ALTERA DEVELOPMENT TOOLS

Brought to you by Arrow Electronics

2010/2011

ALTERA®

LINEAR TECHNOLOGY

www.arrow.com/alteratools | **866-902-9110**

Our strong partnership increases your productivity

Arrow Electronics, Altera, and Linear Technology have been successfully collaborating globally to bring customers verified and optimized power and analog solutions for Altera's range of programmable devices.

The development tools in this brochure allow you to evaluate and benefit from Altera's Technology Leadership. Arrow Electronics can facilitate your new Altera design by providing you with the tools to help you select the right Altera development tools for your requirements.

Assisting you at each stage of your product's development, Arrow offers factory certified FAEs supporting Altera and Linear Technology that work across a broad range of applications. Our world-class design services, training, and tools keep your projects on track and accelerate your time-to-market.

You can buy any of the development tools listed in this brochure from www.arrow.com/alteratools.

 20100189 – 09/10

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ALTERA DEVELOPMENT TOOLS

Brought to you by Arrow Electronics

These world-class tools from Altera are complemented by industry-leading power and analog solutions from Linear Technology that are fully supported by the technical support, services, and expertise of Arrow Electronics. To ensure performance the Linear Technology components found on Altera development boards are proven for interoperability by the Altera board applications teams. With your needs in mind, Arrow's Field Applications Engineers (FAEs) are factory trained by Altera and Linear Technology to provide real-world technical solutions, and most have at least 10 years of design experience.

Both new and experienced designers will be able to leverage the capabilities of the featured development boards to accelerate system design. These kits provide test and debug platforms for RTL generation while you start developing your application software. Reference designs, cables, and programming hardware are included to ensure that you have the ideal FPGA or CPLD design environment. Linear Technology has worked closely with Altera to understand power, mixed signal (ADC/DAC), and other analog requirements of Altera products and systems, to deliver products you can trust.

The Kits and Solutions That Get You to Market Fast

General-Purpose Development Kits

Start your design now with this portfolio of low-cost and easy-to-use development kits, whether you're designing with the MAX II family of CPLDs or an FPGA from the Cyclone or Stratix series.

Embedded Processing Solutions

Altera Nios II processor-based development kits are the perfect platform to evaluate Nios II embedded processors. The kits contain a feature-rich FPGA-based development board, extensive reference designs, and complete documentation. In addition, numerous partners offer companion boards that enable development for specific Nios II embedded applications.

DSP Development Kits

The DSP kits include all of the critical design resources you'll need to start your designs for video and image, wireless, and other complex digital communications. In addition, you can implement entire subsystems in hardware within hours using the hardware evaluation feature of our DSP IP.

I/O Interconnect Development Kits

Altera offers solutions for many high-speed interfaces. The I/O interconnect development kits allow you to evaluate embedded transceivers in a wide variety of applications such as PCI Express, Gigabit Ethernet, XAUI, Fibre Channel, Serial RapidIO®, HD-SDI, and other major standards. Solutions are available for memory, interfaces, and peripherals on the standard PCI card form factor. You can also use the development kits and hardware IP evaluation to assess a variety of high-speed interconnect IP cores as well as to rapidly prototype and debug in a realtime environment.

HSMC Cards

Altera has developed a specification for the interface between development kit host boards and daughtercards. This High Speed Mezzanine Card (HSMC) specification ensures that daughtercards can be used with different host platforms. The connector itself is a slight modification of the SAMTEC QTH/QSH family. Some of Altera's development kits include one or more HSMCs, and a variety of different daughtercards are available from partners. Of course, it is also common practice for users to create their own HSMC interface-compatible daughtercards.

Keep Your Board Current

The Board Update Portal gives you access to useful information on www.altera.com, including the page that contains updated software and design examples. Many Altera development kits include a Board Update Portal design example to facilitate easy development kiet software and board flash memory updates. To access the Board Update Portal you will need a computer and access to a working DHCP-enabled Ethernet connection.

Design Software

Quartus II software is the number-one design software in design software in performance and productivity for CPLD, FPGA, and HardCopy® ASIC designs. Used in combination with a broad portfolio of design-ready intellectual property (IP) cores, Quartus II development software gives you unmatched levels of performance and productivity in your designs. Quartus II software is easy to use and enables you to get products to market faster.

Why Wait? Purchase your Altera development tool now!

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 PCI Express, CPRI, SDI, Gigabit Ethernet, 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 our 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 its class
- Integrated transceiver I/Os and PCI Express hard IP
- High-performance digital signal processing (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 busses 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.

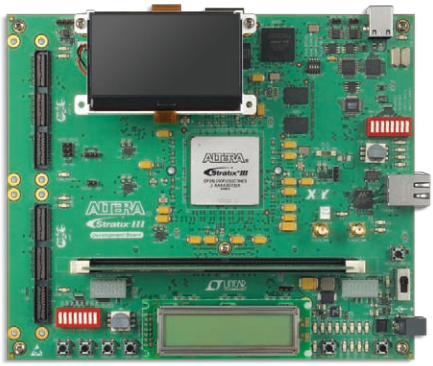
Key features

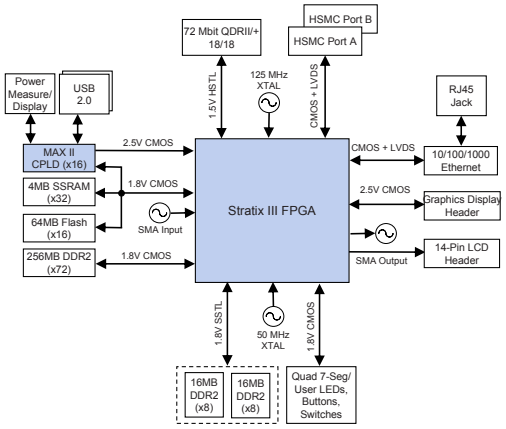
- Low cost
- Zero-power options
- Ultra-small packages
- Instant-on and non-volatile
- In-system programmability (ISP)
- Free Quartus II Web Edition software support
- Free ModelSim-Altera Web Edition software support

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

Altera Stratix III FPGA Development Kit

The Stratix III FPGA Development Kit delivers a complete environment for the development and testing of designs requiring high-performance and high-density devices.





Development Kit Contents

Altera device
- Stratix III EP3SL150F1152 high-performance FPGA

Configuration
- MAX II flash passive serial configuration circuit
- On-board USB-Blaster™ using Quartus II Programmer and JTAG download port

General user input/output
- Push buttons, DIP switches and LEDs
- 128 x 64 dot pixels graphics display and LCD (16 character x 2 line)

Memory devices
- 128-MB DDR2 SDRAM DIMM
- 16-MB DDR2 SDRAM devices (individually addressable)
- 36-Mb QDR II SRAM device
- 4-MB PSRAM
- 64-MB flash memory

Components and interfaces
- USB 2.0
- 10/100/1000 Ethernet
- Two HSMC interfaces–Samtec mate ASP-122952-01

Quartus II design software included with kit
- Quartus II Development Kit Edition Software, one-year license

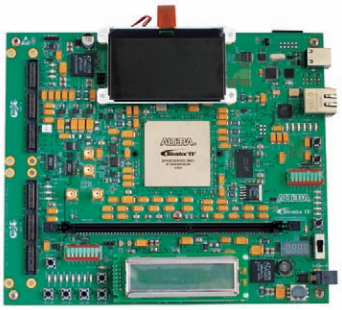
Linear Technology Components

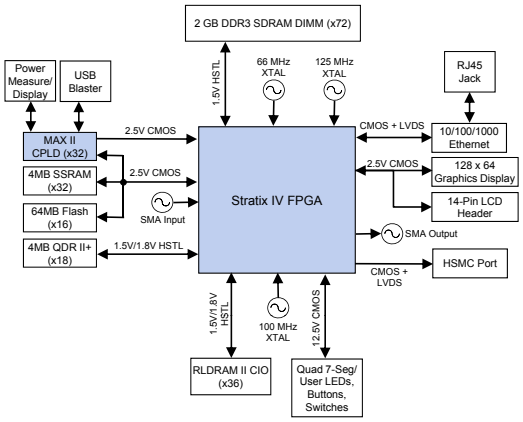
LTM4601 12A µModule DC/DC system
LTC3026 1.5A low input voltage VLDO linear regulator

Part Number	Price
DK-DEV-3SL150N	$2,495.00

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

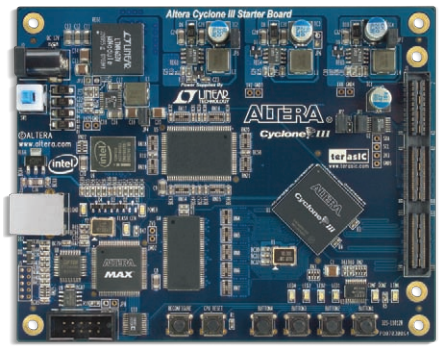
Linear Technology Components

LTM4601 12A DC/DC µModules with PLL, Output Tracking and Margining
LT1764 3A, Fast Transient Response, Low Noise, LDO Regulators
LTC6902 Multiphase Oscillator with Spread Spectrum Frequency Modulation
LTM4604A Low Voltage, 4A DC/DC µModule with Tracking
LTC4151 High Voltage I2C Current and Voltage Monitor

Part Number	Price
DK-DEV-4SE530N	$9,995.00

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

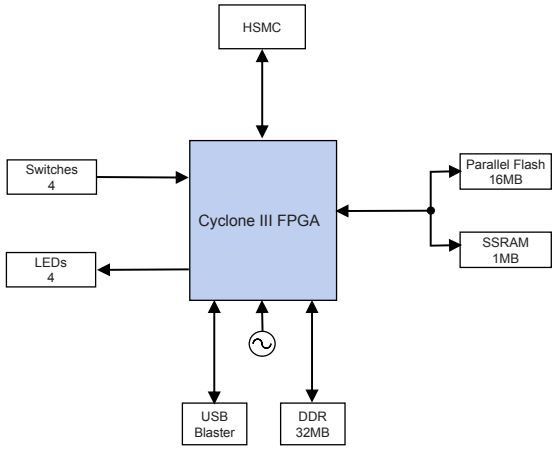
Configuration
- On-board USB-Blaster using Quartus II Programmer

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



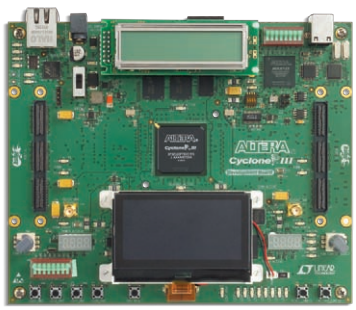
Linear Technology Components

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

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

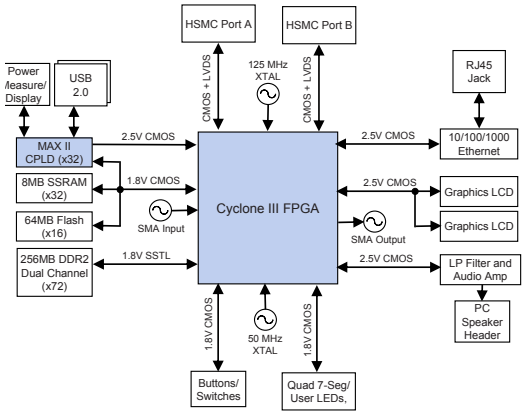
Configuration
- On-board USB-Blaster using Quartus II Programmer

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



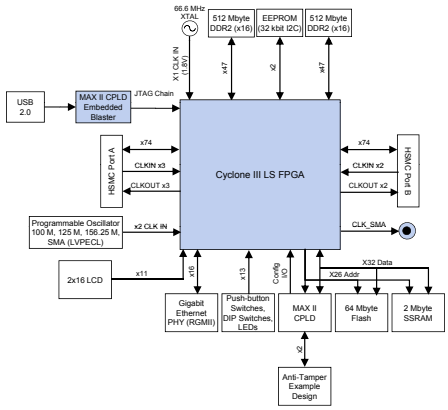
Linear Technology Components

LTM4601 12A µModule DC/DC system
LT1963 1.5A, low noise, fast transient response LDO regulator
LT3481 6V, 2A, 2.8 MHz step-down switching regulator
LT1761 100mA, low noise, LDO micropower regulators
LTC3418 8A, 4MHz, synchronous step-down regulator
LT1931A 1.2 MHz/2.2 MHz inverting DC/DC converter
LTC2402 1 or 2 channel 24-bit µPower no latency A/D converter

Part Number	Price
DK-DEV-3C120N	$995.00

Altera Cyclone III LS FPGA Development Kit

Altera's 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

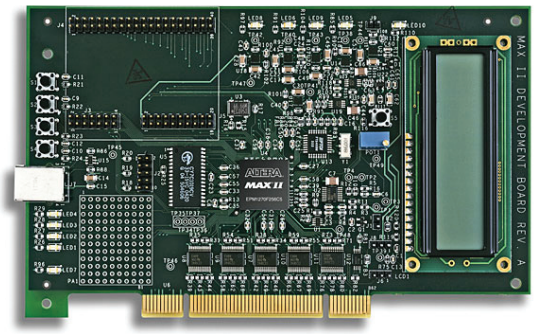
Linear Technology Components

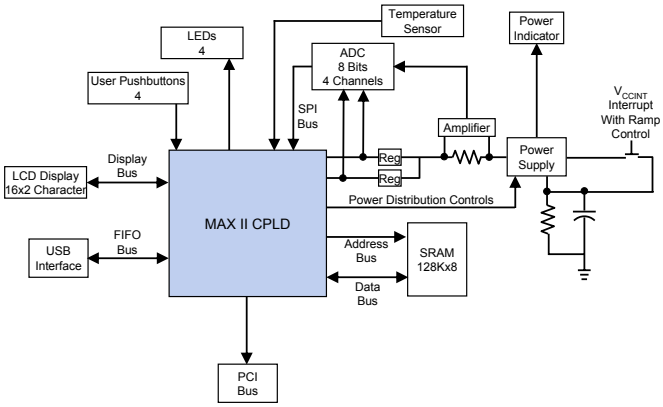
LTC2418	8-/16-Channel 24-Bit No Latency Delta Sigma ADC
LTC3414	4A, 4MHz, monolithic step-down regulator
LT1761	100mA, Low Noise, LDO Micropower Regulator
LTC3853	Triple Output, Multiphase Synchronous Step-Down Controller
LTC3418	8A, 4MHz, Monolithic Synchronous Step-Down Regulator
LT3203	500mA Low Noise Dual Mode Step-Up Charge Pumps

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

Altera MAX II Development Kit

Altera's 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 analog-to-digital 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 (128K x 8 bit)

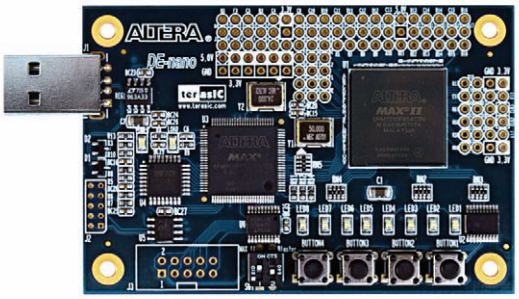
Components and interfaces
- PCI edge form-factor (3.3-V and 5.0-V tolerant)
- JTAG connectors
- USB connector (Type B)
- One 3.3-V-tolerant expansion/prototype header (41 user I/O pins)

Quartus II design software included with kit
- Quartus II Web Edition software

Part Number	Price
DK-MAXII-1270N	$150.00

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

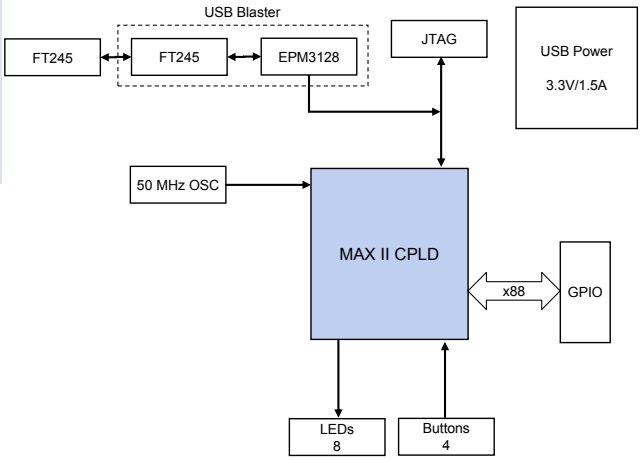
Configuration
- On-board USB-Blaster using Quartus II Programmer

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



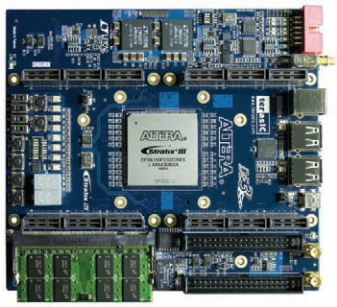
Linear Technology Components

LT1963 1.5A, low noise, fast transient response LDO

Part Number	Price
P0305	$69.00

Terasic DE3 Development Board

The Terasic DE3 development board is the perfect platform for creating your cutting-edge design in programmable logic. The DE3 board can be stacked up to 10 high to create a programmable fabric that is unequaled.



Development Kit Contents

Altera device
- Stratix III EP3SL150 FPGA

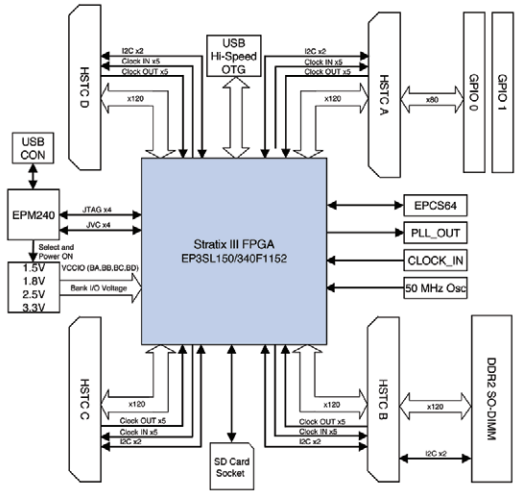
Configuration
- On-board USB-Blaster using Quartus II Programmer

General user input/output
- Four user-defined, push-button switches
- Four slide switches
- One eight position DIP switch
- Two seven-segment displays
- Eight RGB LEDs

Memory devices
- DDR2 SODIMM socket
- SD card socket

Components and interfaces
- 8 HSMC connectors–Samtec mate QSH-090-01-F-D-A
- Two 40-pin expansion headers
- 1 USB host/slave controller(3-port USB host/device controller)

Quartus II design software included with kit
- Quartus II Development Kit Edition Software, one-year license



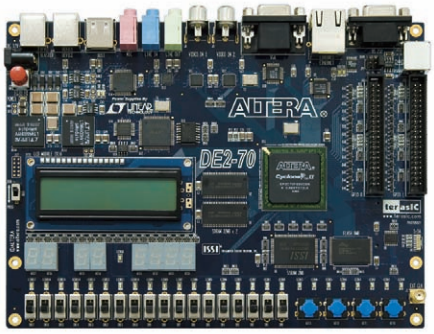
Linear Technology Components

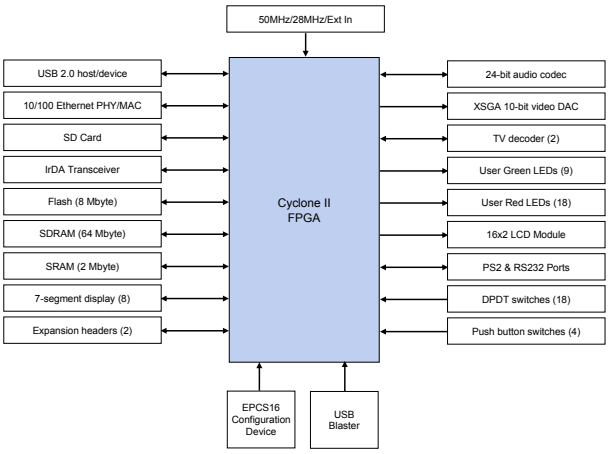
LTM4601 12A DC/DC µModule system
LTM4604 Low voltage, 4A DC/DC µModule with tracking
LT1963 1.5A, low noise, fast transient response LDO
LTC3026 1.5A, low input voltage VLDO micropower regulator

Part Number	Price
P0005_C2	$2,695.00

Terasic DE2-70 Development Board

The Terasic DE2-70 development board offers a rich set of features that make it suitable to be used to evaluate multimedia, storage, and networking interfaces equipped with almost 70,000 LEs from Altera Cyclone II EP2C70. Supporting materials include tutorials, laboratory exercises, and illustrative demonstrations.





Development Kit Contents

Altera device
- EP2C70 Cyclone II FPGA

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

General user input/output
- Four push button switches
- 18 toggle switches
- 18 red user LEDs and 9 green user LEDs

Memory devices
- 2-MB SSRAM
- Two 32-MB SDRAM
- 8-MB flash memory
- SD card socket

Components and interfaces
- 10/100 Ethernet controller with a connector
- USB host/slave controller with USB type A and type B connectors
- RS-232 transceiver and 9-pin connector
- PS/2 mouse/keyboard connector

Quartus II design software included with kit
- Quartus II Web Edition software

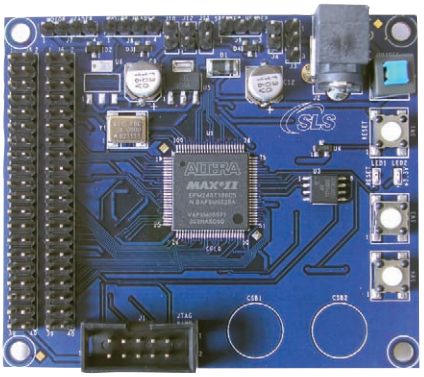
Linear Technology Components

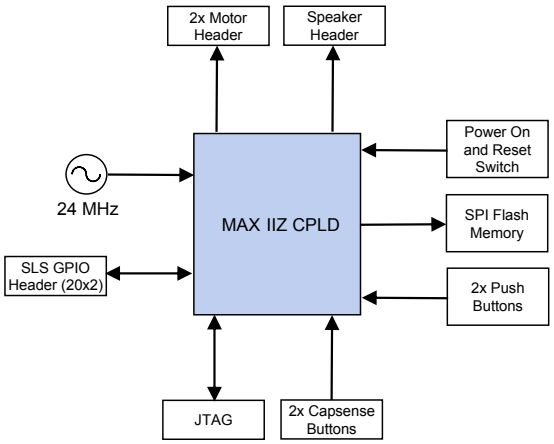
LTM4600 10A high-efficiency DC/DC µModule
LTM4603 6A DC/DC µModule with PLL, output tracking, margining
LT1963 1.5A, low noise, fast transient response LDO

Part Number	Price
P0304	$525.00

SLS MAX IIZ Development Kit

The SLS MAX IIZ Development kit provides a hardware platform for designing and developing simple and low-end systems based on Altera MAX II/MAX IIZ Devices. The development board features a MAX IIZ EPM240ZM100Cx device with 240 Logic Elements (LEs) and 8,192 bits of User Flash Memory (UFM). The kit includes a power supply, USB download cable, documentation and reference designs to get started.





Development Kit Contents

Altera device
- Altera EPM240Z CPLD

Configuration
- On board logic for MAX II configuration (Quartus II compatible)

General user input/output
- 64 general purpose I/Os
- Two user Interface CapSense buttons
- Two push button switches

Memory devices
- SPI Serial Flash Memory (AT25DF041A)

Components and interfaces
- User interface header for motor drive and speaker drive
- External battery interface header

Quartus II design software included with kit
- Quartus II Web Edition software

Part Number	Price
PL1MAX2009100	$129.00

SLS CoreCommander Development Kit

The CoreCommander development kit comes with a suite of SLS IP Cores, drivers, and application software. Delivered as a complete package, the board and soft content ensures quick and easy implementation of industry leading cores with reduced risk AND at a very low cost. CoreCommander can also host several other Altera created IP cores and with a very little effort host IP cores from other manufacturers and developers.

Development Kit Contents

Altera device
- Altera Cyclone III EP3C25F256 FPGA

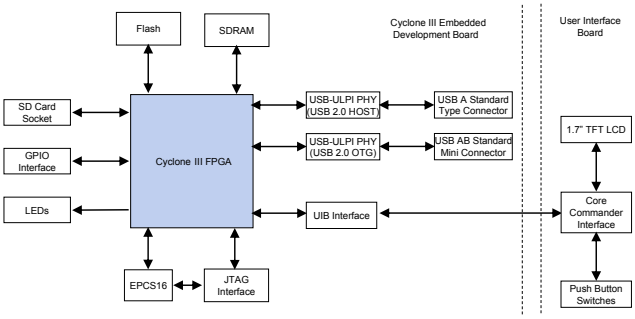
Configuration
- CoreCommander download (CCD) cable

General user input/output
- 1.7" 128x160 pixel TFT LCD with GRAM
- Six user programmable pushbutton switches and two user LEDs

Memory devices
- 8 MB flash memory
- 32 MB SDRAM
- 1 GB SD card

Components and interfaces
- 4 bit parallel SD card interface
- USB 2.0 ULPI/OTG Interface (NXP USB ISP1504 PHY)
- USB 2.0 ULPI/Host Interface (NXP USB ISP1504 PHY)
- Add-on boards are available from SLS for the following applications: Ethernet, Wi-Fi , and dual SD card

Quartus II design software included with kit
- Quartus II Web Edition software



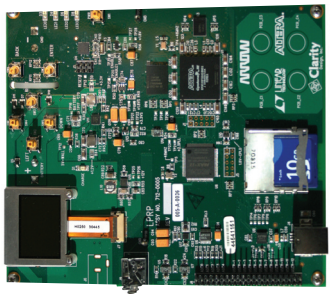
Linear Technology Components

LTC3555 High efficiency USB power manager

Part Number	Price
PL1EDB2000101	$395.00

Arrow Low Power Reference Platform (LPRP)

Arrow Electronics, Altera Corporation, and Linear Technology have combined industry-leading power management solutions with a low power Cyclone III FPGA and board-level power management IP in the revolutionary LPRP. Using the LPRP kit, engineers can implement either an Altera Nios II processor or ARM Cortex M1 32-bit embedded processor inside the Cyclone III FPGA.



Development Kit Contents

Altera device
- Altera Cyclone III EP3C25F256 FPGA

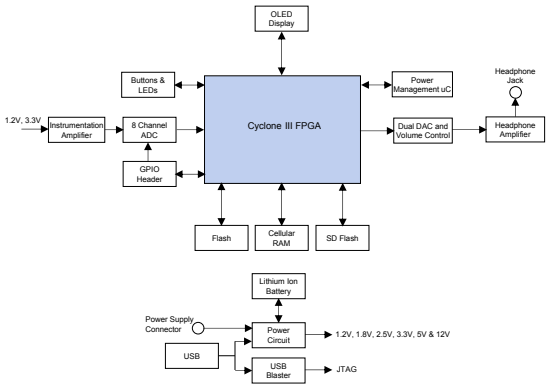
Configuration
- On-board USB-Blaster using Quartus II Programmer

General user input/output
- 96 x 64 bit mapped display
- Four user LEDs
- Six user programmable pushbutton switches

Memory devices
- 32 MB CFI parallel flash memory
- 8 MB cellular RAM memory
- 1 GB SD card (contains user guide and reference materials)

Components and interfaces
- USB connector (Type B)
- 40-pin user I/O connector
- Audio jack connector

Quartus II design software included with kit
- Quartus II Web Edition software



Linear Technology Components

LTC3455 Dual DC/DC converter with USB power manager and Li-Ion battery charger
LT3473 Micropower 1A boost converter with output disconnect
LTC6800 Rail-to-rail input and output, instrumentation amplifier
LT1761 1.8 to 100mA, low noise, LDO micropower regulators
LT1762 150 mA, low noise, LDO micropower regulator
LTC1863 Micropower, 3V, 12-bit, 8-channel 175ks/s A/D converter

$129 Special Promotion Price While Supplies Last

Part Number	Price
LPRP	$129.00

Embedded Suite IP Discount Offer!

Now you can enjoy the flexibility of the Nios II processor and the ease-of-use of Altera's development tools across a broad range of Altera FPGA Development Kits.

Buy any of the below Altera® FPGA development kits and get a 50% discount when you upgrade them to include the Embedded IP Suite. Your cost is only $495! Offer expires December 31, 2010.

Cyclone Series

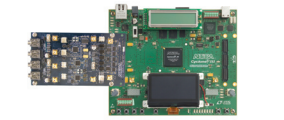
Cyclone III FPGA Starter Kit

Nios II Embedded Evaluation Kit, Cyclone III Edition

Embedded Systems Development Kit, Cyclone III Edition

Cyclone III FPGA Development Kit

DSP Development Kit, Cyclone III Edition



Cyclone IV GX FPGA Development Kit

Stratix Series

Stratix III FPGA Development Kit

Transceiver Signal Integrity Kit, Stratix IV GX Edition

Stratix IV GX FPGA Development Kit

DSP Development Kit, Stratix III Edition

Audio Video Development Kit, Stratix IV GX Edition

Transceiver Signal Integrity Kit, Stratix IV GT Edition

Arria Series

Arria II GX FPGA Development Kit

Arria II GX FPGA Development Kit, 6G

Embedded IP Suite Promotion

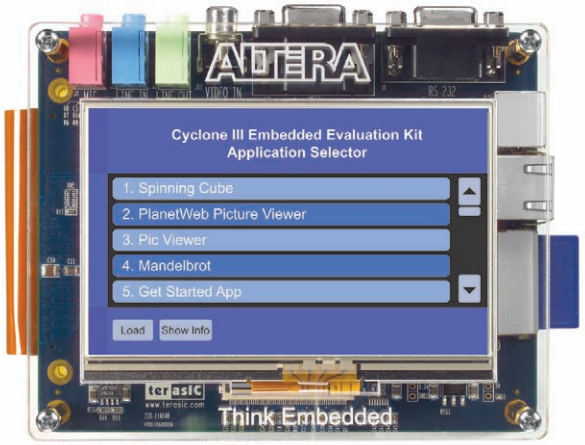
List Price	Promotional Price	Savings	Ordering Code
$995.00	$495.00	$500.00	IPS-EMBEDDED/PROMO

Embedded IP Suite Contents

Description	Ordering Code	Price
Nios II CPU core	IP-NIOS	$495.00
Triple speed Ethernet MAC	IP-TRIETHERNET	$495.00
DDR/DDR2 Memory Controller	IP-SDRAM/DDR IP-SDRAM/DDR2	$3,995.00 $3,995.00

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

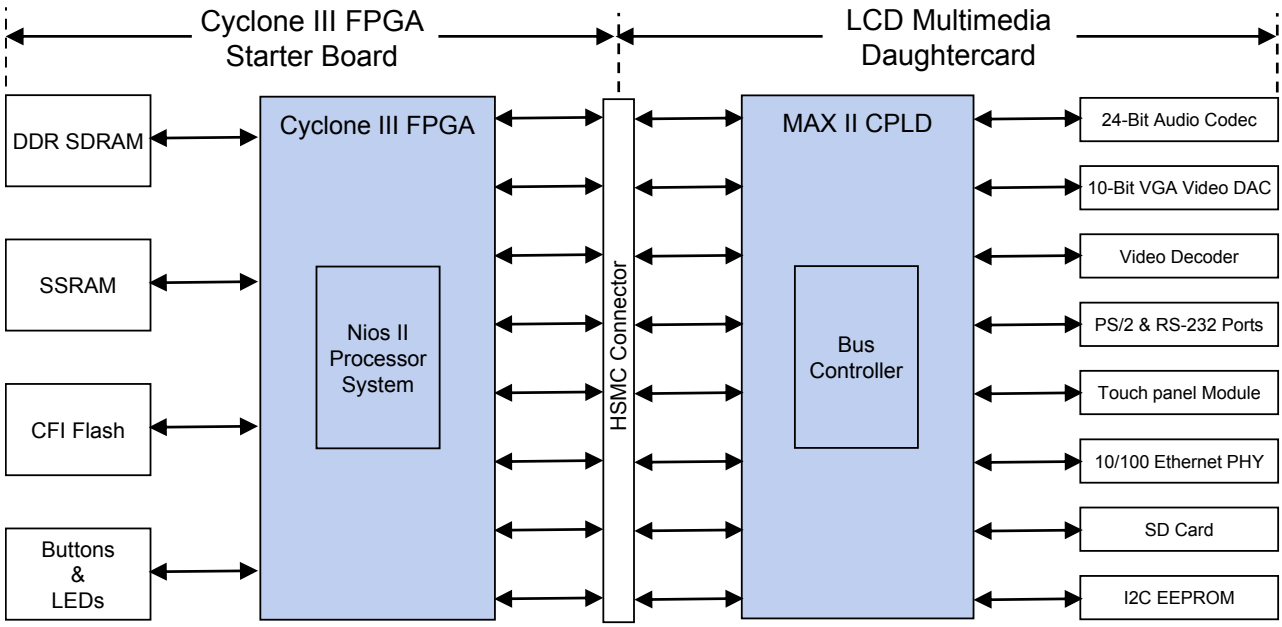
Components and interfaces
- VGA output
- Composite TV-in
- Audio-out, audio-in, and microphone-in
- Secure Digital (SD) card
- Serial connector (RS-232 DB9 port)
- PS/2
- 24-bit CD-quality audio CODEC with line-in, line-out, and microphone-in jacks
- 10/100 Ethernet physical layer/media access control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

Linear Technology Components

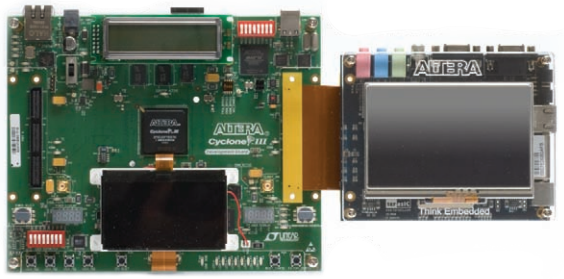
LTM4603	6A µModule DC/DC system
LTC3413	3A, 2MHz regulator for memory termination
LT1959	500 kHz step-down switching regulator
LT1117	800mA low dropout positive regulator
LT1963	1.5A, low noise, fast transient response LDO
LT3461	1.3 MHz / 3 MHz step-up DC/DC converter

Part Number	Price
DK-N2EVAL-3C25N	$449.00



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

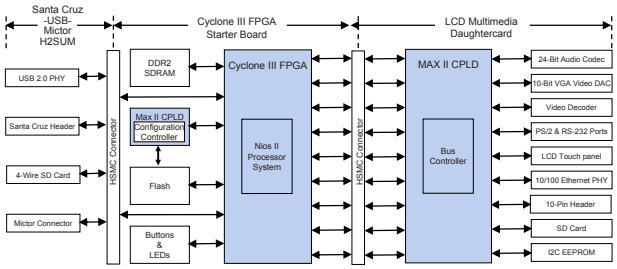
Configuration
- On-board USB-Blaster using Quartus II Programmer

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



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

Linear Technology Components

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

Arrow BeMicro Evaluation Kit

BeMicro is a small low-cost hardware platform for all kinds of Altera FPGA design prototyping in a USB stick form factor. The BeMicro plugs into the USB host connector of a PC or a USB hub and it is powered from this source. BeMicro has an Altera USB-Blaster capability, allowing seamless integration into the Quartus FPGA design environment and the Nios IDE.

Development Kit Contents

Altera device
- Altera Cyclone III (EP3C16F256) FPGA

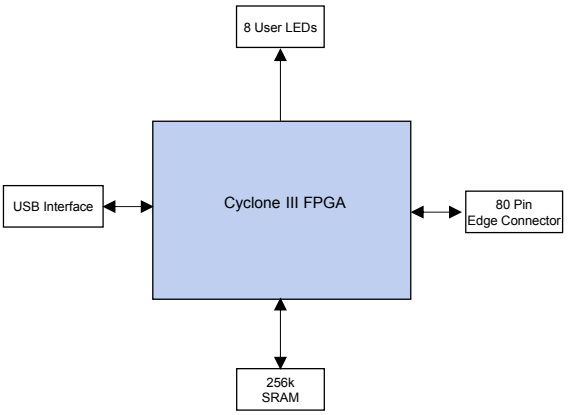
Configuration
- On-board USB-Blaster using Quartus II Programmer

General user input/output
- Three status LED
- Eight user LEDs

Memory devices
- 256k low-power SRAM

Components and interfaces
- 80-pin edge connector–Samtec mate MEC-140-02-L-D-RA1

Quartus II design software included with kit
- Quartus II Web Edition software



Part Number	Price
BEMICRO	$49.00

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 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

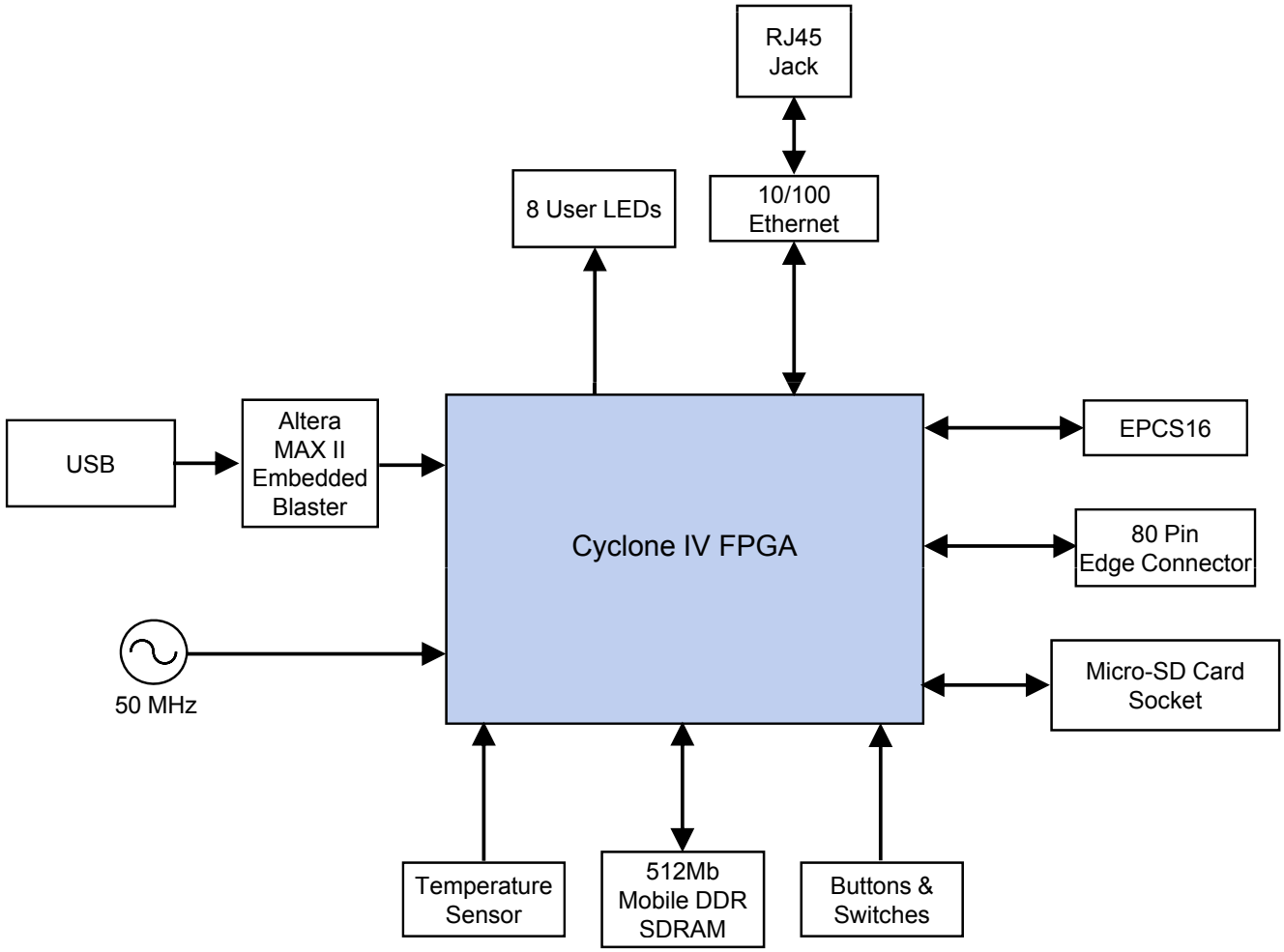
Components and interfaces
- 10/100BASE-T Ethernet PHY with RJ-45 connector
- Temperature sensor
- 80-pin edge connector–Samtec mate MEC-140-02-L-D-RA1

Quartus II design software included with kit
- Quartus II Web Edition software

Linear Technology Components

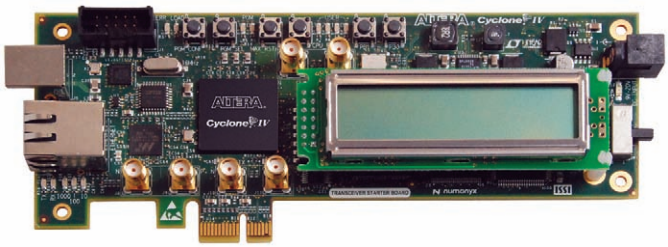
LTC3545-1	Triple 800mA Synchronous Step-Down Regulator
LT3085EDCB	Adjustable 500mA Single Resistor Low Dropout Regulator

Part Number	Price
BEMICRO SDK	Call Arrow for special pricing



Altera Cyclone IV GX Transceiver Starter Kit

Altera's 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

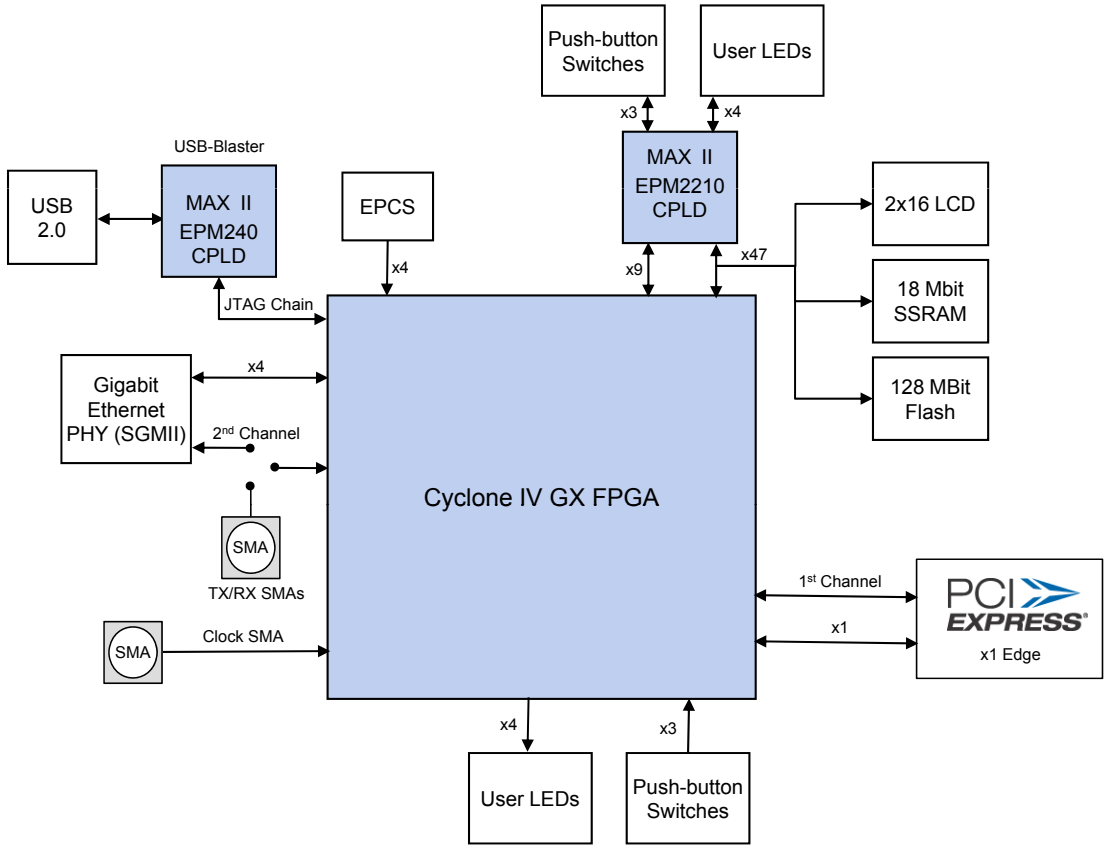
Components and interfaces
- PCI Express edge connector
- 10/100/1000BASE-T Ethernet PHY with RJ-45 connector or one transceiver to SMA connectors (requires a minor board modification)
- On-board power measurement circuitry

Quartus II design software included with kit
- Quartus II Web Edition software

Linear Technology Components

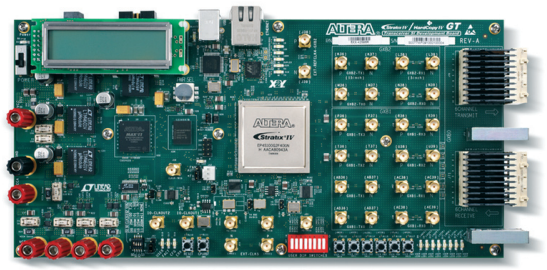
LTC2418	8-/16-Channel 24-Bit No Latency Delta Sigma ADC
LT3510	Dual Tracking 2A Step-Down Switching Regulator
LT3027	Dual 100mA, Low Dropout, Low Noise, Micropower Regulator
LTC4412	Low Loss PowerPath Controller
LT3023	Dual 100mA, Low Dropout, Low Noise, Micropower Regulator

Part Number	Price
DK-START-4CGX15N	$395.00



Altera Transceiver Signal Integrity Kit, Stratix IV GT Edition

The Transceiver SI Development Kit, Stratix IV GX Edition enables evaluation of Stratix IV GX transceiver signal integrity. A customer can use this SI development kit to evaluate transceiver performance from 600 Mbps to 8.5 Gbps, and generate and check PRBS patterns via a simple-to-use graphical user interface (does not require Quartus II software). Customers can also understand the effects of changing Vod, pre-emphasis and equalization settings, perform jitter analysis and verify PMA compliance to PCI Express (Gen1 and Gen2), Serial RapidIO, Gigabit Ethernet, 10 Gigabit Ethernet XAUI, CEI-6G, Serial RapidIO, HD-SDI, Fibre Channel 1G/4G/8G and other major standards.



Development Kit Contents

Altera device
- Stratix IV GT EP4S100G2F40I1N 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
- Push button and DIP switches

Memory devices
- 64 MB sync flash

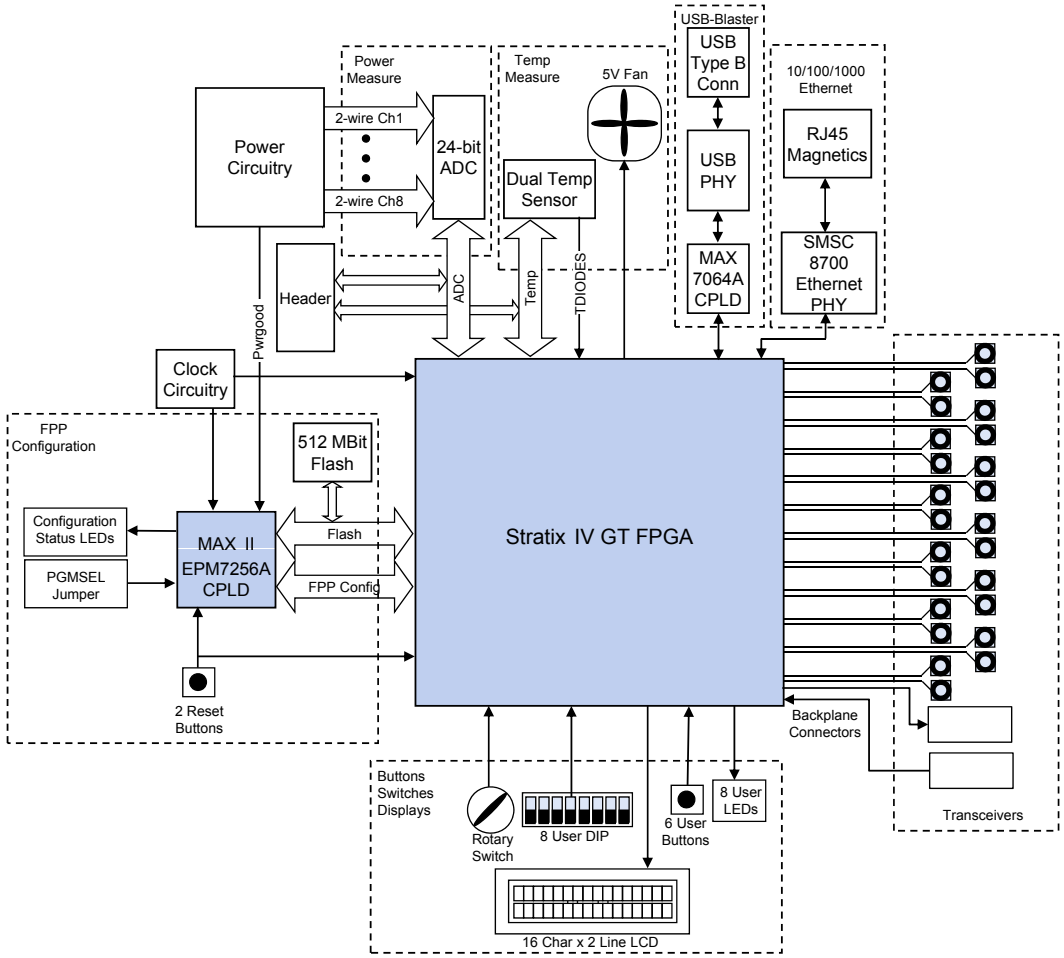
Components and interfaces
- Six full-duplex transceiver channels routed to SMA connectors. All channels support up to 11.3Gbps data rate
- Six full-duplex transceiver channels routed to FCI Airmax connector
- Power measurement circuitry on transceiver related supplies
- Temperature measurement circuitry (die and ambient)
- 10/100/1000BASE-T Ethernet PHY

Quartus II design software included with kit
- Quartus II software license is not included and is not required for kit evaluation

Linear Technology Components

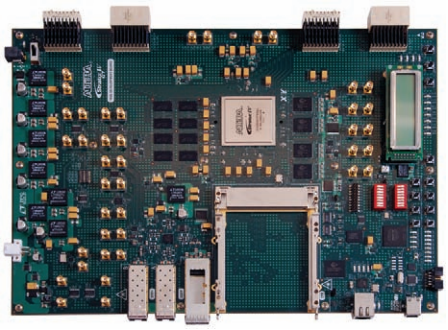
LTM4601	12A DC/DC µModules with PLL, Output Tracking
LT3080	Adjustable 1.1A Single Resistor LDO
LTM4616	Dual 8A per Channel Low VIN DC/DC µModule
LTC3025	500mA Micropower VLDO Linear Regulators
LT1761	100mA, Low Noise, LDO Micropower Regulator
LTC2418	8-/16-Channel 24-Bit No Latency Delta Sigma ADC

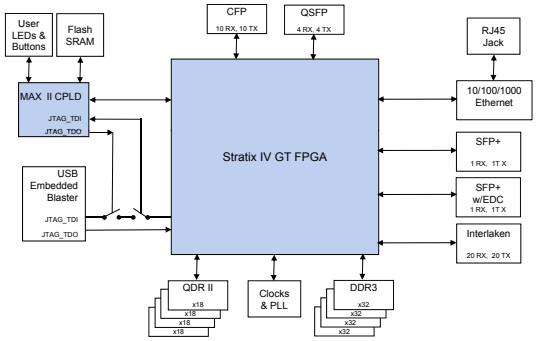
Part Number	Price
DK-SI-4S100G2N	$7,995.00



Altera Stratix IV GT 40G/100G Interlaken Development Kit

The Altera Stratix IV GT 100G Development Kit delivers a platform that can be used to implement 100 Gigabit serial data communications systems. This board will accommodate two SFP+ optical modules (one with EDC and one without (not included in the kit)), a 4 lane QSFP optical module (not included in the kit), a CFP interface, and a 20 lane Interlaken interface.





Development Kit Contents

Altera device
- Stratix IV GT EP4S100G5F1932 FPGA

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

General user input/output
- 16 character x 2 line LCD display
- Push button, DIP switches and 8-user LEDs

Memory devices
- Eight 8 MB x 16 x 8 bank DDR3 SDRAM interface (combine into 4 x32 individual DDR3 interfaces)
- Four 72 MB QDR II SRAMs with 18 bit data buses

Components and interfaces
- USB 2.0
- 4 channels QSFP interface
- 10 channels CFP interface
- 1 channel SFP+ interface
- 1 channel SFP+ (w/EDC) interface
- 20 channel Interlaken interface
- 10/100/1000BASE-T Ethernet PHY

Quartus II design software included with kit
- Quartus II Development Kit Edition Software, one-year license

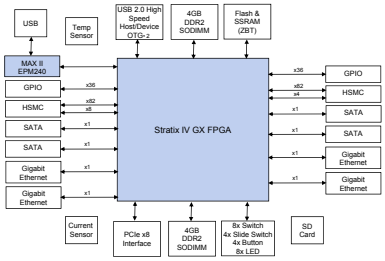
Linear Technology Components

LTM4601 12A µModule DC/DC system
LTC3026 1.5A Low Input Voltage VLDO Linear Regulator

Part Number	Price
DK-DEV-4S100G5N	$19,995.00

Terasic DE4-230 Development Board

The DE4 Development Board is the ideal hardware platform for system designs that demand high-performance, serial connectivity, and advanced memory interfacing.Fully compliant with version 2.0 of the PCI Express standard, and with serial ATA (SATA) interfaces, it provides a highly integrated option for storage applications.



Development Kit Contents

Altera device
- Stratix IV GX EP4SGX230 FPGA

Configuration
- On-board USB-Blaster download cable using Quartus II Programmer
- JTAG and Fast Passive Parallel (FPP) configuration

General user input/output
- Eight LEDs
- Four Push buttons, four slide switches and eight DIP switches

Memory devices
- 64 MB Flash with a 16-bit data bus
- 2 MB ZBT SSRAM
- I2C EEPROM

Components and interfaces
- PCI Express x8 edge connector
- Four Serial ATA Ports (supports SATA 3.0 standard 6 Gbps signaling rate)
- Four Gigabit Ethernet ports (integrated 1.25 GHz SERDES
- Two 172-pin High Speed Mezzanine Card (HSMC) connectors– Samtec mate ASP-122952-01
- Two 40-pin Expansion Headers
- USB 2.0 (Host/Slave Controller)

Quartus II design software included with kit
- Quartus II Development Kit Edition, one-year license

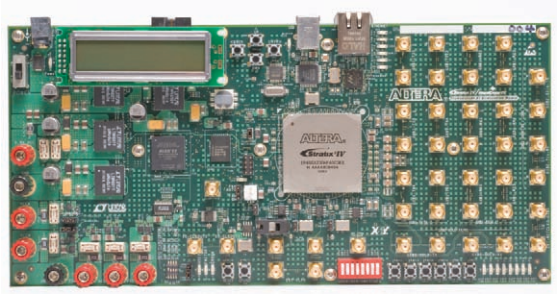
Part Number	Price
P0054	$2,995.00

Linear Technology Components

LTM4616 Dual 8A per Channel Low VIN DC/DC µModule
LT3010 50mA, 3V to 80V Low Dropout Micropower Linear Regulator
LTM4601 12A DC/DC µModules with PLL, Output Tracking and Margining
LT1963 1.5A, Low Noise, Fast Transient Response LDO Regulator
LTC6902 Multiphase Oscillator with Spread Spectrum Frequency Modulation
LTC3025 500mA Micropower VLDO Linear Regulators
LT3080 Parallelable 1.1A Adjustable Single Resistor Low Dropout Regulator
LTC2418 8-/16-Channel 24-Bit No Latency Delta Sigma ADC

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

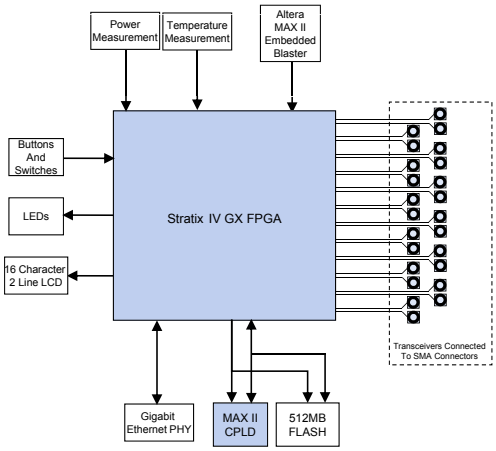
Altera device
- • Stratix IV GX EP4SGX230KF40C2N FPGA

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



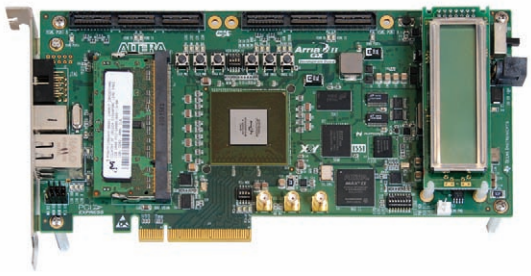
Linear Technology Components

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

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

Altera Arria II GX FPGA Development Kits

The Altera Arria II GX FPGA Development Kits deliver a complete system-level design environment to develop FPGA designs. Two variants are available:
- DK-DEV-2AGX125N: Develop and test PCI Express 1.0, Gigabit Ethernet, SDI, CPRI, OBSAI, SAS/SATA, and Serial RapidIO
- DK-DEV-2AGX260N: for FPGA designs with transceivers supporting up to 6.375-Gbps data rates



Development Kit Contents

Altera device
- Arria II GX EP2AGX125EF35 or EP2AGX260 FPGA

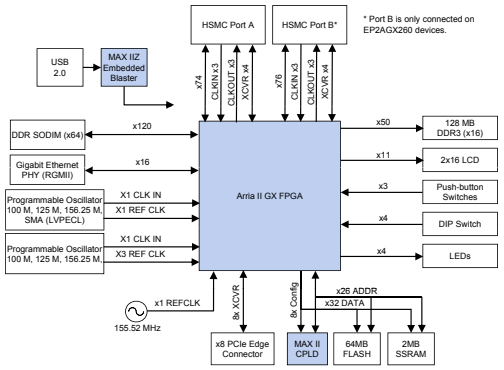
Configuration
- MAX II CPLD and flash fast passive parallel configuration
- On-board USB-Blaster download cable using Quartus II Programmer

General user input/output
- LEDs, push buttons and LCD display

Memory devices
- 128-MB 16-bit DDR3 device
- 1-GB 64-bit DDR2 SODIMM
- 2-MB SSRAM
- 64-MB flash

Components and interfaces
- PCI Express edge connector
- One gigabit Ethernet port
- One HSMC Connector–Samtec mate ASP-122952-01 (Two HSMC Connectors on DK-DEV-2AGX260N)

Quartus II design software included with kit
- Quartus II Development Kit Edition Software, one-year license



Part Number	Price
DK-DEV-2AGX125N	$1,495.00
DK-DEV-2AGX260N	$3,195.00

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

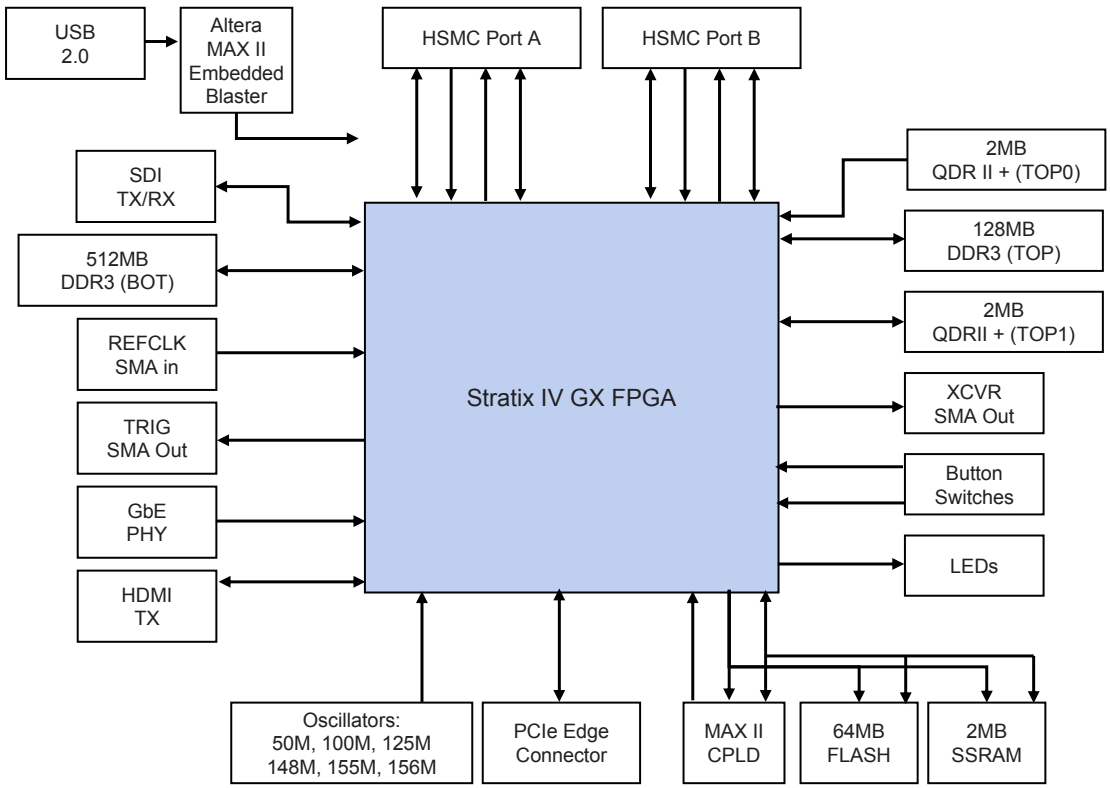
Components and interfaces
- USB 2.0
- PCI Express x8 edge connector
- 10/100/1000BASE-T Ethernet PHY with RJ-45 connector
- Two HSMC connectors–Samtec mate ASP-122952-01
- HDMI video output
- 3G SDI video input and output
- Power measurement circuitry
- Temperature measurement circuitry

Quartus II design software included with kit
- Quartus II Development Kit Edition Software, one-year license

Linear Technology Components

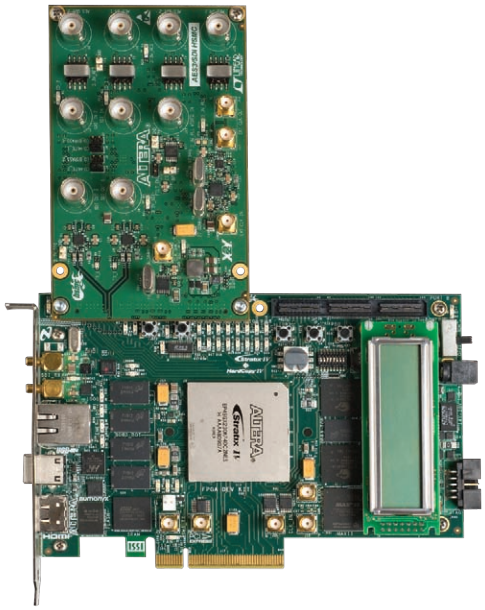
LTM4601	12A DC/DC µModule with PLL, output tracking
LTM4614	Dual 4A per channel output µModule
LTM8021	36V_{IN}, 500mA step-down DC/DC µModule
LT3080-1	Adjustable 1.1A single resistor LDO
LTC3025-1	500mA µPower VLDO linear regulator
LTC3727-1	2-phase synchronous step-down regulator
LT3010	50mA, 3V to 80V low dropout µPower regulator
LTC3414	4A, 4MHz, monolithic step-down regulator
LTC2418	8-/16-channel 24-bit no latency delta sigma ADC
LTC6902	Multiphase oscillator with spread spectrum
LTC4357	Positive high voltage ideal diode controller
LTC4358	5A ideal diode
LTC4352	Low voltage ideal diode controller with monitoring
LTC4151	High voltage I²C current and voltage monitor

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



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

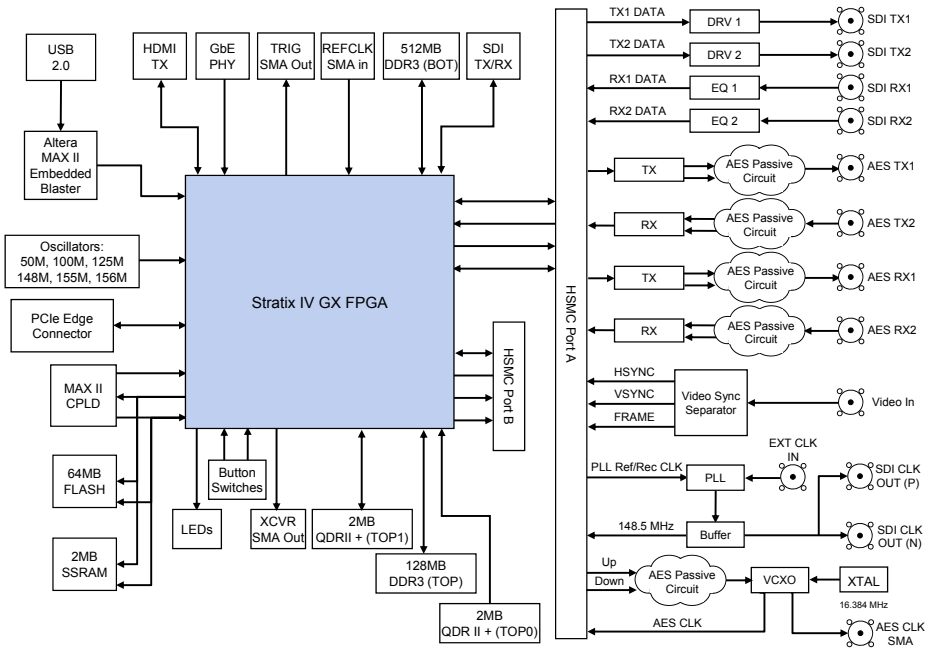
Components and interfaces
- USB 2.0
- PCI Express x8 edge connector
- 10/100/1000BASE-T Ethernet PHY with RJ-45 connector
- Two HSMC connectors–Samtec mate ASP-122952-01
- HDMI video output on the FPGA host board
- Power measurement circuitry
- Temperature measurement circuitry
- One 3G-SDI video input 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

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

Linear Technology Components

LTM4601	12A DC/DC µModule with PLL, output tracking
LTM4614	Dual 4A per channel output µModule
LTM8021	36VIN, 500mA step-down DC/DC µModule
LT3080-1	Adjustable 1.1A single resistor LDO
LTC3025-1	500mA µPower VLDO linear regulator
LTC3727-1	2-phase synchronous step-down regulator
LT3010	50mA, 3V to 80V low dropout µPower regulator
LTC3414	4A, 4MHz, monolithic step-down regulator
LTC2418	8-/16-channel 24-bit no latency delta sigma ADC
LTC6902	Multiphase oscillator with spread spectrum
LTC4357	Positive high voltage ideal diode controller
LTC4358	5A ideal diode
LTC4352	Low voltage ideal diode controller with monitoring
LTC4151	High voltage I2C current and voltage monitor
LT3480	36V, 2A, 2.4MHz Step-Down Switching Regulator with 70µA Quiescent Current
LTC285	3.3V 20Mbps RS485/RS422 Transceiver



Altera DSP Development Kit, Stratix III Edition

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

Development Kit Contents

Altera device
- Stratix III EP3SL150F1152 FPGA

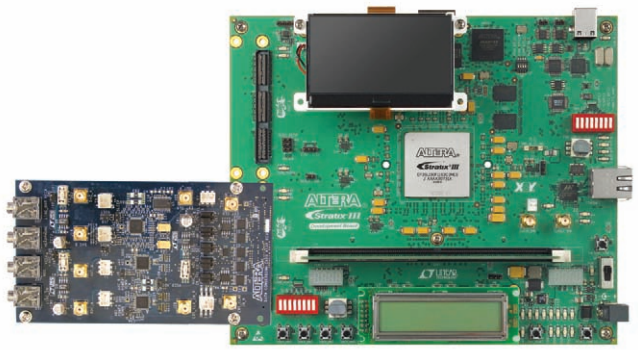
Configuration
- On-board USB-Blaster download cable using Quartus II Programmer

General user input/output
- 128 x 64 dot pixels graphics display
- LCD (16 character x 2 line)

Memory devices
- 128 MB DDR2 SDRAM DIMM
- 16 MB DDR2 SDRAM devices (individually addressable)
- 36 Mb QDR II SRAM device
- 8 MB PSRAM
- 64 MB flash memory

Components and interfaces
- USB 2.0 MAC/PHY
- 10/100/1000 Ethernet
- Two high-speed mezzanine connector (HSMC) interfaces–Samtec mate ASP-122952-01
- SMA input and output

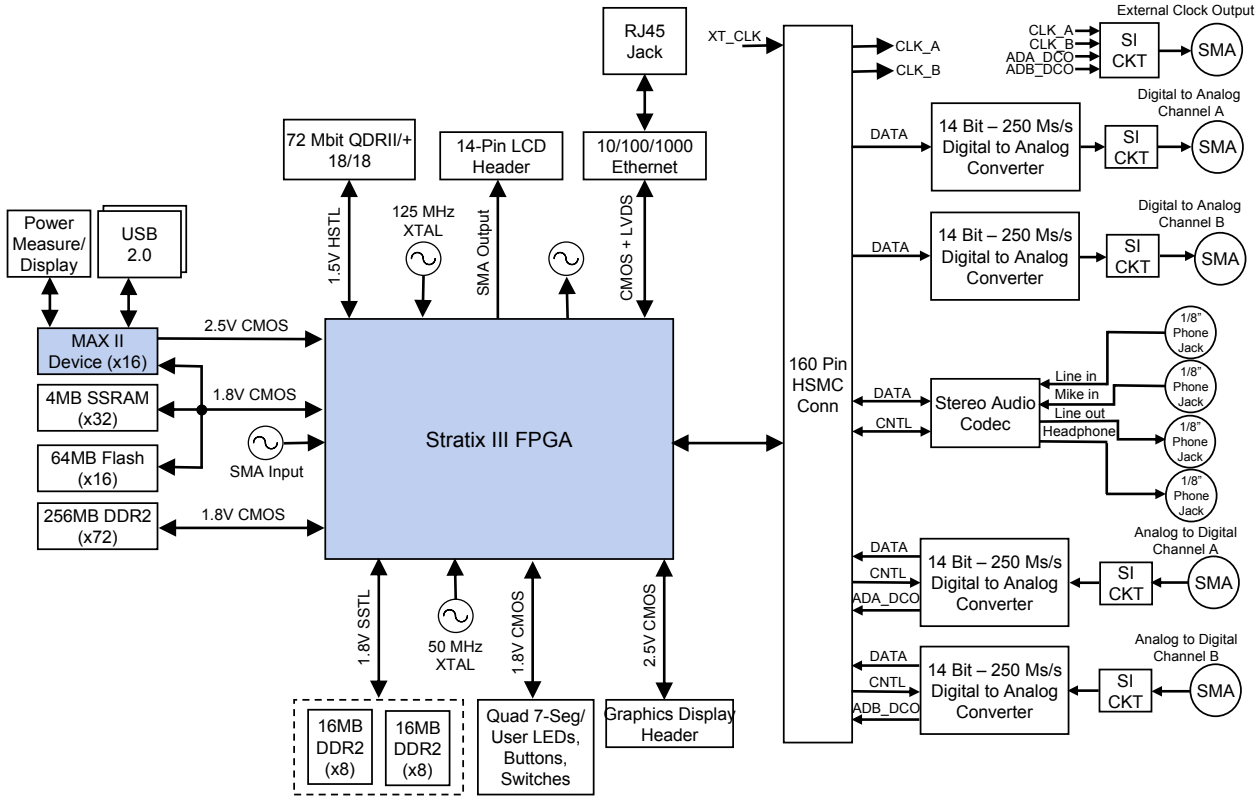
Quartus II design software included with kit
- Quartus II Development Kit Edition Software, one-year license
- DSP Builder
- MATLAB/Simulink 30-day evaluation software



Linear Technology Components

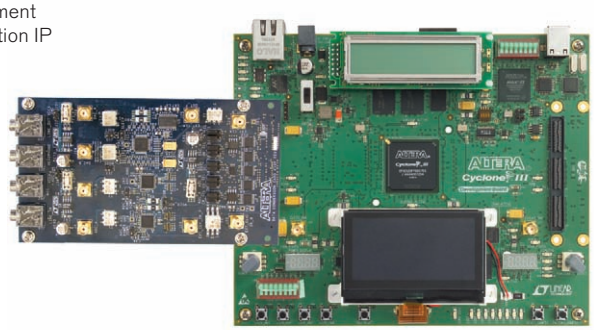
LTM4601	12A DC/DC µModule
LTC3026	1.5A low input voltage VLDO linear regulator
LT1761	100-mA, low noise, LDO micropower regulator
LT1374	4.5A, 500-kHz step-down switching regulator
LT1931	1.2MHz/2.2MHz inverting DC/DC converter
LTC2402	1or 2 channel 24-Bit µPower No Latency Delta-Sigma Converter

Part Number	Price
DK-DSP-3SL150N	$2,895.00



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

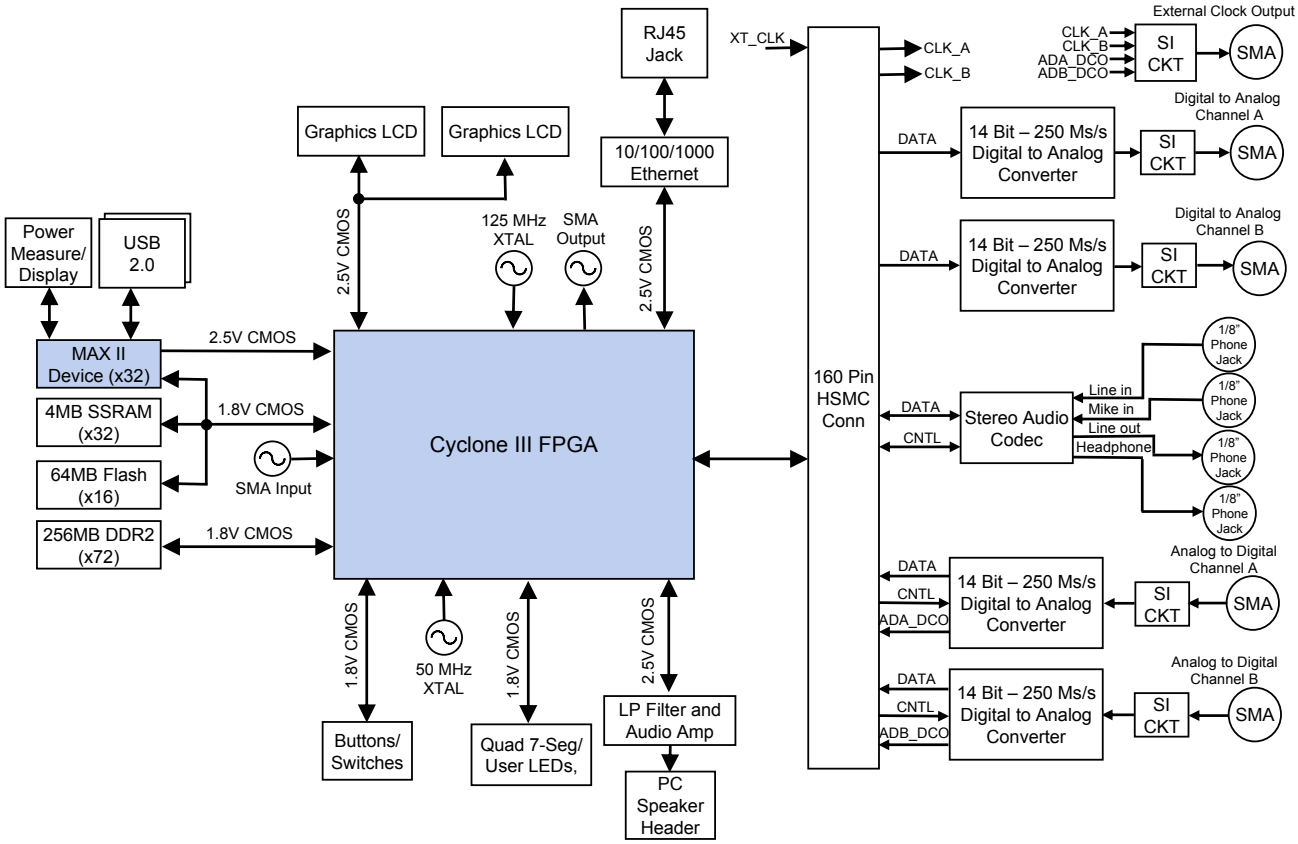
Components and interfaces
- 10/100/1000 Ethernet (RGMII)
- USB 2.0 (Type B)
- Two HSMC connectors–Samtec mate ASP-122952-01
- Dual 14-bit, 150-MSPS A/D converter
- Dual 14-bit, 250-MSPS D/A converter
- Audio in/out/mic

Quartus II design software included with kit
- Quartus II Web Edition software
- MATLAB/Simulink evaluation software

Linear Technology Components

LTM4601	12A µModule DC/DC system
LT1963	1.5A, low noise, fast transient response LDO
LT3481	6V, 2A, 2.8 MHz step-down switching regulator
LT1761	100mA, low noise, LDO micropower regulator
LTC3418	8A, 4 MHz, synchronous step-down regulator
LT1931A	1.2 MHz/2.2 MHz inverting DC/DC converter
LTC2402	1or 2 channel 24-bit µPower Delta-Sigma A/D converter

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



Development Board Daughtercards

Altera Corporation and its partners offer a variety of application-specific daughtercards. You can use these daughtercards to expand the functionality of the development platforms featured in this brochure. Reference designs and application-specific software accompany many of the daughtercards, further facilitating the design process.

HSMC Connectors

HSMC connectors provide the interface between a host board and a mezzanine card. The 'header' part on a mezzanine card plugs into the 'socket' part on a host board. Various connector foot prints are allowed, but all HSMC connectors must adhere to the defined dimensional envelopes and electrical properties described in Chapter 2, Mechanical and Chapter 3, Electrical.

HSMC Daughtercards from SLS

Data Conversion HSMC Snap On Board

Description

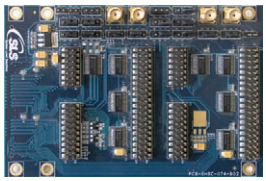
The Data Conversion HSMC can be used for developing DSP applications with Altera Development boards that feature the High Speed Mezzanine Card (HSMC) connector. The Data Conversion HSMC is created to provide a set of Analog to Digital and Digital to Analog interfaces including an Audio Codec interface

Features

- Two 14-bit analog-to-digital (A/D) converter channels with150 MSPS
- Two 14-bit, 250 MSPS, 70 dB digital-to-analog (D/A) converters
- One audio CODEC with input, output, and amplified output
- External clock in Interface
- External clock out Interface

Price: $440 **Part Number: PL1S0150000100**

HSMC E-Gasket Snap On Board



Description

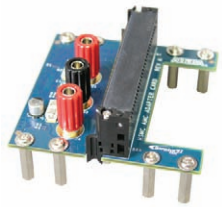
The HSMC E-Gasket board provides an easy interface to the Altera standard Santa Cruz (SC) header. The purpose of this interface is to allow the usage of the Santa Cruz snap-on boards with the host boards having HSMC interface.

Features

- Interface between HSMC and Santa Cruz expansion connectors
- Two sets of Santa Cruz expansion connectors
- Four SMA connectors for external clock
- One external power supply connector

Price: $89 **Part Number: PL1S0120000100**

HSMC to AMC Carrier



Description

The HSMC to AMC Carrier board is an HSMC (High-Speed Mezzanine Connector) to AMC (AdvancedMC) convertor allowing interface to boards using standards such as PCI Express, Advanced Switching (AS), Serial RapidIO (SRIO) and Gigabit Ethernet. The board follows PICMG AMC.0 R2.0 requirements.

Features

- Four fat pipe channels
- Four common option channels

Price: $349 **Part Number: PL1S0140000100**

HSMC to AMC Module

Description

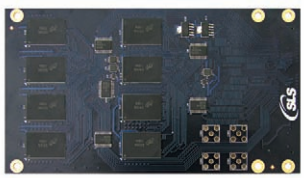
The HSMC to AMC Carrier board is an HSMC (High-Speed Mezzanine Connector) to AMC (AdvancedMC) convertor allowing interface to boards using standards such as PCI Express, Advanced Switching (AS), Serial RapidIO (SRIO) and Gigabit Ethernet. The board follows PICMG AMC.0 R2.0 requirements.

Features

- Four fat pipe channels
- Four common option channels
- Compatible with the SLS HSMC to AMC carrier board

Price: $199 **Part Number: PL1S0130000100**

ONFI 2.0 HSMC Snap On Board



Description

The ONFI 2.0 HSMC (High Speed Mezzanine Card) is designed to develop NAND Flash based applications with Development boards having the High Speed Mezzanine Card (HSMC) connector. The board provides connectivity to eight 16Gb NAND Flash devices and one High Speed Transceiver Transmit and Receive channel via SMA connectors.

Features

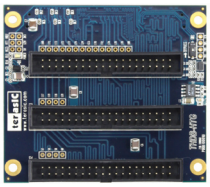
- I Eight 16 Gb Asynchronous/Synchronous NAND Flash Memory devices (Total 16 GB Storage capacity)
- Support for two NAND Flash Controllers per board with 4 devices per controller
- Four SMA connectors to support one High Speed TX and RX channel
- Standard HSMC interface

Price: $422 **Part Number: PL1S0210000100**

HSMC Daughtercards from Terasic

www.terasic.com

GPIO HSMC Card



Description

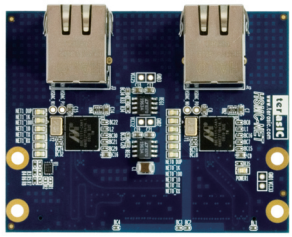
The GPIO HSMC daughter board is designed to fan out the High Speed Mezzanine connector (HSMC) I/Os to three 40-pin expansion prototype connectors, which are compatible with Altera DE2/DE1/DE0 expansion headers. Users can connect up to three Altera DE2/DE1/DE0 boards (or associated daughter cards) onto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

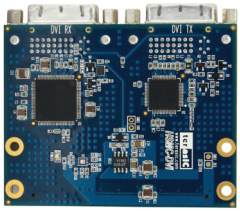
The Terasic Ethernet HSMC Card is a Gigabit Ethernet transceiver with a High Speed Mezzanine Connector (HSMC) interface. It offers network transfers of up to 1 Gbps with the host board using a HSMC connector. Also, it provides a fully integrated Ethernet solution enabling fast implementation design, 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 10Mbps, 100Mbps (Fast Ethernet) or 1000Mbps (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

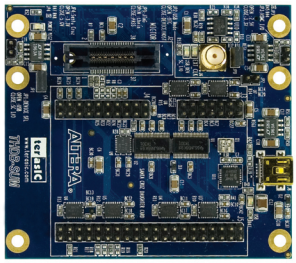
The SATA/SAS Daughter Card allows users to access storage devices through the SATA/SAS protocols using Stratix IV GX, Stratix II GX, Arria II GX, and Cyclone IV GX devkits with a High-Speed Mezzanine Connector (HSMC). This card features 4 single channel SATA signal plug connectors, one 4 channel SATA/SAS 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 Kbit I2C EEPROM
- Differential clocking for 150MHz and 300MHz reference clocks through the HSMC or SMA connectors

Price: $550 **Part Number: P0053**

Santa Cruz / USB / Mictor HSMC Card



Description

The Santa Cruz / USB / Mictor to HSMC Daughter Board is an adapter board to convert a High Speed Mezzanine Connector (HSMC) interface to Santa Cruz (SC), USB, Mictor, and SD Card interfaces. It allows users to use these interfaces on a host board with a HSMC connector. Because of limited I/O numbers of the HSMC interface, the SC interface and USB port have to share the same I/O pins. Users can choose which interface to be enabled by jumper selection. Source signals from the HSMC interface to the SC header on the SUM board pass through level shifters to adjust the logic level difference between the HSMC and SC interface board.

Features

- One HSMC connector for interface conversion
- One SC interface
- Adjustable logic levels between HSMC and SC interface signals
- One Hi-Speed USB On-The-Go transceiver
- One Mictor Connector
- One SMA Connector for external clock input
- One SD Card Socket

Price: $89 **Part Number: P0006**

Check out the complete list of Development Board Daughtercards at:

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

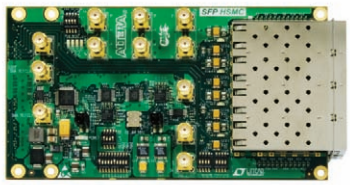
Review the HSMC Specification at:

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

HSMC Daughtercards from Terasic

terasIC
www.terasic.com

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
- 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**

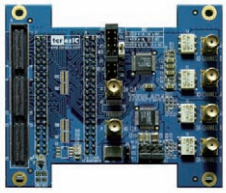
SDI Transceiver HSMC Board

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
- 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:
- Low-cost oscilloscope and pattern generator
- Communication Transceiver
- Platform for various modulation techniques

Features
- 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**

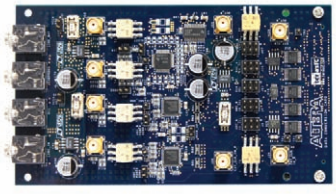
High-Definition Multimedia Interface

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
- One HSTC interface
- One HDMI transmitter with single transmitting port
- One HDMI receiver with dual receiving ports
- Two 2K EEPROM for storing EDID of two receiver ports separately
- Powered from 3.3V pins of HTSC connector

Price: $299 **Part Number: P0014**

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
- External Clock In / Out Interface
- Two 14-bit Analog to Digital (A/D) converter channel with 150MSPS
- Two 14-bit Digital to Analog (D/A) converter channel with 250MSPS
- One Audio CODEC with Line-In, Line-Out, MIC and Headphone

Price: $390 **Part Number: P0035**

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, and 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 (32-bit) 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 (32- and 64-bit)	Windows (32-bit only)

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 (32- and 64-bit), and Linux (32- and 64-bit) 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 www.altera.com/quartus2
Quartus II download www.altera.com/download
Quartus II literature www.altera.com/literature
Training www.altera.com/training

Quartus II design software features summary

Design flow methodology	Incremental compilation	Improves design timing closure and reduces design compilation times up to 70 percent. Supports team-based design.
	Up-front I/O assignment and validation	Enables PCB layout to begin earlier.
	Pin planner	Eases the process of assigning and managing pin assignments for high-density and high pin-count designs.
	SOPC Builder	Automates adding, parameterizing, and linking IP cores—including embedded processors, coprocessors, peripherals, memories, and user-defined logic.
	Off-the-shelf IP cores	Lets you construct your system-level design using IP cores from Altera's megafunction library and from Altera's third-party IP partners.
	Parallel development of FPGA prototypes and ASICs	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.
Performance and timing closure methodology	Physical synthesis optimization	Uses post place-and-route 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	Unmatched support for cross-probing between verification tools and design source files.
	Optimization advisors	Provides design-specific advice to improve design timing performance, resource usage, and power consumption.
	Timing closure floorplan editor	Enables analysis of timing data in the floorplan.
	Chip planner	Reduces verification time (while maintaining timing closure) by enabling small, post place-and-route design changes to be implemented in minutes.
	RTL viewer and technology map viewer	Provides schematic representation that can be used to analyze a design's structure before and after its implementation.
Verification	TimeQuest timing analyzer	Create, manage, and analyze complex timing constraints, and quickly perform advanced timing verification with TimeQuest, an ASIC-strength timing analysis tool with native SDC support.
	SignalTap™ II embedded logic analyzer	Supports the most channels, fastest clock speeds, largest sample depths, and most advanced triggering capabilities available in an embedded logic analyzer.
	PowerPlay technology	Enables you to accurately analyze and optimize both dynamic and static power consumption.
	SignalProbe routing	Routes an internal node to an unused or reserved pin for analysis with an external scope or logic analyzer.
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.

SOPC Builder

SOPC Builder is a Quartus II IP integration tool that enables you to quickly and easily build systems in minutes. Using SOPC Builder, you can focus on your custom user logic design, differentiating functions by eliminating manual system integration tasks. In addition to your custom logic, you can select common functions from the Altera or Altera partner IP core libraries to include in your system. SOPC Builder automatically generates interconnect logic to make the system work optimally and creates a testbench to verify functionality, saving valuable design time.

Peripheral expansion of stand-alone processors

SOPC Builder includes a component editor feature so you can easily interface to nearly any external processor or DSP device. If you create an SOPC Builder component interface to your processor, you can add additional I/O pins, prepackaged peripherals, or custom, self-made peripherals in just a few mouse clicks. SOPC Builder will build the system and output header files for your software development team. Your team can then access the peripherals from the external processor using their preferred integrated development environment.

Connecting to ASSPs or CPUs

Many ASSPs and processors include standard interface protocols, such as PCI, PCI Express, Serial RapidIO SPI, and I^2C. SOPC Builder and SOPC Builder-ready IP let you easily connect your FPGA system to popular external ASSPs and CPUs using the standard interface protocols.

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 basestations, 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:

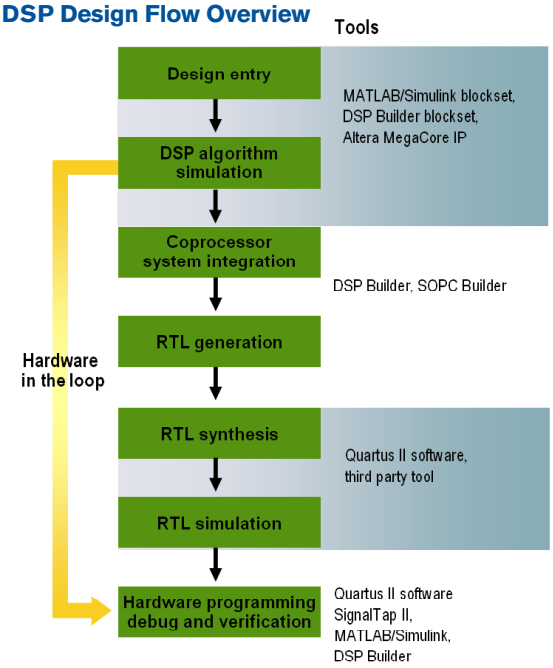
- DSP Builder—A MATLAB/Simulink-based design tool that enables system-level design
- Comprehensive collection of intellectual property (IP) functions for signal processing, including the largest suite of IP for video processing and floating-point operations
- Large portfolio of DSP reference designs 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.

SOPC Builder features summary

IP selection and parameter selection	Select and parameterize off-the-shelf IP from Altera and our partners or create your own custom components. Off-the-shelf IP includes the Nios II processor, memory interfaces, common embedded system peripherals, bridges and interfaces, DSP IP, and hardware accelerator peripherals.
System interconnect fabric generation	Uses an optimal interconnect fabric created specifically for the requirements of each system Integration tasks automatically performed by SOPC Builder include: • Data-path multiplexing between • design blocks • Address decoding • Wait-state generation • Dynamic bus sizing • Interrupt priority assignment • Clock domain crossing to connect peripherals or systems operating on different clock domains
Component editor	Allows you to create your own custom SOPC Builder components
IP reuse	Reuse any custom-created IP core designed for SOPC Builder in future products
Testbench generation	Outputs testbench suites to test-generated systems
Header file generation	Outputs a custom header file based on the memory map and components of the generated system

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

Linear Technology's Tested and Approved Solutions for Altera

Working closely with Altera and strategic board partners, Linear Technology proudly presents its tested and approved solutions for Altera FPGA-and CPLD-based systems. The following pages highlight several Linear Technology devices used on Altera development boards.

Core Voltage, and System IO Solutions					
uModule Regulators					
Linear Technology Parts	Description	Stratix Series	Cyclone Series	Arria Series	MAX II Series
LTM®4600	10A High Efficiency DC/DC µModule® Regulator	x	x		
LTM4601	12A DC/DC µModule Regulator with PLL, Output Tracking and Margining	x	x		
LTM4603	6A DC/DC µModule Regulator with PLL, Output Tracking and Margining		x		
LTM4604	Low Voltage, 4A DC/DC µModule Regulator with Tracking	x			
LTM4605	High Efficiency Buck-Boost DC/DC µModule Regulator	x			
LTM4612	Ultralow Noise 36VIN, 15VOUT, 5A, DC/DC µModule Regulator	x		x	
LTM4614	Dual 4A per Channel Low VIN DC/DC µModule Regulator	x			
LTM4616	Dual 8A per Channel Low VIN DC/DC µModule Regulator	x			
LTM4616	Dual 8A per Channel Low VIN DC/DC µModule Regulator	x			
LTM8023	2A, 36V DC/DC µModule Regulator	x			
Switching Regulators					
Linear Technology Parts	Description	Stratix Series	Cyclone Series	Arria Series	MAX II Series
LT®1374	4.5A, 500kHz Step-Down Switching Regulator	x			
LT1931	1.2MHz/2.2MHz Inverting DC/DC Converters in ThinSOT	x	x		
LT1959	4.5A, 500kHz Step-Down Switching Regulator		x		
LT3461	1.3MHz/3MHz Step-Up DC/DC Converters with Integrated Schottky in ThinSOT		x		
LT3473	Micropower 1A Boost Converter with Schottky and Output Disconnect		x		
LT3481	36V, 2A, 2.8MHz Step-Down Switching Regulator with 50µA Quiescent Current		x		
LT3510	Monolithic Dual Tracking 2A Step-Down Switching Regulator		x		
LTC®1735	High Efficiency Synchronous Step-Down Switching Regulator		x		
LTC3414	4A, 4MHz, Monolithic Synchronous Step-Down Regulator	x	x		
LTC3728	Dual, 550kHz, 2-Phase Synchronous Step-Down Switching Regulator	x		x	
LDO Regulators					
Linear Technology Parts	Description	Stratix Series	Cyclone Series	Arria Series	MAX II Series
LT1117	800mA Low Dropout Positive Regulators Adjustable and Fixed 2.85V,3.3V, 5V		x		
LT1121	Micropower Low Dropout Regulators with Shutdown			x	
LT1761	100mA, Low Noise, LDO Micropower Regulators in SOT-23	x	x		
LT1762	150mA, Low Noise, LDO Micropower Regulators		x		
LT1764	3A, Fast Transient Response, Low Noise, LDO Regulators	x			
LT1963	1.5A, Low Noise, Fast Transient Response LDO Regulators	x	x	x	x
LT3010	50mA, 3V to 80V Low Dropout Micropower Linear Regulator	x			
LT3023	Dual 100mA, Low Dropout, Low Noise, Micropower Regulator		x		

Linear Technology's Tested and Approved Solutions for Altera Continued...

Powering High Speed Serial IOs					
Linear Technology Parts	Description	Stratix Series	Cyclone Series	Arria Series	MAX II Series
LT30801(-1)	Parallelable 1.1A Adjustable Single Resistor Low Dropout Regulator	x		x	
LT3510	Monolithic Dual Tracking 2A Step-Down Switching Regulator		x		
LTC3025(-1)	500mA Micropower VLDO Linear Regulator	x			
LTC3026	1.5A Low Input Voltage VLDO Linear Regulator	x		x	
LTM4604	Low Voltage, 4A DC/DC µModule® Regulator with Tracking	x			

DDR Memory Termination Solutions					
Linear Technology Parts	Description	Stratix Series	Cyclone Series	Arria Series	MAX II Series
LTC3413	3A, 2MHz Monolithic Synchronous Regulator for DDR/QDR Memory Termination	x	x		

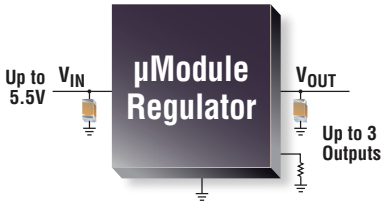
ADC & DAC Solutions					
Linear Technology Parts	Description	Stratix Series	Cyclone Series	Arria Series	MAX II Series
LTC1863	Micropower, 3V, 12-Bit, 8-Channel 175ksps ADCs		x		
LTC2402	2-Channel 24-Bit µPower No Latency Delta-Sigma ADC	x	x		
LTC2418	16-Channel 24-Bit No Latency Delta Sigma ADC	x		x	

Signal Conditioning and Timing Solutions					
Linear Technology Parts	Description	Stratix Series	Cyclone Series	Arria Series	MAX II Series
LTC6800	Rail-to-Rail Input and Output, Instrumentation Amplifier		x		
LTC6902	Multiphase Oscillator with Spread Spectrum Frequency Modulation	x			
LTC6908	Dual Output Oscillator with Spread Spectrum Modulation	x			

Other System Level Solutions					
Linear Technology Parts	Description	Stratix Series	Cyclone Series	Arria Series	MAX II Series
LTC2901-1	Programmable Quad Supply Monitor with Adjustable Reset and Watchdog Timers		x		
LTC3455	Dual DC/DC Converter with USB Power Manager and Li-Ion Battery Charger		x		
LTC4151	High Voltage I^2C Current and Voltage Monitor	x			
LTC4352	Low Voltage Ideal Diode Controller with Monitoring	x			
LTC4357	Positive High Voltage Ideal Diode Controller	x			
LTC4358	5A Ideal Diode	x			
LTC4416	36V, Low Loss Dual PowerPath Controllers for Large PFETs			x	

Linear Technology DC/DC µModule® Regulators

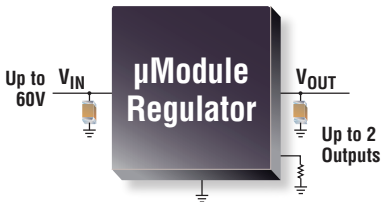
Efficient | Simple | Reliable



Low Input Voltage Step-Down (Buck) (≤ 3.3V and 5V Input Rails)

Part Number	Output Channels	Input Voltage (V) Min ‡	Input Voltage (V) Max	Output Voltage (V) Min	Output Voltage (V) Max	Output Current (A)	LGA Package Dimensions (mm)
LTM4611	1	1.5	5.5	0.8	5	15	15 × 15 × 4.3
LTM4604A*	1	2.375	5.5	0.8	5	4	9 × 15 × 2.3
LTM4614	2	2.375	5.5	0.8	5	4	15 × 15 × 2.8
LTM4615	3	2.375	5.5	0.8	5	4	15 × 15 × 2.8
LTM4608A*	1	2.7	5.5	0.6	5	8	9 × 15 × 2.8
LTM4616	2	2.7	5.5	0.6	5	8	15 × 15 × 2.8

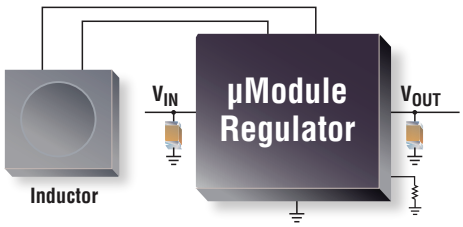
*The LTM4604A and LTM4608A are recommended for new designs over their non-A versions



Mid Input Voltage Step-Down (Buck) (≤ 5V, 12V Rails and Above)

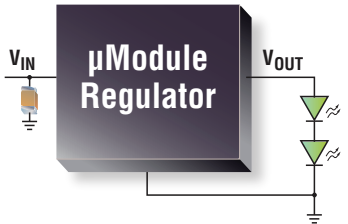
Part Number	Output Channels	Input Voltage (V) Min	Input Voltage (V) Max ‡	Output Voltage (V) Min	Output Voltage (V) Max	Output Current (A)	LGA Package Dimensions (mm)
LTM4602	1	4.5	20	0.6	5	6	15 × 15 × 2.8
LTM4603	1	4.5	20	0.6	5	6	15 × 15 × 2.8
LTM4600	1	4.5	20	0.6	5	10	15 × 15 × 2.8
LTM4605	1	4.5	20	0.8	16	12*	15 × 15 × 2.8
LTM4601	1	4.5	20	0.6	5	12	15 × 15 × 2.8
LTM4601-1	1	4.5	20	0.6	5	12	15 × 15 × 2.8
LTM4601A	1	4.5	20	0.6	5	12	15 × 15 × 2.8
LTM4601A-1	1	4.5	20	0.6	5	12	15 × 15 × 2.8
LTM4619	2	4.5	26.5	0.8	5	4	15 × 15 × 2.8
LTM4618	1	4.5	26.5	0.8	5	6	9 × 15 × 4.3
LTM4602HV	1	4.5	28	0.6	5	6	15 × 15 × 2.8
LTM4603HV	1	4.5	28	0.6	5	6	15 × 15 × 2.8
LTM4606	1	4.5	28	0.6	5	6	15 × 15 × 2.8
LTM4600HV	1	4.5	28	0.6	5	10	15 × 15 × 2.8
LTM4601AHV	1	4.5	28	0.6	5	12	15 × 15 × 2.8
LTM4601HV	1	4.5	28	0.6	5	12	15 × 15 × 2.8
LTM8020	1	4	36	1.2	5	0.2	6.25 × 6.25 × 2.3
LTM8021	1	3	36	0.8	5	0.5	6.25 × 11.25 × 2.8
LTM8022	1	3.6	36	0.8	10	1	9 × 11.25 × 2.8
LTM8031	1	3.6	36	0.8	10	1	9 × 15 × 2.8
LTM8023	1	3.6	36	0.8	10	2	9 × 11.25 × 2.8
LTM8032	1	3.6	36	0.8	10	2	9 × 15 × 2.8
LTM8025	1	3.6	36	0.8	24	3	9 × 15 × 4.3
LTM4612	1	5	36	3.3	15	5	15 × 15 × 2.8
LTM4609	1	4.5	36	0.8	34	10*	15 × 15 × 2.8
LTM4607	1	4.5	36	0.8	24	10*	15 × 15 × 2.8
LTM8027	1	4.5	60	2.5	24	4	9 × 15 × 4.3

*Output current in step-down only mode (requires external inductor)



Buck-Boost Regulator (External Inductor)

Part Number	Output Channels	Input Voltage (V) Min	Input Voltage (V) Max	Output Voltage (V) Min	Output Voltage (V) Max ‡	Output Current (A)	LGA Package Dimensions (mm)
LTM4605	1	4.5	20	0.8	16	5	15 × 15 × 2.8
LTM4607	1	4.5	36	0.8	24	5	15 × 15 × 2.8
LTM4609	1	4.5	36	0.8	34	4	15 × 15 × 2.8



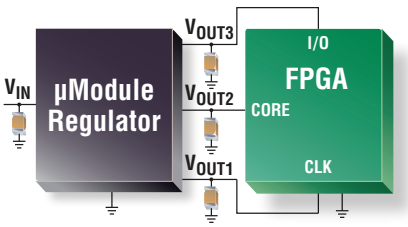
Step-Down Current Regulator/LED Driver

Part Number	Output Channels	Input Voltage (V) Min	Input Voltage (V) Max	Output Voltage (V) Min	Output Voltage (V) Max	Output Current (A)	LGA Package Dimensions (mm)
LTM8040	1	4	36	2.5	1	1	9 × 15 × 2.8

‡ Indicates sorted column

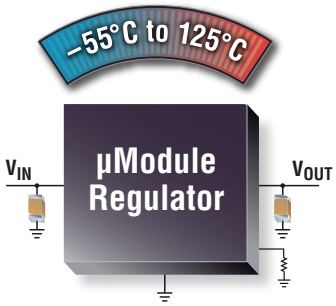
Linear Technology DC/DC µModule® Regulators

Efficient | Simple | Reliable



Multiple Output DC/DC Regulator

Part Number	Outputs ‡ Buck/LDO	Input Voltage (V) Min	Input Voltage (V) Max	Output Voltage (V) Min	Output Voltage (V) Max	Output Current (A)	Current Share	Independent Enable	Clock Input	Track Mrgn
Dual Output										
LTM4614	2/0	2.375	5.5	0.8	5	Dual 4A	N	Y	N	Y
LTM4616	2/0	2.7	5.5	0.6	5	Dual 8A	Y	Y	Y	Y
LTM4619	2/0	4.5	26.5	0.8	5	Dual 4A	Y	Y	Y	Y
Triple Output										
LTM4615	2/1	2.375	5.5	0.8	5	Dual 4A, 1.5	N	Y	N	Y

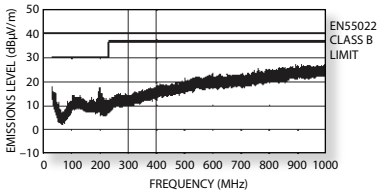


Wide Temperature (–55°C to 125°C) Fully Tested DC/DC Regulator

Part Number	Output Channels	Input Voltage (V) Min	Input Voltage (V) Max	Output Voltage (V) Min	Output Voltage (V) Max ‡	Output Current (A)	Enable	Thermal Shutdown	Soft Start	V_{OUT} Margining
LTM8020MP	1	4	36	1.2	5	0.2	Y	N	N	N
LTM4606MP	1	4.5	28	0.6	5	6	Y	N	Ext	Y
LTM4608AMP	1	2.7	5.5	0.6	5	8	Y	Y	Ext/Int	Y
LTM4600HVMP	1	4.5	28	0.6	5	10	Y	N	Ext	N
LTM4601AHVMP	1	4.5	28	0.6	5	12	Y	N	Ext	Y
LTM8022MP	1	3.6	36	0.8	10	1	Y	N	Ext	N
LTM8023MP	1	3.6	36	0.8	10	2	Y	N	Ext	N
LTM8032MP	1	3.6	36	0.8	10	2	Y	N	Ext	N
LTM4612MP	1	5	36	3.3	15	5	Y	N	Ext	Y
LTM8025MP	1	3.6	36	0.8	24	3	Y	Y	Ext	N
LTM8027MP	1	4.5	60	2.5	24	4	Y	N	Ext	N
LTM4609MP*	1	4.5	36	0.8	34	4	Y	N	Ext	N

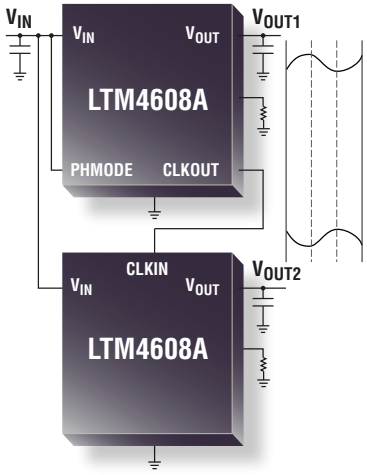
*Requires external inductor

LTM8032 EMI Performance



EN55022 Class B (CISPR22) Certified Low Noise

Part Number	Outputs Channels	Input Voltage (V) Min	Input Voltage (V) Max	Output Voltage (V) Min	Output Voltage (V) Max	Output ‡ Current (A)	SYNC Input	PGood Output	LGA Package Dimensions (mm)
LTM8020	1	4	36	1.2	5	0.2	N	N	9 × 15 × 2.3
LTM8021	1	3	36	0.8	5	0.5	N	N	15 × 15 × 2.8
LTM8031	1	3.6	36	0.8	10	1	Y	Y	15 × 15 × 2.8
LTM8032	1	3.6	36	0.8	10	2	Y	Y	9 × 15 × 2.8



Dual Synchronized LTM4608A with Outputs 180° Out-of-Phase

Synchronizable (PLL Input) DC/DC Regulator

Part Number	Input Voltage (V) Min	Input Voltage (V) Max	Output Voltage (V) Min	Output Voltage (V) Max	Output ‡ Current (A)	Current Share	SYNC Freq (MHz)	CLK Out	Soft Start	PGood Output
LTM8022	3.6	36	0.8	10	1	Y	0.25–2.0	N	Ext	Y
LTM8031	3.6	36	0.8	10	1	Y	0.25–2.0	N	Ext	Y
LTM8023	3.6	36	0.8	10	2	Y	0.25–2.0	N	Ext	Y
LTM8032	3.6	36	0.8	10	2	Y	0.25–2.0	N	Ext	Y
LTM8025	3.6	36	0.8	24	3	Y	0.25–2.0	N	Ext	Y
LTM4619	4.5	26.5	0.8	5	Dual 4A	Y	0.25–0.78	N	Ext	Y
LTM8027	4.5	60	2.5	24	4	N	0.1–0.5	N	Ext	N
LTM4609	4.5	36	0.8	34	4	Y	0.2–0.4	N	Ext	Y
LTM4607	4.5	36	0.8	24	5	Y	0.2–0.4	N	Ext	Y
LTM4605	4.5	20	0.8	16	5	Y	0.2–0.4	N	Ext	Y
LTM4612	5	36	3.3	15	5	Y	0.2–1.3	N	Ext	Y
LTM4603	4.5	20	0.6	5	6	Y	0.7–1.3	N	Ext	Y
LTM4618	4.5	26.5	0.8	5	6	Y	0.4–0.78	N	Ext	Y
LTM4603HV	4.5	28	0.6	5	6	Y	0.7–1.3	N	Ext	Y
LTM4608A	2.7	5.5	0.6	5	8	Y	0.75–2.25	Y	Ext/Int	Y
LTM4616	2.7	5.5	0.6	5	Dual 8A	Y	0.75–2.25	Y	Ext/Int	Y
LTM4601/-1	4.5	20	0.6	5	12	Y	0.6–1.1	N	Ext	Y
LTM4601A/-1	4.5	20	0.6	5	12	Y	0.6–1.1	N	Ext	Y
LTM4601HV	4.5	28	0.6	5	12	Y	0.6–1.1	N	Ext	Y
LTM4601AHV	4.5	28	0.6	5	12	Y	0.6–1.1	N	Ext	Y
LTM4611	1.5	5.5	0.8	5	15	Y	0.36–0.71	N	Ext	Y

Monolithic Switching Regulators

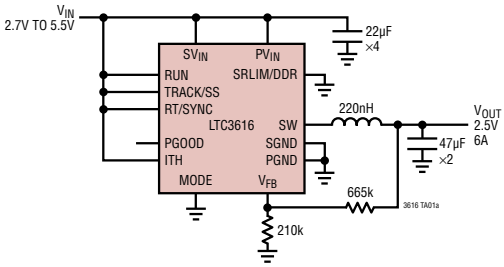
Trackable, Phase-Lockable, Current Sharing Monolithic DC/DC Regulators

Obtaining a high current output circuit footprint is easy thanks to the Linear Technology family of high switching frequency, synchronous monolithic step-down DC/DC converters. Key features include current mode topologies for excellent line and load transient response, spread spectrum operation for low EMI, output currents up to 8A from a single package, high conversion efficiency to minimize thermal issues, input tracking for easy supply sequencing and the ability to stack multiple converters in parallel for accurate current sharing of up to 84A output current.

LTC3616 - 6A, 4MHz, Monolithic Synchronous Step-Down Regulator

Key Features

- High-efficiency: Up to 95 percent
- 6A output current
- Low quiescent current: 75µA
- Programmable frequency: 300kHz to 4MHz
- 2.25V to 5.5V input voltage range
- VOUT (MIN) = 0.6V
- Available in 3x5 QFN
- Evaluation kit part #: DC1461A



Selected Monolithic Converters

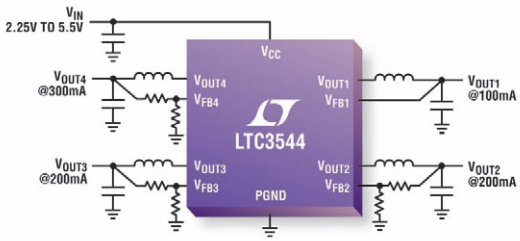
Part Number	V_{IN} Range (V)	I_{OUT} (A)	Frequency	Features	Package
LTC3411A	2.5 to 5.5	1.25	4MHz	±1.5A DDR Mode	QFN, TSSOP-20E
LTC3612	2.25 to 5.5	3	4MHz	V_{OUT}(MIN) = 0.8V	TSSOP-16E/QFN
LTC3413	2.25 to 5.5	±3	2MHz	For DDR/QDR	TSSOP-16E
LTC3614	2.25 to 5.5	4	4MHz	±2A DDR Mode	QFN
LTC3616	2.25 to 5.5	6	4MHz	±3A DDR Mode	QFN
LTC3415	2.5 to 5.5	7	2MHz	PolyPhase®, Stackable	QFN
LTC3418	2.25 to 5.5	8	4MHz	Tracking input	QFN

Multioutput DC/DC Regulators

LTC3544 – Quad Synchronous Step-Down Regulator

Key Features

- Four independent regulators provide up to 300, 200, 200, and 100mA output current
- 2.25V to 5.5V input voltage ranger
- No 2.25MHz constant frequency operation
- Low ripple (20 mVP-P) burst mode operation
- 0.8V reference allows low output voltages
- Evaluation kit part #: DC1040A-B



Selected Multifunction, Multioutput Regulators

Part Number	Buck (I_{OUT})	Boost (I_{SW})	Buck-Boost (I_{OUT})	LDO (I_{OUT})	Package (mm)
LTC3544	300mA + 200mA + 200mA + 100mA	–	–	–	3 x 3 QFN-16
LTC3562	600mA + 600mA + 400mA + 400mA	–	–	–	3 x 3 QFN-20
LTC3445	600mA	–	–	50mA + 50mA	4 x 4 QFN-24
LTC3670/72	400mA	–	–	150mA + 150mA	2 x 3 DFN-12 / 2 x 2 DFN-8
LTC3100	250mA	800mA	–	100mA	3 x 3 QFN-16
LTC3446	1A	–	–	300mA + 300mA	3 x 4 DFN-14
LTC3541	500mA	–	–	300mA	3 x 3 DFN-10
LTC3545	800mA + 800mA + 800mA	–	–	–	3 x 3 QFN-16
LTC3522	200mA	–	400mA	–	3 x 3 QFN-10
LTC3520	600mA	–	1A	LDO Controller	4 x 4 QFN-24
LTC3537	–	600mA	–	100	3 x 3 QFN-16
LTC3523 /-2	400mA	600mA	–	–	3 x 3 QFN-16
LTC3527	–	600mA + 400mA	–	–	3 x 3 QFN-16
LTC3547	300mA + 300mA	–	–	–	2 x 3 DFN-8
LTC3419	600mA + 600mA	–	–	–	3 x 3 DFN-10, MS10
LTC3548	800mA + 800mA	–	–	–	3 x 3 DFN-10, MS10E
LTC3407A-2	800mA + 800mA	–	–	–	3 x 3 DFN-10, MS10E
LTC3417A-2	1.5A + 1A	–	–	–	3 x 5 DFN-16, TSSOP-20E

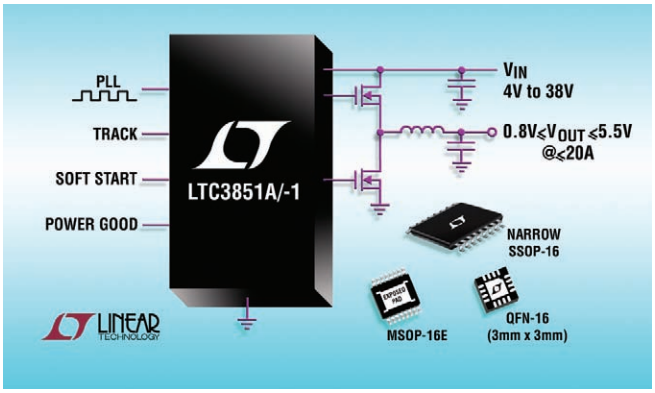
High-Performance Step-Down DC/DC Controllers

Linear Technology designs and manufactures a broad range of step-down DC/DC controllers for a wide variety of applications. These controllers offer very high efficiencies, wide input voltage ranges, multiple output capability, multiphase operation, low quiescent current, tracking, high step-down ratios, clock synchronization as well as a host of protection features.

LTC3851A/-1: Synchronous Step-Down Controller

Key Features

- High Efficiency: Up to 95%
- Current Mode Control with Onboard MOSFET Drivers
- 90ns Minimum On-time for High Step-Down Ratios
- R_{SENSE} or DCR Current Sensing
- Phase Lockable Fixed Frequency: 250kHz to 750kHz
- Very Low Dropout Operation: 99% Duty Cycle
- Adjustable Soft-Start or Tracking
- Selectable Continuous, Pulse Skip or Burst Mode Operation
- Onboard LDO for Bias Voltage



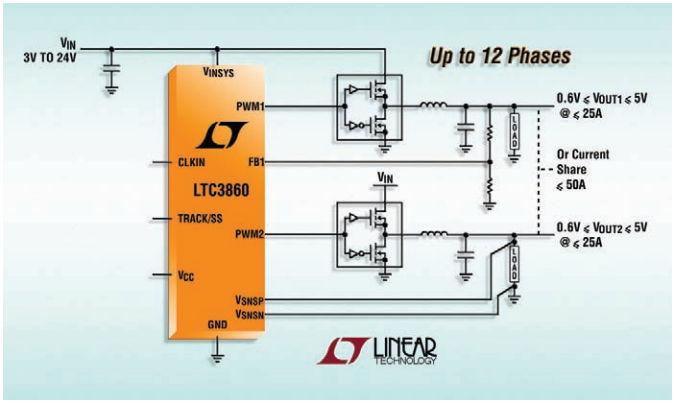
Selected Single Output Step-Down Controllers

Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT} MAX (A)	Operating Frequency (kHz)	Remote Sense	Package
LTC3854	4.5 to 38	0.8 to 5.5	20	400	–	MSOP-12, 2x3 QFN-12
LTC3851A/-1	4 to 38	0.8 to 5.5	25	250 to 750	–	MSOP-16, 3x3 QFN-16, SSOP-16
LTC3775	4.5 to 38	0.6 to 0.8V_{IN}	25	250 to 1MHz	–	3x3 QFN-16
LTC3878	4 to 38	0.8 to 0.9V_{IN}	25	Constant On-Time	–	SSOP-16
LTC3879	4 to 38	0.8 to 0.9V_{IN}	25	Constant On-Time	–	MSOP-16, 3x3 QFN-16
LTC3824	4 to 60	0.8 to V_{IN}	5	200 to 600	–	MSOP-10E
LTC3891	4 to 60	0.8 to 24	25	50 to 900	–	3x4 QFN-20, TSSOP-20
LTC3856	4.5 to 38	0.6 to 5.25	50	250 to 750	Yes	5x5 QFN-32, TSSOP-38
LTC3829	4.5 to 38	0.6 to 5.25	75	250 to 750	Yes	5x7 QFN-38, TSSOP-38

LTC3860: Dual, Multiphase Step-Down Controller with Current Sharing

Key Features

- Operates with external Power Blocks, Dr MOS or N-Channel MosFets and Gate Drivers
- Differential Amplifier for Output Voltage Sense
- Up to 12-Phase Operation
- Very Accurate Current Share Between Channels
- 20ns Minimum On-Time for High Step-Down Ratios
- High Efficiency: Up to 95%
- Phase Lockable Fixed Frequency: 250kHz to 1.25MHz
- Tri-State Output Drive



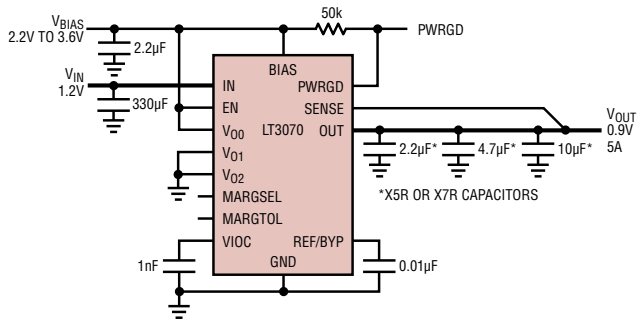
Selected Dual Output Step-Down Controllers

Part Number	V_{IN} Range (V)	V_{OUT} Range (V)	I_{OUT} MAX (A)	Operating Frequency (kHz)	Remote Sense	Package
LTC3850/-1	4.5 to 28	0.8 to 5.5	25/25	250 to 780	–	4x4 QFN-28, 4x5 QFN-28, SSOP-28
LTC3860	3 to 24	0.6 to 5	30/30	200 to 1.2MHz	Yes	5x5 QFN-32
LTC3865	4.5 to 38	0.6 to 5	25/25	250 to 770	–	5x5 QFN-32, TSSOP-38
LTC3855	4.5 to 38	0.6 to 12.5	25/25	250 to 770	Yes	6x6 QFN-40, SSOP-38
LTC3890/-1	4 to 60	0.8 to 24	25/25	50 to 900	–	5x5 QFN-32
LT3742	3.5 to 30	0.8 to V_{IN}	5/5	500	–	4x4 QFN-24
LTC3836	2.75 to 4.5	0.6 to 0.97V_{IN}	10/10	250 to 850	–	SSOP-28, 4x5 QFN-28
LTC3857/-1	4 to 38	0.8 to 24	25/25	50 to 900	–	5x5 QFN-32, SSOP-28
LTC3868/-1	4 to 24	0.8 to 14	25/25	50 to 900	–	5x5 QFN-32, 4x5 QFN-28, SSOP-28

Ultralow Dropout High Current and Directly Parallelable LDO Regulators

UltraFast™, Ultra-Low Dropout, High Current LDOs

The LT3070 and LT3071 are digitally programmable linear regulators with the lowest dropout voltage, lowest noise and fastest transient response of any monolithic 5A LDO currently available. Dropout voltage at 5A is an ultralow 85mV. Output voltage noise at 5A is only 25uV$_{RMS}$ over a 10Hz to 100kHz bandwidth. The LT3070 and LT3071's 1MHz unity gain bandwidth, coupled with their minimum 15uF ceramic output capacitance, provides a mere 30mV of overshoot/undershoot in response to a fast 4.5A output load step, saving significant bulk capacitance, space and cost. The ICs are ideal for efficiently powering low voltage, high current devices such as FPGAs, DSPs, ASICs, microprocessors, sensitive communication supplies, server/storage devices, and for usage in post-buck regulation applications.



UltraFast, Ultralow Dropout, High Current LDOs

Part Number	I_{OUT}	V_{IN} Min (V)	V_{IN} Max (V)	Reference Voltage (V)	Dropout Voltage ($V@I_{OUT}$)	I_Q (Supply)	Package
LT3070	5A	0.95	3	0.8	0.09	1.1mA	QFN-28
LT3071 #	5A	0.95	3	0.8	0.09	1.1mA	QFN-28

analog margining and output current monitor

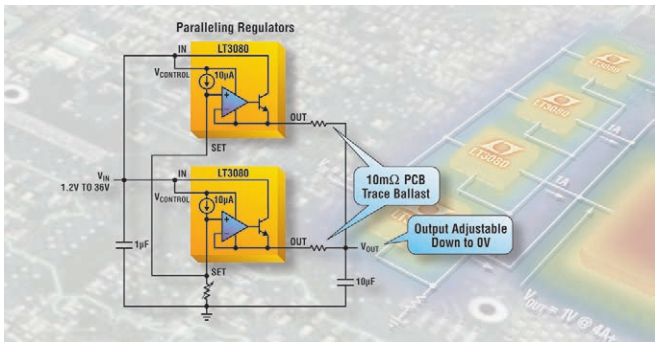
Easily Paralleled: Get High Output Current without Hot Spots

The LT308X family is a new generation of linear regulators compatible with modern surface-mount circuit design. Input voltage is specified up to 36V, providing good margin for transients in many applications. Also, the outputs are adjustable with a single resistor down to 0V and devices are easily paralleled for higher output current or to spread PCB heat. The collector of the power device can be connected separately from the control circuitry to enable dropout voltages of only 300mV, ensuring high efficiency conversion.

LT3080/-1 – Adjustable 1.1A Single Resistor Low Dropout Regulator

Key Features

- Outputs can be directly paralleled
- Output current: 1.1A
- Low dropout voltage: 300mV at 1.1A (two-supply operation)
- Low noise: 40µV$_{RMS}$ (10Hz to 100kHz)
- Stable 10µA current source reference
- Single resistor programs V_{OUT}
- V_{OUT} down to 0V
- V_{IN} up to 36V (40V abs max.)
- Evaluation Kit Part #: DC1294A



Directly Paralleled, Single Resistor Adjustable LDOs

Part Number	I_{OUT}	V_{IN} Min (V)	V_{IN} Max (V)	Reference Voltage (V)	Dropout Voltage ($V@I_{OUT}$)	I_Q (Supply)	Package
LT3082	0.2A	1.2	40	current 10µA	1.3	510uA	DFN-8, SOT-23-8, SOT-223-3
LT3085	0.5A	1.2	36	current 10µA	0.275 #	510uA	DFN-6, MSOP-8E
LT3080/-1	1.1A	1.2	36	current 10µA	0.35 # (1.35, SOT-223)	1mA	DFN-8, MSOP-8E, SOT-223, TO-220, DD-5

2-supply operation

Low Dropout Dual LDO Regulators

Selected Dual Output LDO Regulators

Part Number	I_{OUT}	V_{IN} Min (V)	V_{IN} Max (V)	Reference Voltage (V)	Dropout Voltage ($V@I_{OUT}$)	I_Q (Supply)	Package
LT3023	Dual 100mA	1.8	20	1.22	0.3	40µA	MSOP-10E/DFN-10
LT3027	Dual 100mA	1.8	20	1.22	0.3	40µA	MSOP-10E/DFN-10
LT3024	Dual 500/100mA	1.8	20	1.22	0.3	60µA	TSSOP-16E/ DFN-12
LT3028	Dual 500/100mA	1.8	20	1.22	0.3	60µA	TSSOP-16E/ DFN-12
LT3029	Dual 500/500mA	1.8	20	1.22	0.3	100µA	MSOP-16E/DFN-16
LT3032	Dual ±150mA	±2.3	±20	± 1.22	±0.3	60µA	DFN-14

Low Noise Low Dropout Regulators and Very Low Dropout (VLDO) Regulators

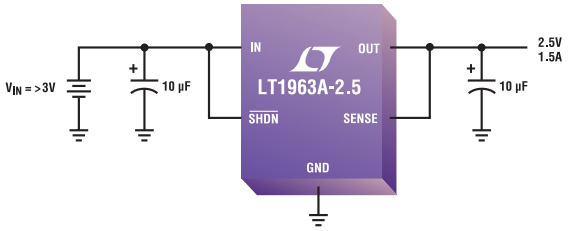
Linear Technology manufactures a broad line of high performance low dropout linear regulators (LDO). These LDOs offer low dropout, fast transient response, excellent line and load regulation, a very wide input voltage range from 0.9V to 45V, and low output voltage down to 0.2V.

LDO Regulators

LT1963/A – 1.5A, Low Noise, Fast Transient Response LDO Regulators

Key Features

- Optimized for fast transient response
- Output current: 1.5A
- Dropout voltage: 340mV
- Low noise: 40 μV_{RMS} (10Hz to 100kHz)
- Fixed output voltages: 1.5V, 1.8V, 2.5V, 3.3V
- Adjustable output range: 1.21V to 20V
- Evaluation Kit Part #: DC367A



Selected LDO Regulators

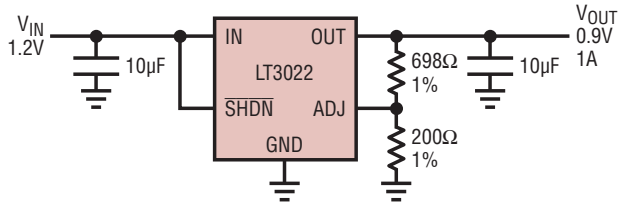
Part Number	I_{OUT}	V_{IN} Min (V)	V_{IN} Max (V)	Reference Voltage (V)	Dropout Voltage ($V@I_{OUT}$)	I_Q (Supply)	Package
LT1761	100mA	1.8	20	1.22	0.3	20µA	SOT-23
LT3060	100mA	1.7	45	0.6	0.3	40µA	DFN-8/SOT-23-8
LT1762	150mA	1.8	20	1.22	0.3	25µA	MSOP-8
LT1962	300mA	1.8	20	1.22	0.27	30µA	MSOP-8
LT1763	500mA	1.8	20	1.22	0.3	30µA	DFN-12/SO-8
LT1965	1.1A	1.8	20	1.20	0.29	500µA	DFN-8/DD/MSOP-8E/TO-220
LT1963/A	1.5A	2.1	20	1.21	0.34	1mA	TSSOP-16E/DD/TO-220/ SOT-223/SO-8
LT1764/A	3A	2.7	20	1.21	0.34	1mA	DD/TO-220/TSSOP-16E
LT1964	200mA	-1.9	-20	-1.21	0.34	30µA	SOT-23

VLDO Regulators

LT3022 – 1A 0.9V to 10V VLDO Linear Regulator

Key Features

- Low dropout voltage: 145mV at I_{OUT} = 1A
- Adjustable output range: 0.2V to 9.5V
- Output current: up to 1A
- Quiescent current: 400µA (Typ)
- Stable with low ESR, ceramic output capacitors (10µF min)
- Excellent supply rejection even near dropout
- Evaluation Kit Part #: DC932A



Selected VLDO Regulators

Part Number	I_{OUT}	V_{IN} Min (V)	V_{IN} Max (V)	Reference Voltage (V)	Dropout Voltage ($V@I_{OUT}$)	I_Q (Supply)	Package
LT3020	100mA	0.9	10	0.2	0.15	120µA	DFN-8/MSOP-8
LTC1844	150mA	1.6	6.5	1.25	0.11	40µA	SOT-23
LTC3025	300mA	0.9	5.5	0.4	0.05	54µA	2x2 DFN-6
LTC3035	300mA	1.7	5.5	0.4	0.045	100µA	2x3 DFN-8
LT3021	500mA	0.9	10	0.2	0.145	120µA	DFN-16/SO-8
LTC3025-1/2/3/4	500mA	0.9	5.5	0.4	0.085	54µA	2x2 DFN-6
LT3022	1A	0.95	10	0.2	0.16	400µA	DFN-16/TSSOP-16E
LTC3026	1.5A	1.14	3.5/5.5	0.4	0.1	400µA	DFN-10/MSOP-10E

Analog-to-Digital Converters

Linear Technology's comprehensive high speed ADC portfolio spans resolutions of 10-,12-,14-,16-bit ADCs with sample rates from 1Msps (min) up to 250Msps. Each color in the chart represents a pin-compatible family, with choices of parallel CMOS or LVDS outputs, serial LVDS, or 2-wire JESD204-compliant serial outputs that interface directly to an FPGA's SerDes port. For higher integration, consider the LTM900x family of signal chain receivers.

Lowest Power High Speed ADCs

		10Msps	25Msps	40Msps	65Msps	80Msps	105Msps	125Msps to 150Msps	160Msps to 185Msps	210Msps to 250Msps
16-Bit	Single	2202	2203	2204	2205 2215 2272	2206 2216 2273	2207 2217 2274	2208	2209	
14-Bit	Single	2245	2246 2256-14	2247 2257-14	2205-14 2248 2258-14	2206-14 2249 2259-14	2207-14 2254 2260-14	2208-14 2255 2261-14 2262-14		
	Dual	2295	2296 2263-14	2297 2264-14	2298 2265-14	2299 2266-14	2284 2267-14	2285 2268-14		
	Quad		2170-14	2171-14	2172-14	2173-14	2174-14	2175-14		
12-Bit	Single	2225	2226 2256-12	2227 2257-12	2228 2258-12	2223 2229 2259-12	2222 2252 2260-12	2224 2253 2221 2261-12 2262-12	2240-12 2220-1 2220	2242-12 2241-12
	Dual	2290	2291 2263-12	2292 2264-12	2293 2265-12	2294 2266-12	2282 2267-12	2283 2268-12		
	Quad		2170-12	2171-12	2172-12	2173-12	2174-12	2175-12		
10-Bit	Single		2236	2237	2238	2233 2239	2232 2250	2234 2251 2231	2240-10 2230	2242-10 2241-10
	Dual		2286	2287	2288	2289	2280	2281		

Parallel

- 6x6 — 1.8V Lowest Power ADCs, CMOS/DDR CMOS/DDR LVDS
- 5x5 — 3V ADCs, CMOS
- 9x9 — 3V Dual ADCs, CMOS
- 7x7 — 3.3V High IF Sampling ADCs, CMOS
- 7x7 — 3.3V High Performance ADCs, CMOS/LVDS
- 9x9 — 3.3V/2.5V Pin-Compatible ADCs, CMOS/LVDS

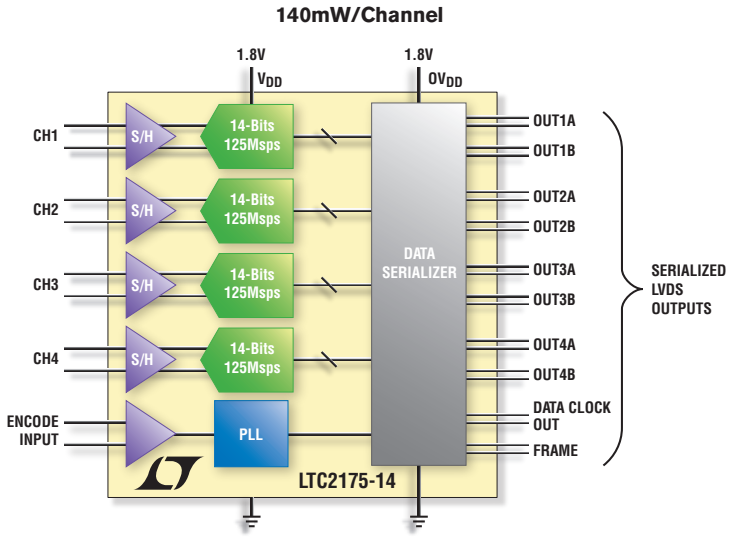
Serial

- 6x6 — 3.3V 2-Wire Serial ADCs
- 6x6 — 1.8V Dual ADCs, Serial LVDS
- 7x8 — 1.8V Quad ADCs, Serial LVDS

LTC2175 14-Bit/12-Bit 25Msps to 125Msps Quad/Dual ADC Family

Key Features

- Quad/Dual-Channel Simultaneous Sampling ADCs (LTC2175/LTC2268)
- 73.1dB SNR (14-Bit Resolution)
- 88dB SFDR
- Low Power: 558mW (140mW/Channel) at 125Msps (LTC2175)
- Single 1.8V Analog & Digital Supplies
- Serial LVDS Outputs
- Selectable Input Ranges: $1V_{P-P}$ to $2V_{P-P}$
- 800MHz Full-Power Bandwidth S/H
- Optional Data Output Randomizer
- Optional Clock Duty Cycle Stabilizer
- 1mW Sleep and 50mW Nap Modes
- Serial SPI Port for Configuration
- Pin-Compatible 14-Bit and 12-Bit Versions
- 52-Pin (7mm × 8mm) QFN Package (Quad Versions)
- 40-Pin (6mm × 6mm) QFN Package (Dual Versions)



One-Third the Power of Comparable High Speed ADCs

Our newest high speed ADC family achieves one-third the power consumption of alternate solutions without compromising AC performance. Operating from a low 1.8V supply, the 14-bit, 125Msps LTC2175 dissipates only 140mW/channel while maintaining 73.1dB SNR and 88dB SFDR at baseband. Digital outputs can be configured as single lane (<65Msps) or dual lane serial LVDS to minimize FPGA pin count.

	25Msps	40Msps	65Msps	80Msps	105Msps	125Msps
14-Bit	2170-14 2263-14	2171-14 2264-14	2172-14 2265-14	2173-14 2266-14	2174-14 2267-14	2175-14 2268-14
12-Bit	2170-12 2263-12	2171-12 2264-12	2172-12 2265-12	2173-12 2266-12	2174-12 2267-12	2175-12 2268-12
Power Consumption	40mW/ch	50mW/ch	80mW/ch	95mW/ch	110mW/ch	140mW/ch

QFN52 Quad ADC Serial LVDS Outputs

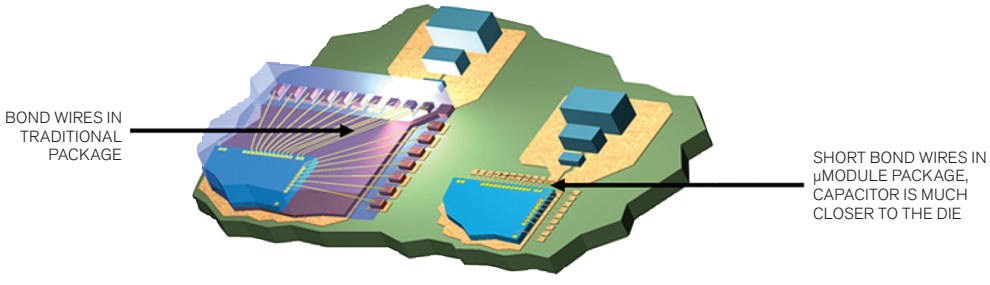
QFN40 Dual ADC Serial LVDS Outputs

Integrated System in a Package (SiP)

The LTM900x µModule family includes receiver subsystems that incorporate high-speed A/D converters, amplifiers, mixers, filters and appropriate matching networks. The µModule construction alleviates the need for driver and ADC impedance matching, filtering, bypass placement and layout, eliminating long hours of troubleshooting and reducing time to market. With no external components required, the LTM900x family provides a high performance solution in less than half the board space of a discrete implementation. The final result is a fully integrated, accurately tested and optimized solution in a small package. For custom configurations, contact Linear Technology.

Benefits of µModule Technology

- Ease of Use
  - Eliminates Most Challenges of Driving High Speed ADCs
  - Integrates Key Components
  - Simplifies Layout without Sacrificing Performance
  - Provides System-Level Testing
- Dramatically Smaller and Simpler than Discrete Implementations
- Proven LTC Quality, Reliability and Service
- ECCN 5A991 - No Export License Required



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)

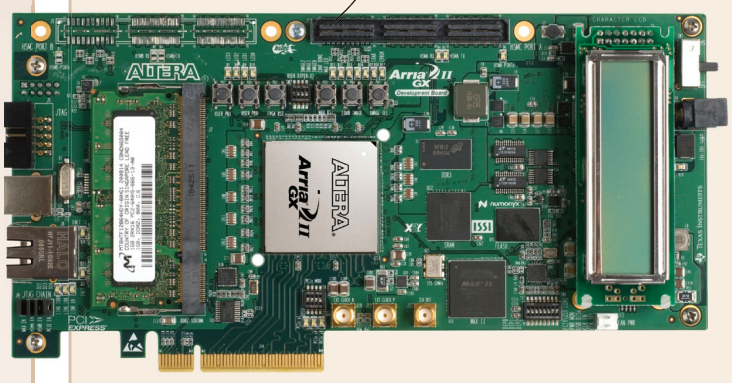
The Altera® HSMC defines the electrical and mechanical properties of a high speed mezzanine card interface. This specification standardizes the way mezzanine cards communicate and connect to host boards. By taking advantage of the high-performance I/O features in today's FPGAs, manufacturers can build 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).**

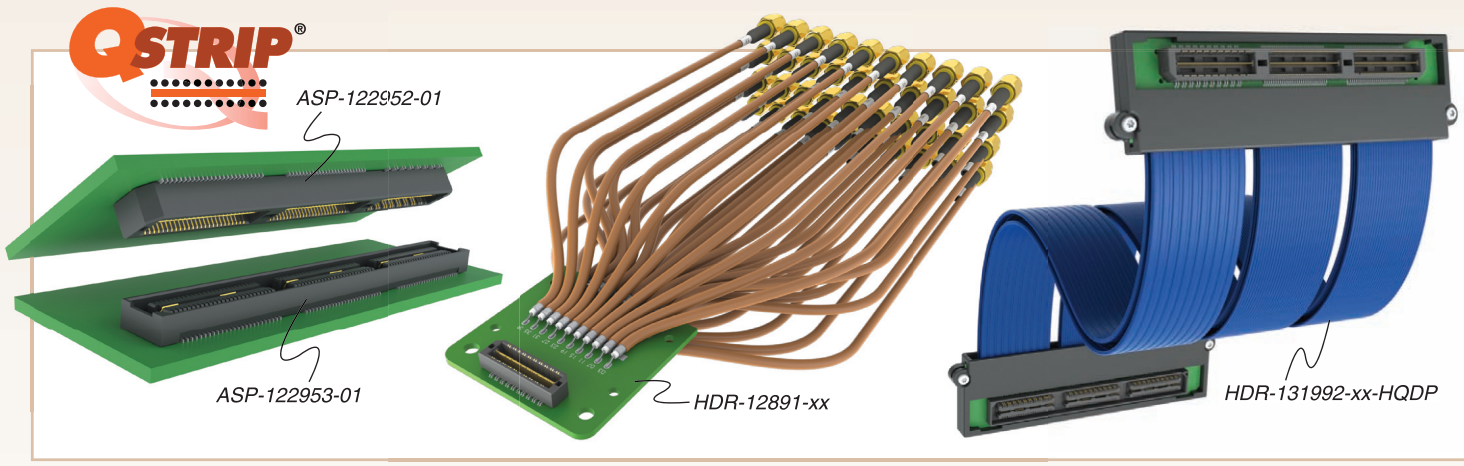
These host boards are used by FPGA designers to prototype hardware designs. The benefit to customers is two-fold. First, a variety of mezzanine cards are being created by Altera and other hardware providers. Second, customers can create their own HSMC solutions and then interface those custom mezzanine 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
The Arria II GX Development Kit delivers a complete system-level design environment that includes Samtec's Q Strip® connectors (QSH/QTH Series).



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

Images courtesy of Altera®



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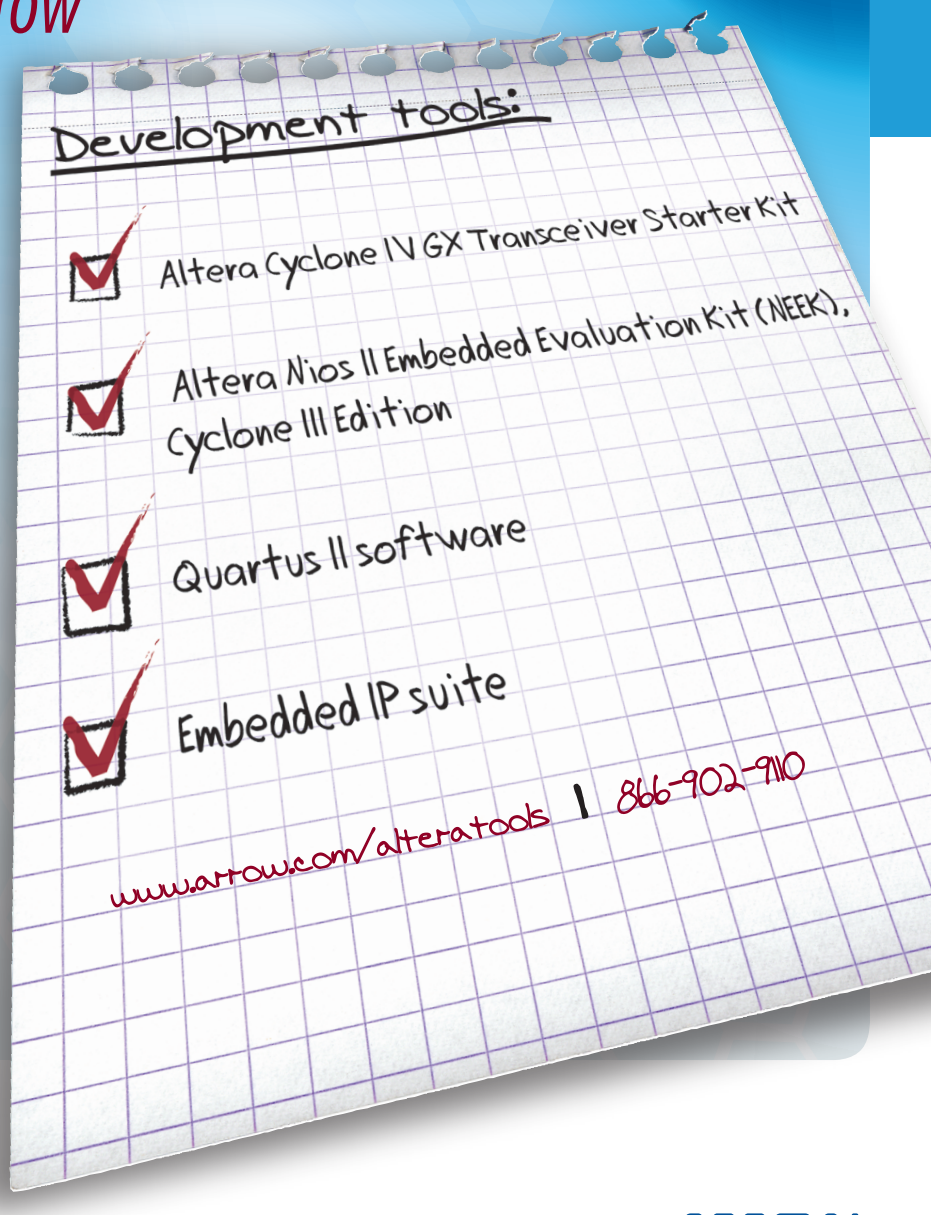

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