards on the HSMC
- Two AES inputs and outputs on the HSMC

Quartus II design software included with kit

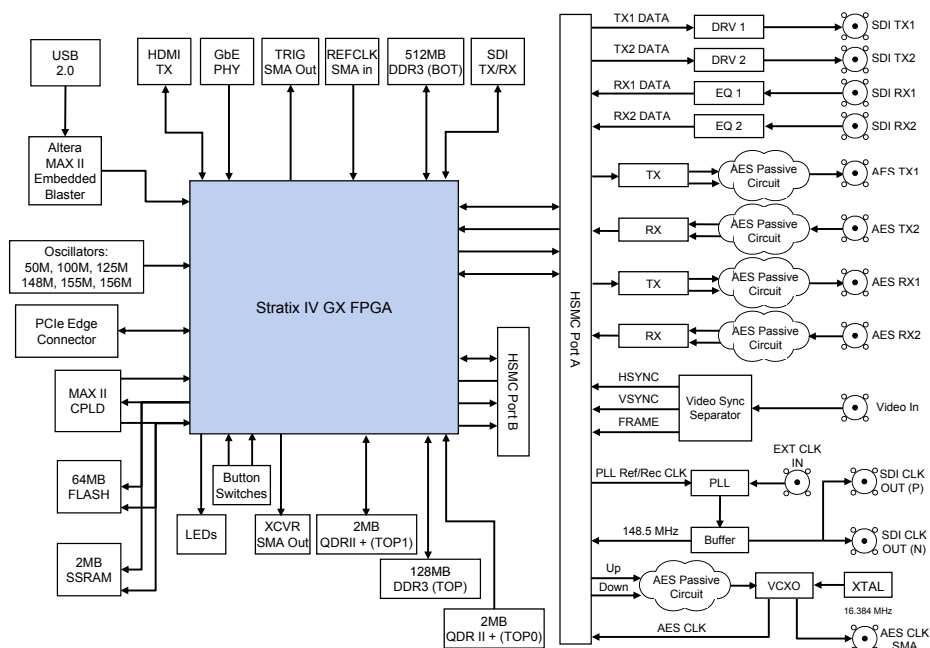
- Quartus II Development Kit Edition Software, one-year license



Linear Technology Components

LTM4601	12 A DC/DC μ Module with PLL, output tracking
LTM4614	Dual 4A per channel output μ Module
LTM8021	36 V _{IN} , 500 mA step-down DC/DC μ Module
LT3080-1	Adjustable 1.1 A single resistor LDO
LTC3025-1	500 mA μ Power VLDO linear regulator
LTC3727-1	2-phase synchronous step-down regulator
LT3010	50 mA, 3 V to 80 V low dropout μ Power regulator
LTC3414	4 A, 4 MHz, monolithic step-down regulator
LTC2418	8-/16-channel 24-bit no latency delta sigma A/D converter
LTC6902	Multiphase oscillator with spread spectrum
LTC4357	Positive high-voltage ideal diode controller
LTC4358	5 A ideal diode
LTC4352	Low-voltage ideal diode controller with monitoring
LTC4151	High-voltage I ² C current and voltage monitor
LT3480	36 V, 2 A, 2.4 MHz step-down switching regulator with 70 μ A quiescent current
LTC285x	3.3 V 20 Mbps RS485/RS422 transceiver

Part Number	Price
DK-VIDEO-4SGX230N	\$4,995.00



Altera DSP Development Kit, Cyclone III Edition



The DSP Development Kit, Cyclone III Edition delivers a complete DSP development environment for design engineers. The DSP Development Kit, Cyclone III Edition includes the Cyclone III development board, the Data Conversion HSMC, the DSP Builder development tool, Quartus II development software, MATLAB/Simulink evaluation software, evaluation IP cores, design examples, power supplies, cables, and documentation.

Development Kit Contents

Altera device

- Cyclone III EP3C120F780 FPGA

Configuration

- On-board USB-Blaster download cable using Quartus II Programmer

General user input/output

- 128 x 64 graphics LCD
- 2-line x 16-character LCD
- Buttons, dip-switches and LEDs
- 7-segment display
- Speaker header

Memory devices

- 256 MB of dual-channel DDR2 SDRAM with ECC
- 8 MB of synchronous SRAM
- 64 MB of flash

Components and interfaces

- 10/100/1000 Ethernet (RGMII)
- USB 2.0 (Type B)
- Two HSMC connectors — Samtec mate ASP-122952-01
- Dual 14-bit, 150-MSPS A/D converter
- Dual 14-bit, 250-MSPS D/A converter
- Audio in/out/mic

Quartus II design software included with kit

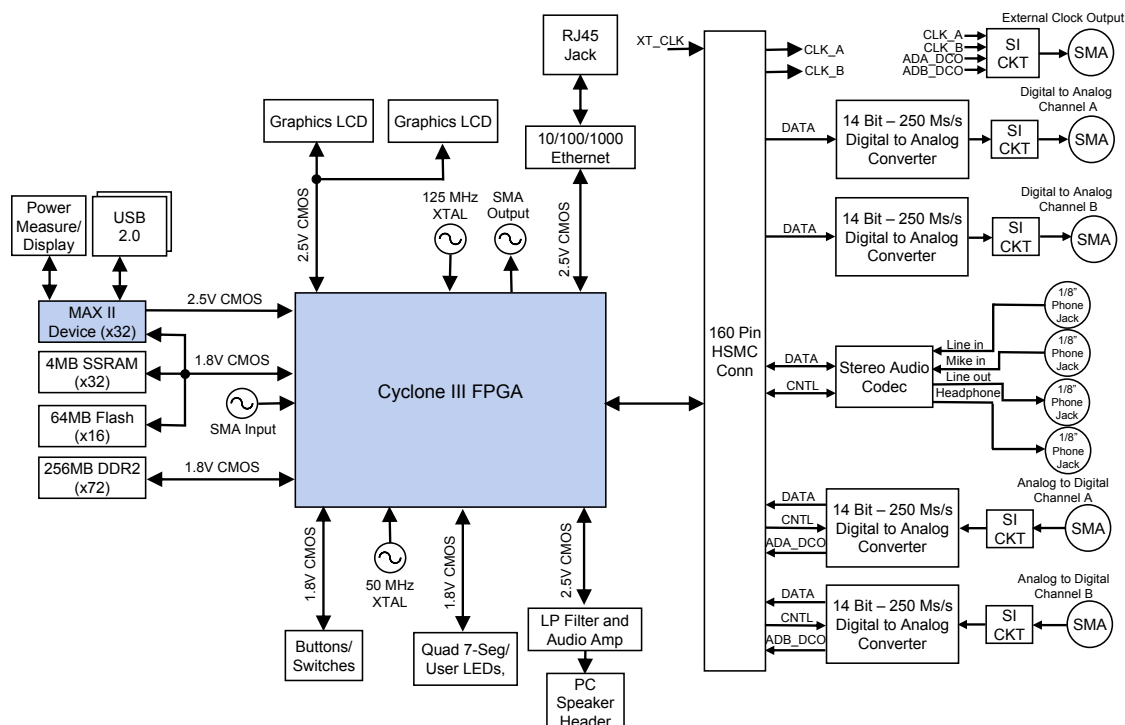
- Quartus II Web Edition software
- MATLAB/Simulink evaluation software



Linear Technology Components

LTM4601	12 A μ Module DC/DC system
LT1963	1.5 A, low-noise, fast transient response LDO
LT3481	6 V, 2 A, 2.8 MHz step-down switching regulator
LT1761	100 mA, low-noise, LDO micropower regulator
LTC3418	8 A, 4 MHz, synchronous step-down regulator
LT1931	1.2 MHz/2.2 MHz inverting DC/DC converter
LTC2402	1- or 2-channel 24-bit μ Power delta sigma A/D converter

Part Number	Price
DK-DSP-3C120N	\$1,595.00



HSMC Daughtercards from Terasic



GPIO HSMC Card



Description

The GPIO HSMC daughter board is designed to fan out the High Speed Mezzanine connector (HSMC) I/Os to three 40-pin expansion prototype connectors, which are compatible with Altera DE2/DE1/DE0 expansion headers. Users can connect up to three Altera DE2/DE1/DE0 boards (or associated daughter cards) onto a HSMC-interfaced host board via the GPIO HSMC daughter board.

Features

- Converts HSMC interface I/O to standard 40-pin expansion connectors.
- Allows users to connect Altera DE2/DE1 boards to a HSMC-interfaced host board.
- Provides test points for signal measurement.

Price: \$55

Part Number: P0024

Ethernet HSMC Card



Description

The Terasic Ethernet HSMC Card is a Gigabit Ethernet transceiver with a High Speed Mezzanine Connector (HSMC) interface. It offers network transfers of up to 1 Gbps with the host board using a HSMC connector. Also, it provides a fully integrated Ethernet solution enabling fast implementation design, shortening development times, and allows you to focus on the core functions of the system design. Lastly, the Ethernet HSMC Card can be connected any HSMC/HSTC interfaces.

Features

- One HSMC connector for interface conversion, which is fully compatible with Cyclone III Starter Kit and DE3 host boards
- Dual-Port Integrated 10/100/1000 Gigabit Ethernet transceiver Supports GMII/MII/RGMII/TBI MAC interfaces for direct connection to a MAC/Switch port
- Dynamically configurable to support 10 Mbps, 100 Mbps (Fast Ethernet) or 1000 Mbps (Gigabit Ethernet) operation
- Requires a 25 MHz reference clock driven from a dedicated oscillator
- Complete Reference Design

Price: \$249

Part Number: P0038

DVI HSMC Card



Description

The Terasic DVI HSMC is a DVI transmitter/receiver board with a High Speed Mezzanine Connector (HSMC) interface. It is designed to allow developers to access high quality and high resolution video signals that support UXGA Resolution (Pixel Rates up to 165 MHz). It gives the flexibility required in high resolution image processing systems by combining both the DVI transmitter and receiver onto the same card. Lastly, the DVI HSMC daughter board can be connected to any HSMC/HSTC interface host boards.

Features

- Digital Visual Interface (DVI) Specification Compliant
- One DVI transmitter with single transmitting port (Supports resolutions from VGA to UXGA at 25 MHz – 165 MHz Pixel Rates)
- One DVI receiver with single receiving port (Supports UXGA Resolution at Output Pixel Rates Up to 165 MHz)

Price: \$219

Part Number: P0017

SATA/SAS HSMC Card



Description

The SATA/SAS Daughter Card allows users to access storage devices through the SATA/SAS protocols using Stratix IV GX, Stratix II GX, Arria II GX, and Cyclone IV GX devkits with a High-Speed Mezzanine Connector (HSMC). This card features 4 single-channel SATA signal plug connectors, one 4-channel SATA/SAS connector, and one ATX style output power connector for hard drives. With the SATA interface, your FPGA system can be used for functionality, specification-compliance, interoperability, and performance testing.

Features

- HSMC interface
- SATA/SAS Single lane interface
- SATA/SAS 4 lane interface
- ATX power
- 8 Kb I²C EEPROM
- Differential clocking for 150 MHz and 300 MHz reference clocks through the HSMC or SMA connectors

Price: \$550

Part Number: P0053

Dual XAUI to SFP+ HSMC Card



Description

This board is intended to be used by customers to implement and design 10G Ethernet systems based on transceiver host boards that support XAUI interfaces. This mezzanine card is intended to be part of an openly sold Development Kit and can be bundled with packages of Software and IP Cores. It will have 2 full duplex 10G SFP+ channels with a XAUI backend interface. The XAUI to SFP+ HSMC provides a hardware platform for developing embedded systems based on XAUI based Altera "GX" based devices. The devices that presently support XAUI are Arria GX, Arria II GX, Stratix II GX and Stratix IV GX.

Features

- Two independent XAUI interfaces from the HSMC to the BCM8727
- Two independent SFI interfaces from the BCM8727 to SFP+ cages
- MDIO interfaces
- I²C EEPROM for HSMC identification and user data
- Si5334C clock generator
- 156.25 MHz reference available on SMA connectors and through the HSMC connector
- Four user bi-color LEDs for each channel (8 total bi-color LEDs)

Price: \$785.00






Part Number: P0092

Check out the complete list of Development Board Daughtercards at:

http://www.altera.com/products/devkits/kit-daughter_boards.jsp

Review the HSMC Specification at:

http://www.altera.com/literature/ds/hsmc_spec.pdf

SFP HSMC Board 	Description The Small Form-Factor Pluggable (SFP) Board allows the evaluation of SFP Modules with Stratix IV GX, Arria GX, and Arria II GX development kits in SGMII Ethernet, Fibre Channel, CPRI/OBSAI, and SONET applications. Four transceiver channels are routed to dedicated transceiver connections on the HSMC, four are connected to LVDS signals on the HSMC.	Features <ul style="list-style-type: none"> Four transceiver based SFP connectors Four LVDS based SFP connectors Two transceiver receive SMAs Two Transceiver Transmit SMAs One LVDS clock input SMA pair Two single-ended clock output SMAs One LVDS clock output SMA pair One LVPECL clock output SMA pair
Price: \$590		Part Number: P0040
SDI Transceiver HSMC Board 	Description The Serial Digital Interface (SDI) Transceiver HSMC Board provides a hardware platform for developing video broadcast systems. This board is intended to be used by customers to implement SDI and AES systems with transceiver based host boards.	Features <ul style="list-style-type: none"> Support triple rate 3G/HD/SD SDI standard Two SDI inputs and outputs Two AES inputs and outputs SDI clean up PLL and an AES PLL
Price: \$490		Part Number: P0039
High-Speed A/D and D/A Daughterboard 	Description The high-speed A/D and D/A daughterboard is designed to support DSP solutions on the Altera Cyclone III Starter Kits, or other boards with HSMC connectors. Target applications include: <ul style="list-style-type: none"> Low-cost oscilloscope and pattern generator Communication Transceiver Platform for various modulation techniques 	Features <ul style="list-style-type: none"> Dual AD channels with 14-bit resolution and data rate up to 65 MSPS Dual DA channels with 14-bit resolution and data rate up to 125 MSPS Clock sources include 100MHz oscillator, SMA for AD and DA each, and PLL from either HSMC or GPIO interface
Price: \$219		Part Number: P0003 GPIO, P0003 HSMC
High-Definition Multimedia Interface 	Description The HDMI daughter board is an HDMI transmitter/receiver board with HSTC (High Speed Terasic Connector) interface. The transmitter and receivers are compliant with HDMI 1.3a, HDCP 1.2, and DVI 1.0 specifications. The kit includes a reference design to control the HDMI board from a Terasic DE3 development kit.	Features <ul style="list-style-type: none"> One HSTC interface One HDMI transmitter with single transmitting port One HDMI receiver with dual receiving ports Two 2 K EEPROM for storing EDID of two receiver ports separately Powered from 3.3 V pins of HTSC connector
Price: \$299		Part Number: P0087
AD/DA Data Conversion Card 	Description The AD/DA Data Conversion Card was created to provide a set of Analog to Digital and Digital to Analog interfaces including an Audio CODEC interface. The High Speed Mezzanine Card (HSMC) can be used to develop DSP applications with Altera Development boards and Terasic Development boards (e.g.DE3) that feature the HSMC connector.	Features <ul style="list-style-type: none"> External Clock In / Out Interface Two 14-bit Analog to Digital (A/D) converter channel with 150 MSPS Two 14-bit Digital to Analog (D/A) converter channel with 250 MSPS One Audio CODEC with Line-In, Line-Out, MIC and Headphone
Price: \$390		Part Number: P0035



QUARTUS® II

Quartus II Design Software

If you're looking for a design environment that will quickly move you from concept to creation, choose Altera's Quartus II design software. Number one in performance and productivity for CPLD, FPGA, SOC FPGA and HardCopy ASIC designs, Quartus II software offers complete, automated system definition and implementation, all without requiring lower-level HDL or schematics. This capability—plus its seamless integration with leading EDA software tools and flows—will help turn your ideas into working systems in minutes.

Free software package includes:

- Quartus II Web Edition software
 - Support for MAX series CPLDs, and Cyclone series and Arria FPGAs
 - Support for Windows and Linux operating system
- Nios II Embedded Design Suite
- ModelSim-Altera Starter Edition simulation software
 - Optional upgrade: ModelSim-Altera Edition for faster simulation
- Evaluation of the Altera MegaCore® IP library

Quartus II Software

	Subscription Edition	Web Edition
Devices:	All	MAX and Cyclone series; Arria GX series
Features:	100%	95%
Distribution:	Download and DVD	Download and DVD
Cost:	Paid license	Free - no license required
Operating system support:	Windows and Linux	Windows and Linux

Altera subscription program

Altera's subscription program offers a comprehensive suite of premium software and IP products. Included in the subscription are:

- Quartus II Subscription Edition software
 - Support for all Altera devices
 - Support for Windows and Linux operating systems
- Support for enhanced productivity features
 - Incremental compilation for faster compile times
 - Multi-processor support for faster compile times
- Nios II Embedded Design Suite (EDS)
- ModelSim-Altera Starter Edition simulation software
 - Optional upgrade: ModelSim-Altera Edition for faster simulation
- Complete IP Base Suite, which includes full licenses to the following Altera functions:
 - FIR Compiler
 - NCO Compiler
 - FFT Compiler
 - DDR SDRAM Controller
 - DDR SDRAM High-Performance Controller
 - DDR2 SDRAM Controller
 - DDR2 SDRAM High-Performance Controller
 - DDR3 SDRAM High-Performance Controller
 - QDR II SRAM Controller
 - RLDRAM II Controller
 - SerialLite II

For more information

Quartus II software
Quartus II download
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Training
OS

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www.altera.com/download
www.altera.com/literature
www.altera.com/training
www.altera.com/download/os-support

Quartus II design software features summary

Design flow methodology	Incremental compilation ¹	Improves design timing closure and reduces design compilation times up to 70 percent. Supports team-based design.
	Pin planner	Eases the process of assigning and managing pin assignments for high-density and high pin-count designs.
	Qsys (replaces SOPC Builder)	Automates system development by integrating IP functions and subsystems (collection of IP functions) using a hierarchical approach and a high-performance interconnect (based on a network-on-a-chip architecture).
	Off-the-shelf IP cores	Lets you construct your system-level design using IP cores from Altera and from Altera's third-party IP partners.
	Parallel development of FPGA prototypes and ASICs ¹	Allows for FPGA prototypes and HardCopy ASICs to be designed in parallel using the same design software and IP.
	Scripting support	Supports command-line operation and Tcl scripting, as well as GUI design processing.
	Rapid Recompile ¹	Maximizes your productivity by reducing your compilation time by 50 percent on average (for a small design change after a full compile). Improves design timing preservation.
Performance and timing closure methodology	Physical synthesis	Uses post placement and routing delay knowledge of a design to improve performance.
	Design space explorer (DSE)	Increases performance by automatically iterating through combinations of Quartus II software settings to find optimal results.
	Extensive cross-probing	Provides support for cross-probing between verification tools and design source files.
	Optimization advisors	Provides design-specific advice to improve performance, resource usage, and power consumption.
	Chip planner	Reduces verification time (while maintaining timing closure) by enabling small, post placement and routing design changes to be implemented in minutes.
Verification	TimeQuest timing analyzer	Provides native Synopsys Design Constraint (SDC) support and allows you to create, manage, and analyze complex timing constraints and quickly perform advanced timing verification.
	SignalTap II embedded logic analyzer ²	Supports the most channels, fastest clock speeds, largest sample depths, and most advanced triggering capabilities available in an embedded logic analyzer.
	System Console	Enables you to easily debug your FPGA in real time using read and write transactions. It also enables you to quickly create a GUI to help monitor and send data into your FPGA.
	PowerPlay technology	Enables you to accurately analyze and optimize both dynamic and static power consumption.
Third-party support	EDA partners	Offers EDA software support for synthesis, functional and timing simulation, static timing analysis, board-level simulation, signal integrity analysis, and formal verification. To see a complete list of partners, visit www.altera.com/products/software/partners/eda_partners/eda-index.html .

¹ Included in Subscription Edition only.

² Available with talkback feature enabled in Web Edition.

Quartus II software design flow

Quartus II Software Key Features		Availability	
		Subscription Edition	Web Edition (Free)
Design entry	Cyclone FPGA and MAX CPLD device support		
	Arria and Stratix FPGA device support		
	HardCopy ASIC device support		
	Multiprocessor support (faster compile time support)		
	IP Base Suite (includes licenses for 15 popular IP cores)		
	Qsys (next-generation system-integration tool)		
	SOPC Builder (legacy system development tool)		
	Rapid Recompile (faster compile for small design changes)		
	Incremental compile (performance preservation and team-based design)		
Functional simulation	ModelSim®-Altera Starter Edition software		
	ModelSim-Altera Edition software		
Synthesis	Quartus Integrated Synthesis (synthesis tool)		
Placement and routing	Fitter (placement and routing tool)		
Timing and power verification	TimeQuest tool (static timing analysis)		
	PowerPlay tool and optimization (power analysis)		
In-System debug	SignalTap™ II logic analyzer (embedded logic analyzer) ²		
	Transceiver Toolkit (transceiver interface and verification tool)		
Operating System Support		Availability	
		Subscription Edition	Web Edition (Free)
Windows/Linux 32-bit support			
Windows/Linux 64-bit support			

DSP Builder

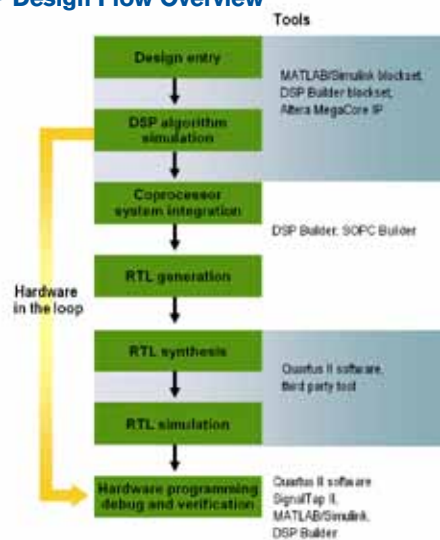
Altera's DSP Builder creates a seamless bridge between the MATLAB/Simulink tool and Altera's Quartus II software, giving FPGA designers the algorithm development, simulation, and verification capabilities of MATLAB/Simulink system-level design tools. If your stand-alone DSP processor is running out of computational horsepower, FPGAs can solve the problem. FPGAs speed up your system with massive DSP horsepower that efficiently implements DSP algorithms in applications such as motion estimation, complex video processing, OFDM-MIMO processing in base stations, and single data rate (SDR) algorithms.

Altera provides the industry's most comprehensive portfolio of solutions for implementing your high-performance DSP design in our FPGAs:

- DSP Builder—A MATLAB/Simulink-based design tool that enables system-level design
- Comprehensive collection of intellectual property (IP) functions for signal processing, including the largest suite of IP for video processing and floating-point operations
- Large portfolio of DSP reference designs for wireless, highdefinition video, and other signal processing applications
- Range of DSP development kits to speed up design

Designing DSP applications in FPGAs requires both high-level algorithm development and HDL development tools. Altera's DSP Builder integrates these tools by combining the algorithm development, simulation, and verification capabilities of MATLAB/Simulink system-level design tools with VHDL synthesis, simulation, and the hardware debugging capabilities of the Quartus II development tool.

DSP Design Flow Overview



Part Number	Price
SW-QUARTUS-SE-FIX	\$2,995.00
SW-QUARTUS-SE-FLT	\$3,995.00
SW-QUARTUS-SE-ADD	\$3,995.00
SWR-QUARTUS-SE-FIX	\$2,495.00
SWR-QUARTUS-SE-FLT	\$2,495.00
IPT-DSPBUILDER	\$1,995.00
IPT-C2H-NIOS	\$2,995.00

Power Management Solutions for Altera's FPGAs, CPLDs, and HardCopy® ASICs

Power estimation tools, such as the PowerPlay Early Power Estimator (EPE) and the PowerPlay Power Analyzer from Altera are available to estimate the power consumption of your design before creating the design.

Stratix® (GX) V, IV, III, II FPGAs and Hardcopy V, IV, III, II ASICs					Core Voltage: 0.85 V, 0.9 V, 1.1 V, 1.2 V	
Input Supply	≤200 mA	≤500 mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	Up to 25A
1.8 V	LT*3020 Linear LTC*3549 Monolithic	LT3085 Linear LTC3409 Monolithic	LT3080 Linear LTC3026 Linear	LT3083 Linear LT3070 Linear LT3071 Linear	2 × LT3070 Linear 2 × LT3071 Linear	2 × LTM4611 μModule Regulator
2.5 V to 5 V	LT3020 Linear LTM*8020 μModule® Regulator	LT3085 Linear LTM8021 μModule Regulator	LTC3411A Monolithic LTC3417A Monolithic LTC3569 Monolithic	LTC3612 Monolithic LTM4604A μModule Regulator LTM4614 Dual μModule Regulator LTM4615 Triple μModule Regulator	LTC3608 Monolithic LTC3616 Monolithic LTM4608A μModule Regulator LTM4616 Dual μModule Regulator	LTC3855 Controller 2 × LTM4611 μModule Regulator
≤12 V to 24 V	LT3502 Monolithic	LT3503 Monolithic	LT3503 Monolithic LTC3601 Monolithic	LTM8025 μModule Regulator LTM4618 μModule Regulator LTM4619 Dual μModule Regulator	LTM4601A μModule Regulator LTM4628 Dual μModule Regulator LTM4627 μModule Regulator	LTC3855 Controller LTC3880 Controller 2 × LTM4627 μModule Regulator

Arria® (GX) V, II, I FPGAs					Core Voltage: 0.9 V, 1.1 V, 1.2 V	
Input Supply	≤200 mA	≤500 mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	
1.8 V	LT1761 Linear LTC3549 Monolithic	LT3085 Linear LTC3409 Monolithic	LT3080 Linear LTC3026 Linear	LT3083 Linear LT3070 Linear LT3071 Linear	2 × LT3070 Linear 2 × LT3071 Linear	
2.5 V to 5 V	LT3020 Linear LTC3544 Monolithic	LT3085 Linear LTC3025-1	LTC3411A Monolithic LTC3417A Monolithic LTC3569 Monolithic	LTC3546 Monolithic LTC3612 Monolithic	LTC3608 Monolithic LTC3616 Monolithic LTC3418 Monolithic	
≤12 V to 24 V	LT3502 Monolithic	LT3503 Monolithic	LT3503 Monolithic LTC3601 Monolithic	LTC3604 Monolithic LTC3850 Controller LTC3633 Monolithic	LTC3605 Monolithic LTC3633 Monolithic LTC3855 Controller	

Cyclone® (GX) V, IV, III, II FPGAs					Core Voltage: 1.1 V, 1.2 V	
Input Supply	≤200 mA	≤500 mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	
1.8 V	LT1761 Linear LTC3549 Monolithic	LT3085 Linear LTC3409 Monolithic	LT3080 Linear LTC3026 Linear	LT3083 Linear LT3070 Linear LT3071 Linear	2 × LT3070 Linear 2 × LT3071 Linear	
2.5 V to 5 V	LT3020 Linear LTC3544 Monolithic	LT3085 Linear LTC3025-1 Linear	LTC3411A Monolithic LTC3417A Monolithic LTC3569 Monolithic	LTC3612 Monolithic LTC3614 Monolithic LTC3615 Monolithic	LTC3608 Monolithic LTC3616 Monolithic LTC3617 Monolithic	
≤12 V to 24 V	LT3502 Monolithic	LT3503 Monolithic LT3645 Monolithic	LT3503 Monolithic LT3505 Monolithic LTC3601 Monolithic	LTC3604 Monolithic LTC3850 Controller LTC3633 Monolithic	LTC3605 Monolithic LTC3633 Monolithic	

MAX® V CPLDs				Core Voltage: 1.8 V	
Input Supply	≤200 mA	≤500 mA	≤1A – 1.5A		
1.8 V	LT1761 Linear LTC3549 Monolithic	LT3085 Linear LTC3409 Monolithic	LT3080 Linear LTC3026 Linear		
2.5 V to 5 V	LT3020 Linear LTC3544 Monolithic	LT3085 Linear LTC3025-1 Linear	LTC3411A Monolithic LTC3417A Monolithic LTC3569 Monolithic		
≤12 V to 24 V	LT3502 Monolithic	LT3503 Monolithic LT3645 Monolithic	LT3503 Monolithic LT3505 Monolithic LTC3601 Monolithic		

DDR Memory or Active Bus Termination				
Input Supply	< ±1.5A	< ±3A	< ±6A	> ±6A
2.5 V to 5.5 V	LTC3612 Monolithic LTC3615 Dual Monolithic	LTC3614 Monolithic LTC3616 Monolithic LTC3618 Monolithic	LTC3617 Monolithic	LTC3718 Controller
>5.5 V		LTC3634 Monolithic		LTC3718 Controller LTC3876 Controller

*Additional products in Linear's μModule family are now available. New products are highlighted in bold.

Monolithic Switching Regulators

High-Current Step-Down DC/DC Power Solutions for Stratix and Arria FPGAs

Linear Technology designs and manufactures a broad range of step-down DC/DC regulators specifically designed to power Altera's Stratix and Arria FPGAs, including solutions to meet the 3 percent core tolerance specification for the Stratix V device family. These regulators typically have 0.6V references with less than ± 1 percent accuracy over temperature and include other features, such as low quiescent current, voltage tracking, high step-down ratios, clock synchronization as well as a host of protection features.

Part Number	V _{IN} Range (V)	V _{OUT} Min (V)	I _{OUT} (1) Max (A)	Solution (2) Type	Reference Voltage Tolerance	Remote Sense Amplifier	PMBus (I ² C) Capable
LTC3866	4.5 to 38	0.6	40	Single-output Controller	$\pm 0.5\%$	Yes	Yes with companion IC
LTC3855	4.5 to 38	0.6	50 (2 X 25)	Dual-output Controller	$\pm 0.75\%$	Yes	Yes with companion IC
LTC3838	4.5 to 38	0.6	50 (2 X 25)	Dual-output Controller	$\pm 0.67\%$	Yes	Yes with companion IC
LTC3856	4 to 38	0.6	50	Single-output Controller	$\pm 0.75\%$	Yes	Yes with companion IC
LTC3861	3 to 24	0.6	60	Dual-output Controller	$\pm 0.75\%$	Yes	Yes with companion IC
LTC3883	4.5 to 24	0.5	25	Single-output Controller	$\pm 0.5\%$	Yes	Integrated
LTC3880	4.5 to 24	0.6	50 (2 X 25)	Dual-output Controller	$\pm 0.5\%$ Total DC accuracy	Yes	Integrated
LTC3608	4 to 18	0.6	8	Monolithic	$\pm 1\%$	No	Yes with companion IC
LTC3610	4 to 24	0.6	12	Monolithic	$\pm 1\%$	No	Yes with companion IC
LTC3613	4.5 to 24	0.6	15	Monolithic	$\pm 0.67\%$	Yes	Yes with companion IC
LTM4601A	4.5 to 20	0.6	12	μ Module Regulator	$\pm 1.5\%$ Total DC accuracy	Yes	Yes with companion IC
LTM4627	4.5 to 20	0.6	15	μ Module Regulator	$\pm 1.5\%$ Total DC accuracy	Yes	Yes with companion IC
LTM4628	4.5 to 26.5	0.6	16 (2 X 8)	Dual-output μ Module Regulator	$\pm 1.5\%$ Total DC accuracy	Yes	Yes with companion IC
LTM4620	4.5 to 16	0.6	26 (2 X 13)	Dual-output μ Module Regulator	$\pm 1.5\%$ Total DC accuracy	Yes	Yes with companion IC

Note (1) The maximum output current depends on the choice of external components. Regulators can be paralleled to generate more output current.

(2) Controllers need external inductor and MOSFETs; Monolithic regulators need external inductor, and μ Module regulators have integrated inductor, MOSFET, and some capacitors

Step-Down DC/DC Power Solutions for Arria and Cyclone FPGAs

FPGAs targeted for mid-range and lower cost applications require lower currents than the higher current DC/DC μ Module Regulator and controllers. Linear Technology has a host of cost-effective and easy-to-implement monolithic and DC/DC μ Module regulators that are suitable for these applications.

Part Number	V _{IN} Range (V)	V _{OUT} Min (V)	I _{OUT} (1) Max (A)	Solution (2) Type	Power Good and RUN/SHDN Pin for Sequencing
LT3510	3.1 to 25	0.8	2 X 2	Dual Monolithic	Yes
LTC3626	3.6 to 20	0.6	2.5	Monolithic	Yes
LT3507A	4 to 36	0.8	2.7, 2 X 1.8	Triple Monolithic	Yes
LTC3612	2.25 to 5.5	0.6	3	Monolithic	Yes
LTC3614	2.25 to 5.5	0.6	4	Monolithic	Yes
LTM4604A	2.375 to 5.5	0.8	4	μ Module Regulator	Yes
LTM4614	2.375 to 5.5	0.8	2 X 4	Dual μ Module Regulator	Yes
LTC3615	2.25 to 5.5	0.6	2 X 3	Dual Monolithic	Yes
LTC3633	3.6 to 15	0.6	2 X 3	Dual-output controller	Yes
LTC3605A	4 to 20	0.6	5	Monolithic	Yes
LTC3616	2.25 to 5.5	0.6	6	Monolithic	Yes
LTM4608A	2.7 to 5.5	0.6	8	μ Module Regulator	Yes
LTM4616	2.7 to 5.5	0.6	2 X 8	Dual μ Module Regulator	Yes

Note (1) The maximum output current depends on the choice of external components. Regulators can be paralleled to generate more output current.

(2) Controllers need external inductor and MOSFETs; Monolithic regulators need external inductor, and μ Module regulators have integrated inductor, MOSFET, and some capacitors

Low Noise Power Solutions for High-Speed Transceiver Rails

Linear Technology designs and manufactures a broad range of step-down regulators specifically designed to power noise-sensitive power rails for high-speed transceivers. The solutions used for these applications are low dropout linear regulators and integrated DC/DC μ Module regulators.

Part Number	V_{IN} Range (V)	V_{OUT} Min (V)	$I_{OUT(1)}$ Max (A)	Solution (2) Type	Power Good and RUN/SHDN Pin for Sequencing
LT3022	0.9 to 10	0.2	1	Linear Regulator	SHDN pin
LTC3025-1	0.9 to 5.5	0.4	0.5	Linear Regulator	SHDN pin
LT3080	1.2 to 36	0	1.1	Linear Regulator	With simple external FET
LTC3026	1.14 to 5.5	0.4	1.5	Linear Regulator	Yes
LT3083	1.2 to 23	0	3	Linear Regulator	With simple external FET
LTM4604A	2.375 to 5.5	0.8	4	μ Module Regulator	Yes
LTM4614	2.375 to 5.5	0.8	2 X 4	Dual μ Module Regulator	Yes
LT3070	0.95 to 3.0	0.8	5	Linear Regulator	Yes
LT3071	0.95 to 3.0	0.8	5	Linear Regulator	Yes
LTM4608A	2.7 to 5.5	0.6	8	μ Module Regulator	Yes
LTM4616	2.7 to 5.5	0.6	2 X 8	μ Module Regulator	Yes

Note (1) The maximum output current depends on the choice of external components. Regulators can be paralleled to generate more output current.

(2) Controllers need external inductor and MOSFETs; Monolithic regulators need external inductor, and μ Module regulators have integrated inductor, MOSFET, and some capacitors

DDR Memory/ Bus Termination Regulators

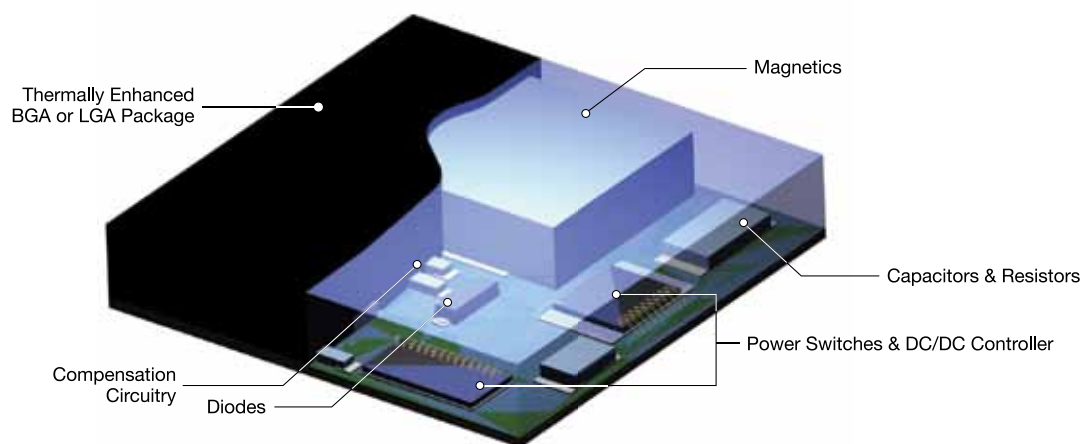
DDR memory or bus termination regulators have to be able to sink and source current. Linear Technology provides stand-alone regulators that can source and sink currents as well as integrated solutions that can power the VDDQ rails and the VTT reference voltage.

Part Number	V_{IN} Range (V)	V_{OUT} Min (V)	$I_{OUT(1)}$ Max (A)	Solution (2) Type	Integrated VTTREF
LTC3614	2.25 to 5.5	0.6	± 3	Monolithic	No
LTC3618	2.25 to 5.5	0.5	$\pm 3 + 3$	Monolithic	Yes
LTC3634	3.6 to 15	0.6	$\pm 3 + 3$	Monolithic	Yes
LTC3617	2.25 to 5.5	0.5	± 6	Monolithic	Yes
LTC3876	4.5 to 38	0.5	± 20	Controller	Yes

Note (1) The maximum output current depends on the choice of external components. Regulators can be paralleled to generate more output current.

(2) Controllers need external inductor and MOSFETs; Monolithic regulators need external inductor, and μ Module regulators have integrated inductor, MOSFET, and some capacitors

μ Module Power Products



Digital Power

PMBus/SMBus/I²C™ Power Control

Managing multi-rail FPGA systems and achieving very tight core power specifications can be a challenge for today's system architects. Digital Power Management solutions from Linear Technology are used on Altera® Development Boards and Kits to greatly simplify tasks, such as sequencing, monitoring, margining, supervision, and other key functions and requirements for Altera FPGA systems.

Linear Technology Digital Power Solutions offer very tight accuracy, $\pm 0.25\%$, allowing Altera customers plenty of room to achieve the tolerance specifications for the core power.



Digital Power Management Companion ICs can be used in conjunction with any power supply to add ± 0.25 percent measurement accuracy to increase system efficiency of any Altera-based system.

LTC2970 – Dual I²C Power Supply Monitor and Margining Controller

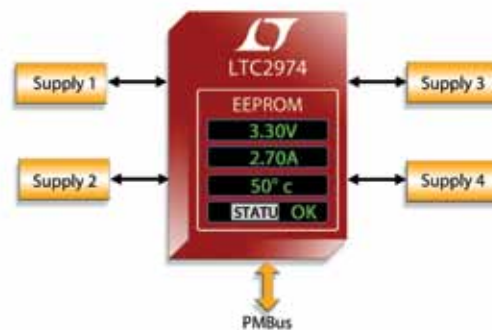
Key Features

- Less than $\pm 0.5\%$ total unadjusted error 14-bit $\Delta\Sigma$ ADC with on-chip reference
- Dual, 8-bit DACs with 1x voltage buffers
- Linear, voltage servo adjusts supply voltages by ramping DAC outputs up/down
- I²C™ Bus interface (SMBus compatible)
- Extensive, user configurable fault monitoring
- On-chip temperature sensor
- Available in 24-lead 4 mm x 5 mm QFN package

LTC2974 – Quad Digital Power Supply Manager with EEPROM

Key Features

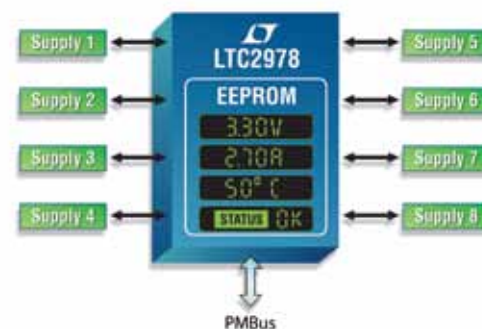
- I²C/SMBus serial interface
- PMBus compliant command set
- Configuration EEPROM with CRC
- Black box fault logging to internal EEPROM
- Differential input, 16-bit $\Delta\Sigma$ ADC with less than $\pm 0.25\%$ of total unadjusted error
- Four voltage servos precisely adjust supply voltages using 10-bit DACs with soft-connect
- Monitors four output voltages, four output currents and one input voltage
- Monitors four external temperature sensors and internal die temperature
- 4-channel sequencer, time based or tracking
- Programmable watchdog timer
- Four OV/UV V_{OUT} and one V_{IN} supervisor
- Four overcurrent/undercurrent supervisors
- Supports multichannel fault management
- Operates autonomously without additional software
- LTC2974 can be powered from 3.3 V or 4.5 V to 15 V
- Available in 64-lead 9 mm x 9 mm QFN package



LTC2978 – Octal Digital Power Supply Manager with EEPROM

Key Features

- I²C/SMBus serial interface
- PMBus compliant command set
- Configuration EEPROM with CRC
- Black box fault logging to internal EEPROM
- Differential input, 16-bit $\Delta\Sigma$ ADC with less than $\pm 0.25\%$ of total unadjusted error
- Eight voltage servos precisely adjust output voltages using eight 10-bit DACs with soft-connect
- Monitors eight output voltages and one input voltage and internal die temperature
- 8-channel sequencer
- Programmable watchdog timer
- Eight UV/OV V_{OUT} and one V_{IN} supervisor
- Supports multichannel fault management
- Operates autonomously without additional software
- LTC2978 can be powered from 3.3 V or 4.5 V to 15 V
- Available in 64-pin 9 mm x 9 mm QFN package



Used on the Transceiver Signal Integrity Development Kit, Stratix V GX/GT Edition

For applications that are space limited or for customers who want a fully integrated power supply with digital functionality, the LTC3880 offers an ideal solution.

LTC3880 – Dual Output PolyPhase Step-Down DC/DC Controller with Digital Power System Management

Key Features

- Used on the Stratix V FPGA Development Kit, Arria V FPGA Development Kit, and Arria V FPGA Starter Kit
- PMBus/I²C compliant serial interface
 - Telemetry read back includes V_{IN} , I_{IN} , V_{OUT1} , I_{OUT1} , temperature and faults
 - Programmable voltage, current limit, digital soft-start/stop, sequencing, margining, OV/UV and frequency synchronization (250 kHz to 1 MHz)
- $\pm 0.5\%$ output voltage accuracy over temperature
- Integrated 16-bit ADC
- Internal EEPROM and fault logging

Power Conversion

- Wide V_{IN} range: 4.5 V to 24 V
- V_{OUT} range: 0.5V to 5.5V
- Analog current mode control loop
- Supports power-up into prebiased load
- Accurate PolyPhase[®] current sharing for up to six phases
- Available in 40-pin (6 mm x 6 mm) QFN package



Used on the Stratix V GX FPGA Development Kit, Arria V GX FPGA Development Kit, Arria V GT FPGA Development Kit, and the Arria V GX Starter Kit.

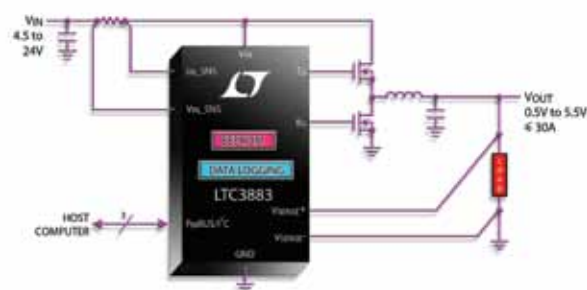
LTC3883/LTC3883-1- Single Phase Step-Down DC/DC Controller with Digital Power System Management

Key Features

- PMBus/I²C Compliant Serial Interface
 - Telemetry read back includes V_{IN} , I_{IN} , V_{OUT} , I_{OUT} , temperature and faults
 - Programmable voltage, current limit, digital soft-start/stop, sequencing, margining, OV/UV/OC and frequency synchronization (250 kHz to 1 MHz)
- $\pm 0.5\%$ output voltage accuracy over temperature
- Integrated 16-bit ADC and 12-bit DAC
- Integrated high side current sense amplifier
- Internal EEPROM and fault logging
- Integrated N-channel MOSFET gate drivers

Power Conversion

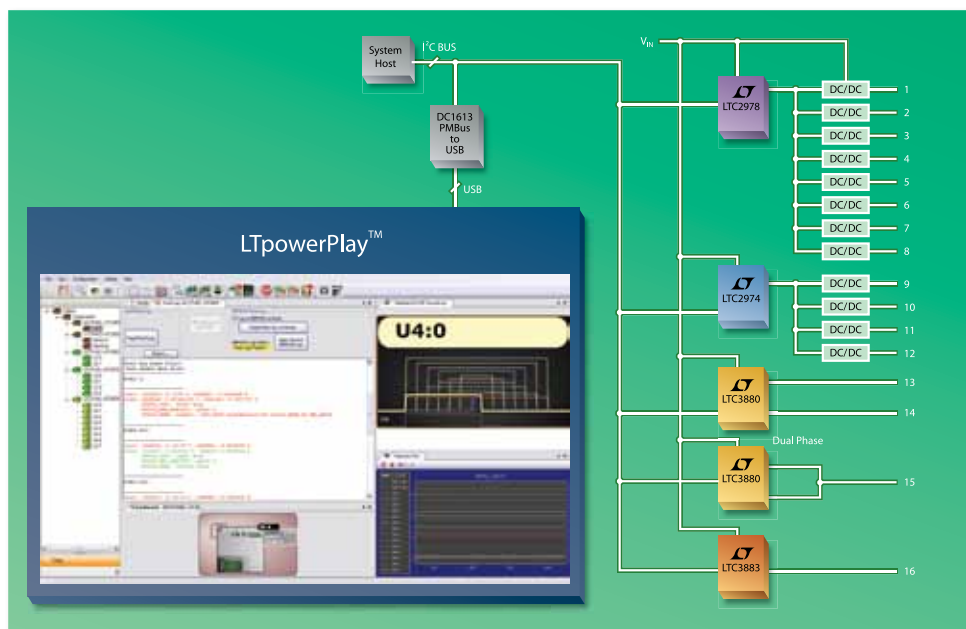
- Wide V_{IN} range: 4.5 V to 24 V
- V_{OUT} range: 0.5V to 5.5V
- Analog current mode control loop
- Accurate PolyPhase[®] current sharing for up to six phases
- Auto calibration of inductor DCR
- Available in 32-lead (5 mm x 5 mm) QFN package



Digital Power Management Tools

Users can harness the powerful GUI to configure and interrogate the digital power management IC, user settings, and fault log. This tool provides rapid troubleshooting and debug capabilities during power system design, development, production, and failure analysis. Once configured, these devices provide the essential system management functions without host intervention and do not require writing a single line of code.

Digital Interface Power Management Block Diagram



System Monitors

Energy efficiency and power consumption are critical factors in today's electronic designs. Measuring power consumption, as well as the point sources for heat can increase overall system health and reliability.

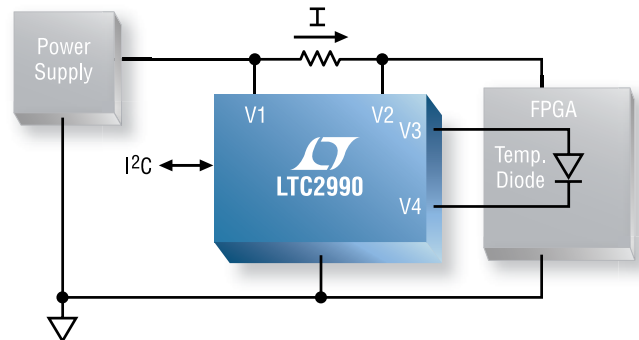
Linear Technology's family of power and temperature monitors measures voltage and current, as well as internal and external temperature, and can either digitize this information with an on-chip high resolution analog-to-digital-converter (ADC), or provide analog outputs with alerts for a truly comprehensive monitoring solution.

I²C Temperature, Voltage, and Current Monitor

The LTC2990, a temperature voltage and current monitor for 3 V to 5.5 V systems, integrates a 14-bit ADC, 10ppm/°C reference and I²C interface to provide submillivolt voltage resolution, as well as accuracy of ±1°C internally and ±0.5°C remotely when making temperature measurements.

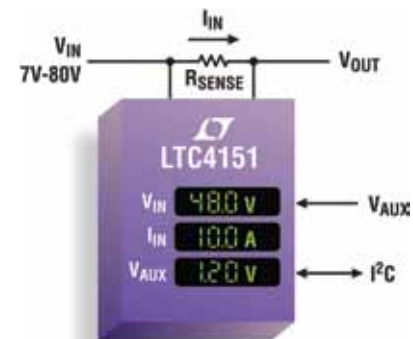
Measures:

- External temperature
- Internal temperature
- Single-ended voltage
- Differential voltage
- Rail-to-rail current
- Internal V_{CC}



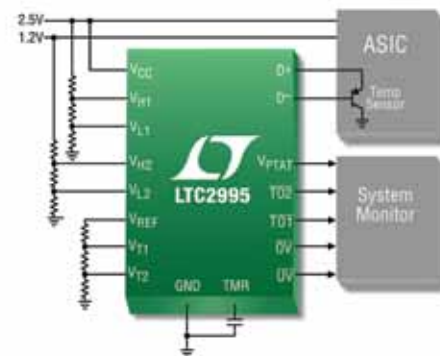
I²C Current and Voltage Monitor

The LTC4151 is a high-side power monitor that operates over a wide voltage range of 7 V to 80 V. In default operation mode, the onboard 12-bit ADC continuously measures high-side current, input voltage, and an external voltage. Data is reported through the I²C interface when polled by a host.



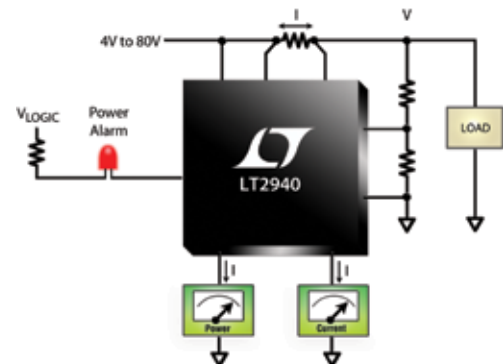
Temperature Sensor and Dual Voltage Monitor with Temperature and Voltage Alerts

The LTC2995 is an analog temperature monitor for low-voltage systems which provides a 3.5ms-updated voltage proportional to absolute temperature (V_{PTAT}) so that systems can quickly react with subdegree accuracy when making internal or external temperature measurements. The LTC2995 provides equally impressive high voltage monitoring capabilities for two rails, as well as temperature and voltage alerts, for a truly comprehensive thermal monitoring solution. No code is required to configure these tiny devices.



Analog Power and Current Monitor

The LT2940 is a power and current monitor for 4 V to 80 V systems that brings together the necessary circuits to accurately measure, monitor, and control power. Unlike traditional power monitors that rely on data converters and multiplying registers to calculate power, the LT2940 uses a true four-quadrant analog multiplier for continuous results with 500 kHz bandwidth, ideal for use in many pulsed, chopped AC, and control applications.



High-Speed ADCs and Signal Chain uModule Solutions

Linear Technology's extensive high-speed ADC portfolio includes pin-compatible, high-performance multichannel ADCs in resolutions of 10-bit, 12-bit, 14-bit, and 16-bit sampling from 1 Msps up to 310 Msps. Linear Technology offers single, dual, quad, and octal ADCs, with flexible serial or parallel interfaces, and lowest power consumption without compromising AC performance. Many of these ADCs offer unique features for reducing digital feedback in situations where even good layout practice might fail.

Several design examples from Linear Technology illustrate fully functioning hardware demonstrations, complete with demo code, interfacing the LTC2158 ADC (parallel LVDS interface), and the LTM9011 low power octal ADC (serial LVDS interface) families to Altera FPGAs. Target applications include communications, cellular base stations, software-defined radios, medical imaging, high definition video, and test and measurement equipment. The LTC2158 and LTM9011 are supported with demo boards from Linear Technology:

- DC1933: Linear Technology FMC to HSMC Adapter Board for interfacing Linear Technology DC1564 and DC1565 ADC demo boards to Altera HSMC connector.
- LTC2158: Linear Technology demo board part # DC1564.
- LTC2153: Linear Technology demo board part # DC1565.
- LTM9011: Linear Technology demo board part # DC1751 for DC coupled inputs or DC1884 for AC coupled inputs.
 - Requires Samtec FMC to HSMC Adapter (Request from Linear Technology Sales representative).
- Please contact your local Arrow or Linear Technology sales representative for ordering information.

DC1933 FMC to HSMC Adapter

The DC1933 enables engineers to quickly interface Linear Technology's family of LTC2158 dual and single high-speed ADCs, with DDR LVDS outputs directly to an appropriate Altera development board that utilizes high-speed mezzanine card (HSMC) connectors. Contact your local Arrow salesperson for ordering information.



14-Bit/12-Bit 170 Msps to 310 Msps Single and Dual ADC Family

The LTC2153 and LTC2158 are 1.8 V single and dual, high IF sampling 14-/12-bit, 170 Msps to 310 Msps ADC families maintain excellent spurious-free dynamic range (SFDR) performance at input frequencies up to 900 MHz. These ADCs are designed specifically to meet the needs of today's communications systems, where high undersampling capability saves cost by eliminating downconversion stages.

The LTC2158 is a dual 310 Msps ADC, ideal for I/Q sampling applications, and offers a short pipeline latency of just five clock cycles for closed loop systems. The single version, LTC2153, is ideal for IF sampling architectures. The easy to drive input range saves power in the ADC driver, and improves performance at high input frequencies.

	170Msps	210Msps	250Msps	310Msps
14-Bit	2155-14	2156-14	2157-14	2158-14
	2150-14	2151-14	2152-14	2153-14
12-Bit	2155-12	2156-12	2157-12	2158-12
	2150-12	2151-12	2152-12	2153-12
Power Consumption	284mW/Ch	308mW/Ch	325mW/Ch	362mW/Ch

6x6 QFN

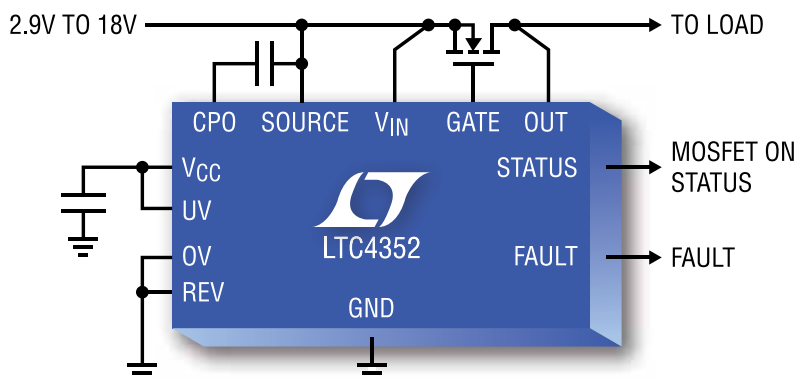
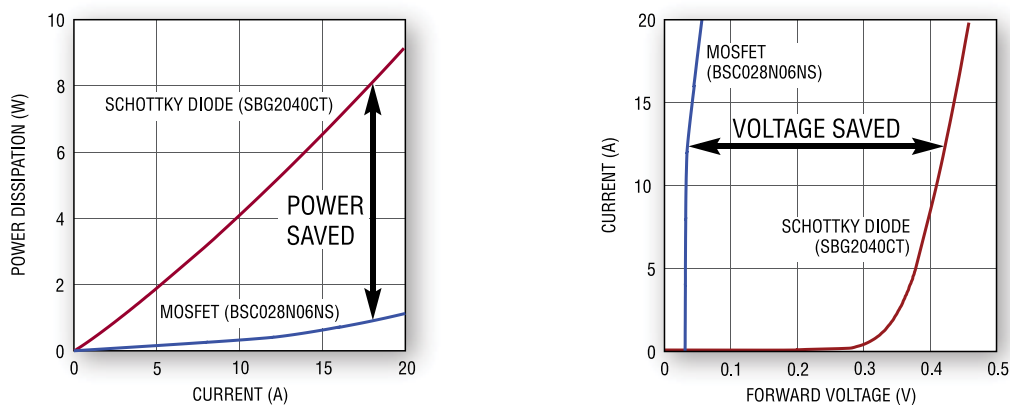
1.8V Single ADCs
DDR LVDS Outputs

9x9 QFN

1.8V Dual ADCs
DDR LVDS Outputs

Ideal Diode Controllers

Ideal diode controllers offer a simple low-loss replacement to power Schottky diodes in high current applications, in addition to reducing voltage drop in low voltage applications. Linear Technology's family of ideal diodes uses N-channel or P-channel MOSFETs to perform the function of a low forward voltage diode. This provides a more efficient solution and preserves precious board space by reducing the need for heat sinking. Linear control of the forward voltage drop across the MOSFET ensures smooth current delivery without oscillation, even under light loads. If a power source fails or is shorted, a fast turn-off minimizes reverse current transients. Ideal diode controllers are perfect for ORing supplies together to provide redundancy in the event of input failure or hard short. Additionally, ideal diodes can be used for output supply hold-up during brief interruptions of power input.



Linear Technology N-Channel Ideal Diodes

Part Number	ORing Range	Function	Package
LTC4354	-4.5 V to -80 V	Dual Ideal Diode with monitoring	3 x 2 DFN-8, SO-8
LTC4355	9 V to 80 V	Dual Ideal Diode with monitoring	4 x 3 DFN-14, SO-16, MSOP-16
LTC4357	9 V to 80 V	Single Ideal Diode	2 x 3 DFN-6, MSOP-8
LTC4358	9 V to 26.5 V	Single Ideal Diode with internal 5A FET	4 x 3 DFN-14, TSSOP-16
LTC4352	0 V to 18 V	Single Ideal Diode with monitoring	3 x 3 DFN-12, MSOP-12
LTC4353	0 V to 18 V	Dual Ideal Diode with enable inputs	4 x 3 DFN-16, MSOP-16
LTC4370	0 V to 18 V	Two Supply Diode-OR current balancing controller	4 x 3 DFN-16, MSOP-16
LTC4227	2.9 V to 18 V	Dual Ideal Diode and single hot swap controller	4 x 5 QFN-20, SSOP-16
LTC4228	2.9 V to 18 V	Dual Ideal Diode and hot swap controller	4 x 5 QFN-28, SSOP-28
LTC4359	4 V to 80 V	Single Ideal Diode, reverse-current protection	2 x 3 DFN-6, MSOP-8
LTC4364	4 V to 80 V	Surge Stopper with Ideal Diode, reverse current protection	4 x 3 DFN-14, MSOP-16, SO-16

Interface

Linear Technology's Interface products encompass a wide variety of industry-standard communication devices, including RS485 transceivers that enable long-range equipment communication and I²C/SMBus digital interface devices that improve inter-chip communication. Our RS485, RS232, multiprotocol and control area network (CAN) transceivers easily support today's fastest data rates, high node count, and low voltage supplies, while high electrostatic discharge (ESD), failsafe, fault-protection and galvanic isolation increase system reliability. Process Field Bus (PROFIBUS) compatible devices easily meet the robust requirements of fieldbus solutions in factory and process automation environments. The I²C/SMBus bus buffers, multiplexers, rise time accelerators and isolators help digital systems meet specific I²C bus requirements, such as maximum bus capacitance and rise times, using unique selectable rise time acceleration strength and stuck bus recovery features.

Linear Technology RS232 Transceivers

Part Number	Number of Drivers	Number of Receivers	Supply (V)	Data Rate (kbps)	ESD (kV)	Driver Disable	Shutdown Mode	Temp. Grade	Packages
2500V_{RMS} Isolation									
LTM2882-3/-5	2	2	3.3/5	1000	±10	▪	▪	C, I, H, MP	LGA-32, BGA-32
General Purpose									
LTC2801	1	1	1.8 to 5	250	±10	▪	▪	C, I	5 x 3 DFN-12
LTC2802	1	1	1.8 to 5	1000	±10	▪	▪	C, I	5 x 3 DFN-12

Linear Technology RS485/RS422 Transceivers

Part Number	Supply (V)	Max Data Rate (Bits)	#Dr	#Rec	Duplex	SHDN	ESD (kV)	Failsafe	Comments	Temp. Grade	Packages
2500V_{RMS} Isolation											
LTM2881-3/-5	3.3/5	20 M	1	1	Full	Yes	±15	Type 2	No external components required. Isolated 1W DC/DC converter, switchable, 120Ω termination, UL file #E151738	C, I, H, MP	15 x 11.25 x 2.8 LGA-32, 15 x 11.25 x 3.4 BGA-32
LTC1535	5	250 k	1	1	Full	No	±8	Type 2	UL file #E151738	C, I	SO(W)-28
±60V Fault Protection											
LTC2862-1/-2	3 to 5.5	20 M/250 k	1	1	Half	Yes	±15	Type 2	Pin compatible with LT1785A	C, I, H	SO-8, 3 x 3 DFN-8
LTC2863-1/-2	3 to 5.5	20 M/250 k	1	1	Full	No	±15	Type 2		C, I, H	SO-8, 3 x 3 DFN-8
LTC2864-1/-2	3 to 5.5	20 M/250 k	1	1	Full	Yes	±15	Type 2	Pin compatible with LT1719A	C, I, H	SO-14, 3 x 3 DFN-10
LTC2865	3 to 5.5	20 M/250 k	1	1	Full	Yes	±15	Type 2	Logic supply pin, SLO pin	C, I, H	MSOP-12, 4 x 3, DFN-12
Integrated Switchable 120Ω Termination											
LTC2854	3.3	20 M	1	1	Half	Yes	±25	Type 2	±25 kV	C, I, H	3 x 3 DFN-10
LTC2859	5	20 M/250 k	1	1	Half	Yes	±15	Type 2	Driver slew rate control	C, I, H	3 x 3 DFN-10
LTC2855	3.3	20 M	1	1	Full	Yes	±15	Type 2		C, I, H	4 x 3, DFN-12, SSOP-16
LTC2861	5	20 M/250 k	1	1	Full	Yes	±15	Type 2	Driver slew rate control	C, I	4 x 3, DFN-12, SSOP-16
RS232/RS485 Multiprotocol											
LTC2870	3 to 5.5	20 M/500 k	1	1	Both	Yes	±26	Type 2	Two RS232 transceivers	C, I	4 x 5, QFN-28, TSSOP-28
LTC2871	3 to 5.5	20 M/500 k	1	1	Both	Yes	±16	Type 2	Two RS232 transceivers	C, I	5 x 7, QFN-38, TSSOP-38
LTC2872	3 to 5.5	20 M/500 k	2	2	Both	Yes	±16	Type 2	Four RS232 transceivers	C, I	5 x 7, QFN-38

Type 1 = Open; Type 2 = Idle, Open, Short

Micron® Memory Makes It Easy to Design with Altera® FPGAs

Collaborating to develop and deliver the DRAM, NAND, and NOR solutions that accelerate our customers' business

- Innovative technologies, from leading-edge to legacy, to meet a wide variety of customer needs
- Product reliability and compatibility that optimize customers' time to market and design costs

For details, design guides, and power calculators, visit micron.com

	Micron DRAM	DDR3 SDRAM	DDR2 SDRAM	DDR SDRAM	RLDRAM® 3	RLDRAM® 2	LPDDR2
	Family	MT41	MT47	MT46	MT44	MT49	MT42
	Voltage	1.35V, 1.5V	1.5V	2.5V	1.35V	1.8V	1.2V
	Clock Rate	400–1066 MHz	200–533 MHz	166–200 MHz	800–1066 MHz	300–533 MHz	400 MHz
	Width	x8, x16	x8, x16	x8, x16	x18, x36	x18, x36	x16, x32
	Density	1Gb, 2Gb, 4Gb	1Gb, 2Gb	256Mb, 512Mb	576Mb, 1Gb	288Mb, 576Mb	512Mb, 2Gb, 4Gb
	Altera Stratix® FPGAs						
	Stratix V (1)	2133 Mb/s	1066 Mb/s		1600 Mb/s	1066 Mb/s	
		1066 MHz	533 MHz		800 MHz	533 MHz	
	Stratix IV	1066 Mb/s	800 Mb/s	400 Mb/s		1066 Mb/s	
		533 MHz	400 MHz	200 MHz		533 MHz	
	Stratix III	1066 Mb/s	800 Mb/s	400 Mb/s		800 Mb/s	
		533 MHz	400 MHz	200 MHz		400 MHz	
	Stratix II and Stratix II GX		666 Mb/s	400 Mb/s		600 Mb/s	
			333 MHz	200 MHz		300 MHz	
	Stratix and Stratix GX			400 Mb/s		400 Mb/s	
				200 MHz		200 MHz	
	Altera Arria® FPGAs						
	Arria V (1)	1333 Mb/s	800 Mb/s			800 Mb/s	800 Mb/s
		666 MHz	400 MHz			400 MHz	400 MHz
	Arria II GZ	800 Mb/s	666 Mb/s			700 Mb/s	
		400 MHz	333 MHz			350 MHz	
	Arria II GX	800 Mb/s	666 Mb/s	400 Mb/s			
		400 MHz	333 MHz	200 MHz			
	Arria GX		466 Mb/s	400 Mb/s			
			200 MHz	200 MHz			
	Altera Cyclone® FPGAs						
	Cyclone V (1)	800 Mb/s	800 Mb/s				666 Mb/s
		400 MHz	400 MHz				333 MHz
	Cyclone IV		400 Mb/s	333 Mb/s			
			200 MHz	167 MHz			
	Cyclone III LS		333 Mb/s	300 Mb/s			
			167 MHz	150 MHz			
	Cyclone III		400 Mb/s	334 Mb/s			
			200 MHz	167 MHz			
	Cyclone II		333 Mb/s	333 Mb/s		250 MHz	
			167 MHz	167 MHz			

Please verify exact configuration and specification with your Altera or Micron representative.
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Silicon Labs Clocks and Oscillators — Ideal for Altera FPGAs

- Used on all 28nm Altera development kits
- Clock generators generate any combination of output frequencies w/ low jitter: <1 ps rms
- Jitter cleaners generate any output frequency from any input frequency w/ ultra-low jitter: <0.3 ps rms
- Clock buffers provide low jitter, low skew differential/CMOS clock distribution
- I2C programmable XO/VCXOs provide any-frequency synthesis
- High PSRR minimizes impact of board-level noise on clock jitter
- Factory-customized clocks/oscillators available at no charge and with short <2 week lead times
 - Request a custom clock/oscillator: www.silabs.com/custom-timing
- View Altera reference designs at: www.silabs.com/TimingRD
- Ideal for 10G/40G/100GbE, OTN, wireless infrastructure, broadcast video, servers, storage, test/meas, mil/aero
- Visit www.silabs.com/timing for more information

Low Jitter XO/VCXOs							
Silicon Labs Device	Description	Clock In/Out	RMS Jitter	Control	Stratix Series	Cyclone Series	Arria Series
Si57x	Any-frequency I2C prog. XO/VCXO	0/1	0.3 ps	I2C	X	X	X
Si53x/Si55x	Programmable XO/VCXO, 10MHz-1.4GHz	0/1	0.3 ps	Pin	X	X	X
Si51x	Programmable XO, 100kHz-250MHz	0/1	1.0 ps	Pin	X	X	X
Low Jitter Clock Generators							
Silicon Labs Device	Description	Clock In/Out	RMS Jitter	Control	Stratix Series	Cyclone Series	Arria Series
Si5338	Any-frequency LVPECL/LVDS/CMOS clk	1/4	1 ps	I2C	X	X	X
Si5335	Any-frequency LVPECL/LVDS/CMOS clk	1/4	1 ps	Pin	X	X	X
Si52147	PCIe Gen 1/2/3 clk	1/9	1 ps	I2C	X	X	X
Si5356	Any-frequency CMOS clk	1/8	2 ps	I2C		X	X
Si5355	Any-frequency CMOS clk	1/8	2 ps	Pin		X	X
Si5351	Any-frequency CMOS clk	2/8	3.5 ps	I2C		X	X
Si5350	Any-frequency CMOS clk	2/8	3.5 ps	Pin		X	X
Low Jitter Clock Buffers/Level Translators							
Silicon Labs Device	Description	Clock In/Out	RMS Jitter	Control	Stratix Series	Cyclone Series	Arria Series
Si5330A	Low jitter, low skew LVPECL clk buffer	1/4	0.15 ps	Pin	X	X	X
Si5330B	Low jitter, low skew LVDS clk buffer	1/4	0.15 ps	Pin	X	X	X
Si5330F	Low jitter, low skew CMOS clk buffer	1/8	0.15 ps	Pin		X	X
Si53159	PCIe Gen 1/2/3 HCSL clk buffer	1/9	1.0 ps	Pin	X	X	X
Ultra Low Jitter Clock Generators / Jitter Cleaners							
Silicon Labs Device	Description	Clock In/Out	RMS Jitter	Control	Stratix Series	Cyclone Series	Arria Series
Si5374	4-DSPLL any-frequency jitter cleaning clk	8/8	0.3 ps	I2C	X	X	X
Si5368	1-DSPLL any-frequency jitter cleaning clk	4/5	0.3 ps	I2C/SPI	X	X	X
Si5326	1-DSPLL any-frequency jitter cleaning clk	2/2	0.3 ps	I2C/SPI	X	X	X
Si5319	1-DSPLL any-frequency jitter cleaning clk	1/1	0.3 ps	I2C/SPI	X	X	X

FPGA-BASED EVALUATION KITS & DEVELOPMENT BOARDS

Samtec has assisted in the development of many Semiconductor Application Designs with most major semiconductor companies. These designs are based on Samtec Q Strip® and Q Pairs® product families.

ALTERA HSMC (High Speed Mezzanine Card)

The Altera® HSMC defines the electrical and mechanical properties of a high speed mezzanine card interface. This specification standardizes the way mezzanine cards communicate and connect to host boards. By taking advantage of the high-performance I/O features in today's FPGAs, manufacturers can build a single mezzanine card that interfaces to multiple host boards. They can also build a host board that can leverage many different, pre-built, mezzanine cards.

High Speed Mezzanine Card Connectors & Altera Development Kits

The HSMC connectors defined by the specification are based on the 0.5mm pitch Q Strip® (QSH/QTH Series) high speed board-to-board connectors from Samtec. **Many Altera development kits feature host boards with the HSMC connectors. The host board connector is Samtec part number ASP-122953-01 (a modified QSH Series). The mezzanine card connector is Samtec part number ASP-122952-01 (a modified QTH Series).**

These host boards are used by FPGA designers to prototype hardware

designs. The benefit to customers is two-fold. First, a variety of mezzanine cards are being created by Altera and other hardware providers. Second, customers can create their own HSMC solutions and then interface those custom mezzanine cards to several different FPGA host boards. For a complete listing of Altera daughter cards to expand the functionality of other development platforms (including those utilizing the HSMC Specification) go to: www.altera.com/products/devkits/kit-daughter_boards.jsp

Altera Arria II GX FPGA Development Kit

Arria® II GX delivers a complete system-level design environment that includes Samtec's Q Strip® connectors (QSH/QTH Series).

Host board connector is Samtec part number ASP-122953-01.
Mezzanine card connector is Samtec part number ASP-122952-01.

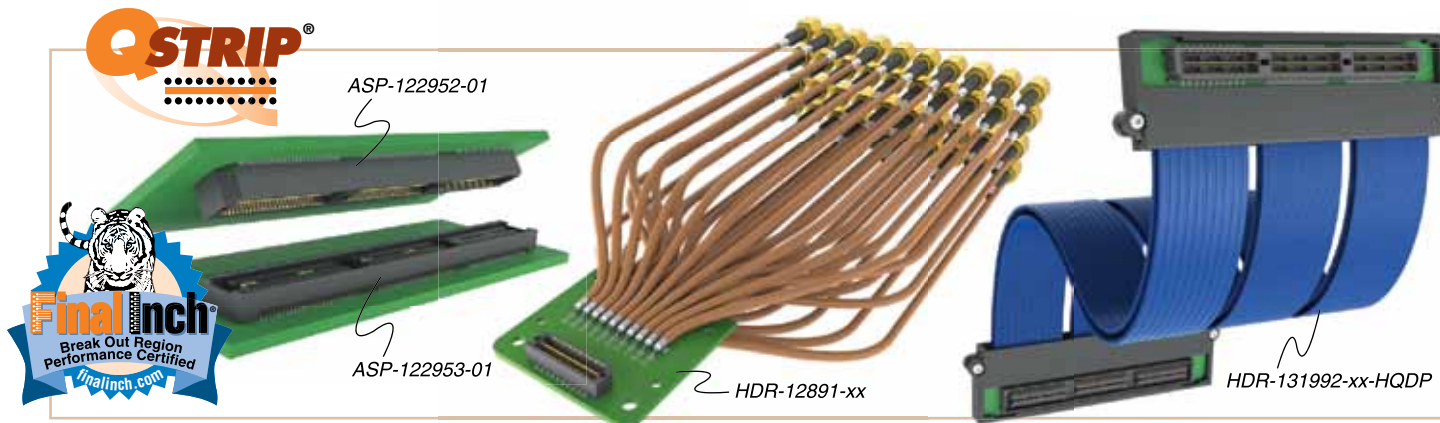
Altera Stratix IV GX FPGA Development Kit

Stratix® IV GX features a -C2 (fast) speed grade production silicon device and includes Samtec Q Strip® connectors (QSH/QTH Series).

Host board connector is Samtec part number ASP-122953-01.
Mezzanine card connector is Samtec part number ASP-122952-01.



Images courtesy of Altera®



For more information visit www.samtec.com/altera

Development boards not available through Samtec. For information on development boards and mezzanine cards by Altera® visit www.altera.com



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