ENGLISH

ALTERA

LINEAR TECHNOLOGY

Development / Evaluation Board Solutions

China, Hong Kong

Japan

MACNICA Group

October 2010

Altera & Linear Technology Development Board Solution Book

Index

ALTERA DEVELOPMENT BOARD SOLUTIONS

Stratix IV E FPGA Development Kit

Altera Corporation

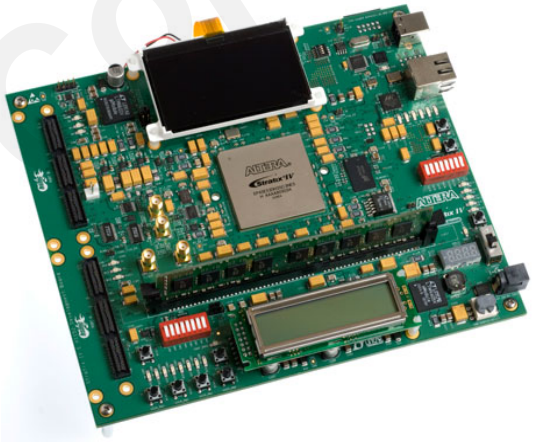
The Altera Stratix IV E FPGA Development Kit provides an FPGA designer all hardware and software needed as a complete system level design environment solution. The kit includes a one year user license for Quartus® II development software.

■ **Devices**

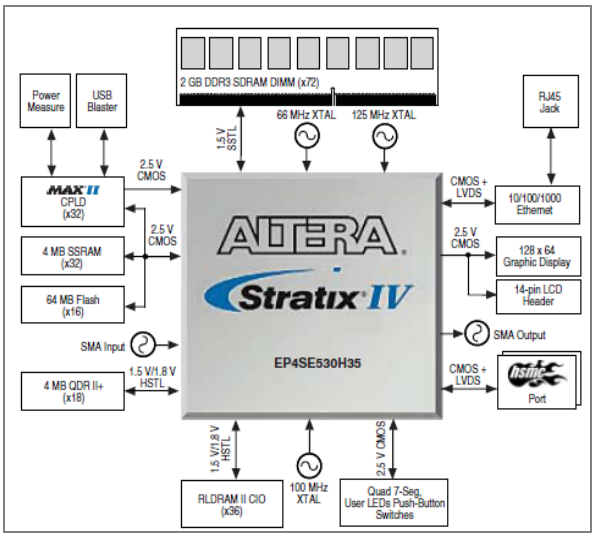
- **Altera**
  - ✧ **Stratix IV E FPGA** EP4SE530H35C2N FPGA
- **Linear Technology**
  - ✧ **LTM4601** 12A DC/DC µModules with PLL, Output, Tracking and Margining
  - ✧ **LTM4604A** Low Voltage, 4A DC/DC µModule with Tracking
  - ✧ **LTM4605** High Efficiency Buck-Boost DC/DC µModule
  - ✧ **LT3026** 1.5A Low Input Voltage VLDO Linear Regulator
  - ✧ **LT1761** 100mA, Low Noise, LDO Micropower Regulators in TSOT-23
  - ✧ **LT1764A** 100mA, Low Noise, LDO Micropower Regulators in TSOT-23

■ **Features**

- Stratix IV E FPGA development board
  - ✧ Stratix IV E EP4SE530H35C2N FPGA
  - ✧ On-board USB-Blaster™ download cable using Quartus II Programmer
- Clocks
  - ✧ On-board clock oscillators: 50 MHz, 66 MHz, 100 MHz, and 125 MHz
  - ✧ SMA connectors for external clock input
  - ✧ SMA connector for clock output
- General user input/output
  - ✧ LEDs, push-buttons, DIP switches, graphics LCD, character LCD, quad seven-segment display
- Memory devices
  - ✧ 2-GByte DDR3 SDRAM DIMM with a 72-bit data bus
  - ✧ 72-Mbit QDR II+ SRAM device with a 18-bit data bus
  - ✧ 576-Mbit RLDRAM II CIO device with a 36-bit data bus
  - ✧ 18-Mbit SSRAM with a 36-bit data bus
  - ✧ 512-Mbit flash with a 16-bit data bus
- Components and interfaces
  - ✧ Two HSMC connectors
  - ✧ 10/100/1000BASE-T Ethernet PHY with RJ-45 connector
  - ✧ Temperature measurement circuitry
  - ✧ Power measurement circuitry
- Stratix IV E FPGA Development Kit CD-ROM
  - ✧ Design examples
- Altera's Complete Design Suite DVD
  - ✧ Quartus II Software Development Kit Edition includes support for Stratix IV FPGAs and HardCopy® IV ASICs (one-year license included)
  - ✧ Nios II Embedded Design Suite
  - ✧ MegaCore® IP Library includes Triple-Speed Ethernet, DDR3, RLDRAM II, and QDR II+ MegaCore intellectual property (IP) cores
- Loopback and debug HSMCs
- Power adapter and cables



Stratix IV E FPGA Development Board



Block Diagram

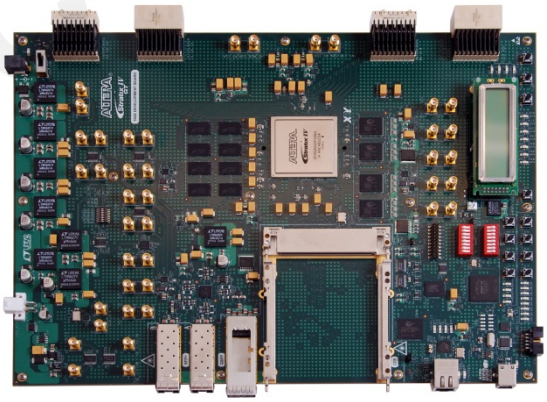
Stratix IV GT 100G Interlaken Development Kit

Altera Corporation

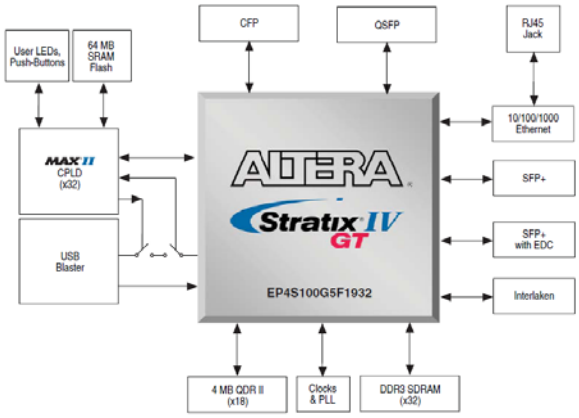
The Altera Stratix IV GT 100G Interlaken Development Kit delivers a platform that can be used to implement 100 Gigabit serial data communications systems. Stratix IV GT FPGAs are optimized specifically for the latest generation of 40G and 100G applications used in communications systems, high-end test equipment and military communications systems. The 11.3-Gbps integrated transceivers featured in the Stratix IV GT FPGA provide customers a true single-FPGA 100G solution, enabling 100G optical modules to interface directly with the FPGA. 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.

■ **Devices**
- **Altera**
  - ✧ **Stratix IV GT** EP4S100G5F1932 FPGA
- **Linear Technology**
  - ✧ **LTM4601**
    12A DC/DC µModules with PLL, Output Tracking and Margining
  - ✧ **LT1374**
    4.5A, 500kHz Step-Down Switching Regulator
  - ✧ **LTC3026**
    1.5A Low Input Voltage VLDO Linear Regulator
  - ✧ **LT1761**
    100mA, Low Noise, LDO Micropower Regulator
  - ✧ **LTC2418**
    8-/16-Channel 24-Bit No Latency Delta Sigma ADC
  - ✧ **LTM4600**
    10A High Efficiency DC/DC µModule
  - ✧ **LT1963**
    1.5A, Low Noise, Fast Transient Response LDO Regulator
  - ✧ **LTM8023**
    2A, 36V DC/DC µModule
  - ✧ **LT3010**
    50mA, 3V to 80V Low Dropout Micropower Linear Regulator

■ **Features**
- Altera Stratix IV GT EP4S100G5F1932 FPGA
- Configuration
  - ✧ Embedded USB-Blaster
  - ✧ 1-G flash device (FPP via system controller MAX II device
- Memory Interfaces
  - ✧ Two DDR3 interfaces, x32 bit data buses
    - ➢ Tree topology; simultaneous operation to 400 MHz
    - ➢ Should be able to run one at 533 MHz
  - ✧ Four QDR II interfaces x18 bit data buses
    - ➢ 400 MHz
- Components and Interfaces
  - ✧ 10 Transceivers to CFP
  - ✧ 2 Transceiver to SFP+ (one w/EDC, one w/o)
  - ✧ 4 Transceivers to QSFP
  - ✧ 20 Transceivers to FCI Airmax (Interlaken)
  - ✧ 10/100/1000 Mbps Ethernet with RJ-45
- Power & temperature measurement circuitry



Stratix IV GT 100G Interlaken Development Kit



Block Diagram

Stratix IV GX FPGA Development Kit

Altera Corporation

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 1-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 QDR II+ memory
- Build designs capable of migrating to Altera's low-cost HardCopy IV ASICs.

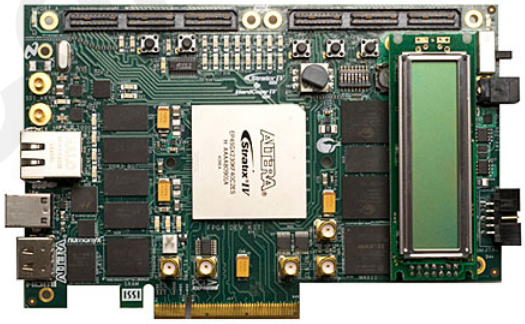
■ **Devices**

- **Altera**
  - ✧ **Stratix IV GX** EP4SGX230KF40C2N FPGA
- **Linear Technology**
  - ✧ **LTM4601**
    12A DC/DC µModules with PLL, Output - Tracking and Margining
  - ✧ **LTM4614**
    Dual 4A per Channel Low VIN DC/DC µModule
  - ✧ **LTM3727**
    High Efficiency, 2-Phase Synchronous Step-Down Switching Regulators
  - ✧ **LTM8021**
    36VIN, 500mA Step-Down DC/DC µModule
  - ✧ **L LT3010**
    50mA, 3V to 80V Low Dropout Micropower Linear
  - ✧ **LT3025**
    300mA Micropower VLDO Linear Regulator
  - ✧ **LT3080**
    Adjustable1.1A Single Resistor Low Dropout Regulator

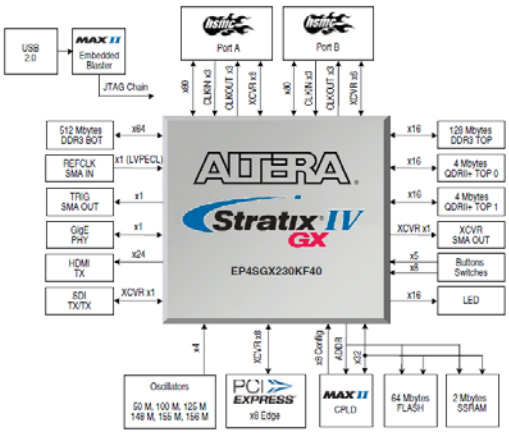
■ **Features**

- **Stratix IV GX FPGA development board**
  - ✧ Stratix IV GX FPGA
  - ✧ On-board clock oscillators
  - ✧ SMA connectors for external clock input & output
- **General user input/output**
  - ✧ LEDs & LCD display
  - ✧ Push-button & DIP switches
- **Memory**
  - ✧ DDR3 SDRAM: 512 MByte (64-bit data) and 128 MByte (16-bit data)
  - ✧ 4-MByte QDR II+ SRAMs (18-bit data) x 2 pcs
  - ✧ 64-MByte sync flash & 2-MByte SSRAM
- **Component and interfaces**
  - ✧ PCI Express x8 edge connector
  - ✧ 10/100/1000BASE-T Ethernet PHY with RJ-45 connector
  - ✧ Two HSMC connectors
  - ✧ HDMI video output
  - ✧ 3G SDI video input and output
  - ✧ Power & Temperature measurement circuitries

- **Other features**
  - ✧ Stratix IV GX FPGA Development Kit CD-ROM
  - ✧ Design Examples
  - ✧ Board Update Portal featuring the Nios II processor web server and remote system update
  - ✧ Board Test System
- Complete documentation



Stratix IV GX FPGA Development Kit



Block Diagram

Transceiver Signal Integrity Development Kit, Stratix IV GT Edition

Altera Corporation

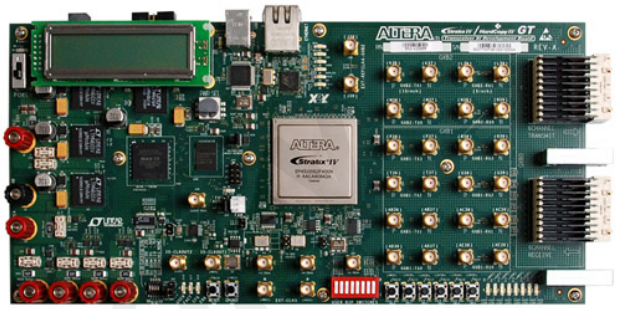
The Transceiver Signal Integrity Development Kit, Stratix IV GT Edition allows you to evaluate the performance the Stratix IV GT transceivers and the low power benefits of the device itself. This document provides the detailed pin-out and component reference information required to create FPGA designs for implementation on the development board.

■ **Devices**

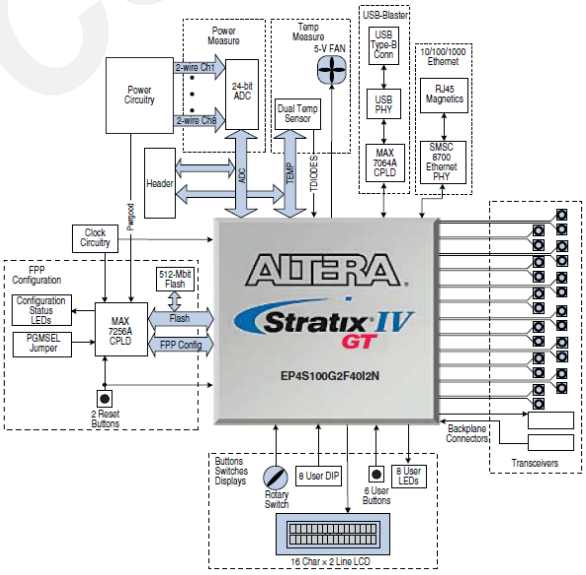
- **Altera**
  - ✧ **Stratix IV GT** EP4S100G2F40I1N FPGA
- **Linear Technology**
  - ✧ **LTM4601**
    12A DC/DC µModules with PLL, Output Tracking and Margining
  - ✧ **LTM4616**
    Dual 8A/Channel µModule Switching Regulator
  - ✧ **LT3080-1**
    1.1A LDO Linear Regulator
  - ✧ **LTC3025-1**
    500 mA VLDO Linear Regulator
  - ✧ **LT1761**
    100 mA Low Noise LDO Linear Regulator

■ **Features**

- The Transceiver Signal Integrity Development Kit, Stratix IV GT Edition allows you to:
  - ✧ Evaluate transceiver performance up to 11.3 Gbps
  - ✧ Generate and check pseudo-random binary sequence (PRBS) patterns via a simple-to-use GUI (does not require Quartus II software)
  - ✧ Dynamically change differential output voltage (V_{OD}), pre-emphasis, and equalization settings to optimize transceiver performance for your channel
  - ✧ Perform jitter analysis
  - ✧ Verify physical medium attachment (PMA) compliance to 40G/100G Ethernet, Interlaken, CEI-6G/11G, PCI Express (Gen1, Gen2, and Gen3), Serial RapidIO®, and other major standards
  - ✧ Validate interoperability between optical modules (optical modules require SMA input to test interoperability with the Transceiver Signal Integrity Development Kit, Stratix IV GT Edition), such as SFP, SFP+, and QSFP



Stratix IV GT Development Board



Block Diagram

Audio Video Development Kit, Stratix IV GX Edition

Altera Corporation

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.

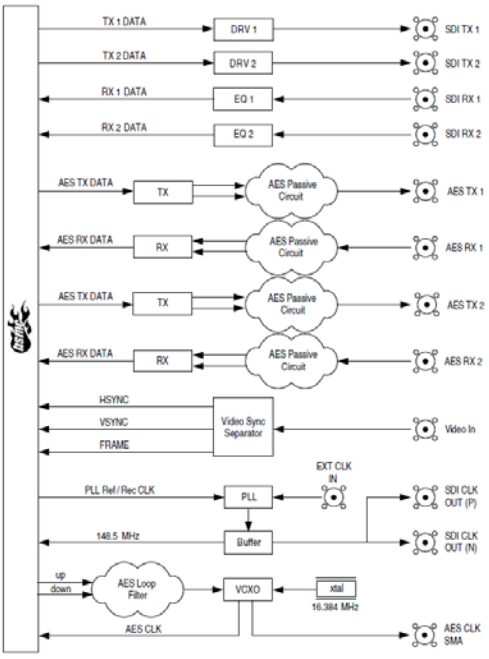
■ **Devices**

- **Altera**
  - ✧ **Stratix IV** EP4SGX230KF40C2N FPGA
- **Linear Technology**
  - ✧ **LTM4601**
    12A DC/DC µModules with PLL, Output Tracking and Margining
  - ✧ **LTM4614**
    Dual 4A per Channel Low VIN DC/DC µModule Regulator
  - ✧ **LTM3727**
    High Efficiency, 2-Phase Synchronous Step-Down Switching Regulators
  - ✧ **LTM8021**
    36VIN, 500mA Step-Down DC/DC µModule
  - ✧ **LT3010**
    50mA, 3V to 80V Low Dropout Micropower Linear Regulator
  - ✧ **LT3025**
    300mA Micropower VLDO Linear Regulator
  - ✧ **LT3080**
    Adjustable1.1A Single Resistor Low Dropout Regulator

■ **Features**

- **The kit is the combination of:**
  - ✧ Stratix IV GX FPGA Development Board
  - ✧ The transceiver serial digital interface (SDI) high-speed mezzanine card (HSMC)
- **Video/audio interfaces**
  - ✧ HDMI video output on the FPGA host board
  - ✧ 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**
- **Memory devices**
  - ✧ 512-MByte DDR3 SDRAM with a 64-bit data bus
  - ✧ 128-MByte DDR3 SDRAM with a 16-bit data bus
  - ✧ Two 4-MByte QDR II + SRAMs with 18-bit data buses
  - ✧ 64-MByte sync flash and 2-MByte SSRAM external memory
- **Loopback and debug HSMCs**
- **Design examples:** Board Update Portal and Board Test System
- OpenCore Plus access to the MegaCore IP library, including the Altera Video and Image Processing Suite of IP cores
- **SDI reference design**

Audio Video Development Kit, Stratix IV GX Edition



Block Diagram of SDI HSMC board

DSP Development Kit, Stratix III Edition

Altera Corporation

The DSP Development Kit, Stratix III Edition delivers a complete digital signal processing (DSP) development environment. The kit facilitates the entire design process from design conception through hardware implementation. The DSP Development Kit, Stratix III Edition includes the Stratix III FPGA development board, a data conversion high-speed mezzanine card (HSMC), Quartus II development software, MATLAB/Simulink evaluation software, evaluation intellectual property (IP) cores, design examples, power supplies, cables, and documentation.

■ **Devices**

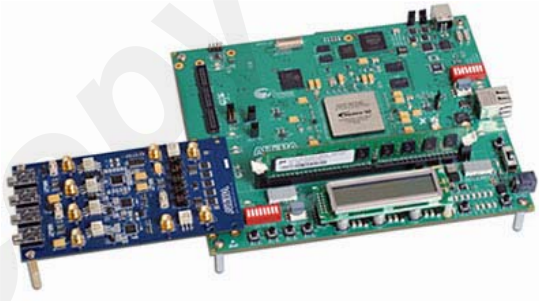
- **Altera**
  - ✧ **Stratix III** EP3SL150F1152 FPGA
- **Linear Technology**

  Power Devices
  - ✧ **LTM4601EV**
    12A DC/DC µModules with PLL, Output Tracking and Margining
  - ✧ **LTC3026EDD**
    1.5A Low Input Voltage VLDO Linear Regulator
  - ✧ **LT1761ES5-SD**
    100mA, Low Noise, LDO Micropower Regulators in TSOT-23
  - ✧ **LT1374CFE**
    4.5A, 500kHz Step-Down Switching Regulator
  - ✧ **LT1931AES5**
    1.2MHz/2.2MHz Inverting DC/DC Converters in ThinSOT

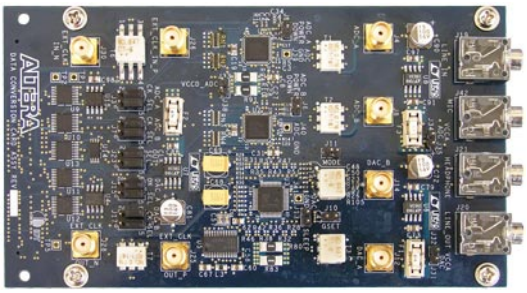
  AD Converter
  - ✧ **LTC2402CMS**
    1-/2-Channel 24-Bit µPower No Latency Delta-Sigma ADC in MSOP-10

■ **Features**

- **Stratix III Development Board**
  - ✧ High-performance Stratix III EP3SL150F1152 FPGA
- **Memory**
  - ✧ DDR2 SDRAM & QDR II SRAM
  - ✧ PSRAM and flash memory
- **Displays and Interfaces**
  - ✧ USB 2.0 MAC/PHY
  - ✧ Graphics & character LCD displays
  - ✧ On-board embedded USB-Blaster download cable
- **Data Conversion HSMC**
  - ✧ Two 14-bit, 150-million samples per second (MSPS) analog to digital (A/D) converters
  - ✧ Two 14-bit, 250-MSPS digital to analog (D/A) converters
  - ✧ Audio in/out/mic
- **Complete Documentation and tools**
  - ✧ Stratix III FPGA Development Kit, CD-ROM
  - ✧ Design examples for the Stratix III FPGA development board
  - ✧ Altera Complete Design Suite DVD
  - ✧ ModelSim®-Altera software
  - ✧ Altera MegaCore IP Library (simulation & hardware evaluation)
  - ✧ Nios II Embedded Design Suite (EDS), Evaluation Edition (free)
  - ✧ Video demos of Quartus II software & the Nios II processor
  - ✧ DSP Builder filtering design
  - ✧ Nios II processor reference designs
  - ✧ MATLAB/Simulink 30-day evaluation software



DSP Development Kit
Stratix III Edition



Data Conversion HSMC

Arria II GX FPGA Development Kit

Altera Corporation

The Altera Arria II 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:

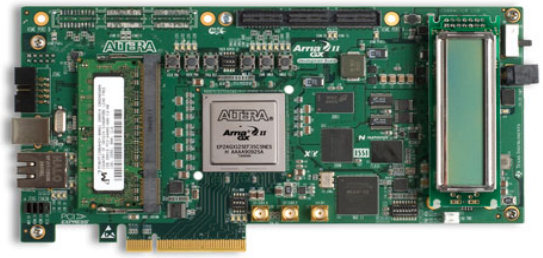
- Develop and test PCI Express 1.0 (up to x8 lane) designs
- Develop and test memory subsystems consisting of DDR2 and DDR3 memory
- Develop and test designs based on other Arria II GX supported protocol interfaces such as Gigabit Ethernet, SDI, CPRI, OBSAI, SAS/SATA, and Serial RapidIO.

■ **Devices**

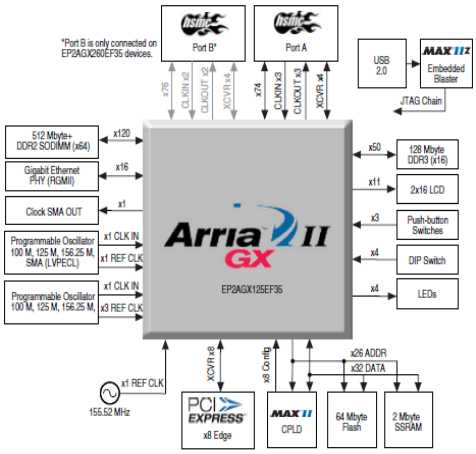
- **Altera**
  - ✧ **Arria II GX** EP2AGX125EF35 FPGA
  - ✧ **MAX II** EPM2210F256 CPLD

■ **Features**

- Arria II GX EP2AGX125EF35 FPGA
- On-board ports
  - ✧ ◦One HSMC expansion port
  - ✧ ◦One gigabit Ethernet port
- On-board memory
  - ✧ 128-MB 16-bit DDR3 device
  - ✧ 1-GB 64-bit DDR2 SODIMM
  - ✧ 2-MB SSRAM
  - ✧ 64-MB flash
- FPGA configuration circuitry
  - ✧ MAX II CPLD and flash fast passive parallel configuration
  - ✧ On-board USB-Blaster circuitry using the Quartus II Programmer
- On-board clocking circuitry
  - ✧ Four on-board oscillators
    - ➢ 100 MHz
    - ➢ Programmable oscillator, default frequency 125 MHz
    - ➢ Programmable oscillator, default frequency 100 MHz
    - ➢ 155.52 MHz
  - ✧ SMA connectors for external LVPECL clock input
  - ✧ SMA connector for clock output
- General user I/O
  - ✧ LEDs/displays
    - ➢ Four user LEDs, Two-line character LCD display, One configuration-done LED, One HSMC interface transmit/receive LED (Tx/Rx), Three PCI Express LEDs, Five Ethernet LEDs
- Push-buttons (Six total)
  - ✧ Two out of the six is general user push-buttons
- DIP switches
  - ✧ Four user DIP switches
  - ✧ Eight MAX II device control DIP switches
- Arria II GX FPGA Development Kit CD-ROM
  - ✧ Design examples
    - ➢ Board Update Portal, featuring the Nios II processor web server and remote system update
    - ➢ Board test system
  - ✧ Complete documentation
- Altera's complete Design Suite DVD
  - ✧ Quartus II Software Development Kit Edition, includes support for Arria II GX FPGAs
    - ➢ Includes one-year license
  - ✧ Nios II Embedded Design Suite
  - ✧ MegaCore IP Library includes PCI Express, Triple Speed Ethernet, SDI, and DDR3 High-Performance Controller IP cores
    - ➢ IP evaluation available through OpenCore Plus
- Power adaptor and cables



Arria II GX FPGA Development Kit



Block Diagram

Cyclone IV GX Transceiver Starter Kit

Altera Corporation

Altera's **Cyclone IV GX Transceiver Starter Kit** provides a low-cost platform for developing transceiver I/O-based FPGA designs. This kit includes the complete hardware and software for you to

- Develop your FPGA design for cost-sensitive applications
- Measure the FPGA's low power consumption
- Test signal quality of the FPGA transceiver I/Os (up to 2.5 Gbps)
- Develop and test PCI Express 1.0 endpoint x1 lane designs (~250-Mbps transfer rate)

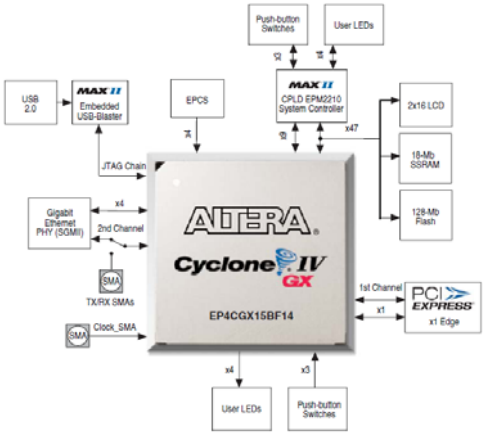
■ **Devices**

- **Altera**
  - ✧ **Cyclone IV GX** EP4CGX15BF14C8N FPGA
- **Linear Technology**
  - ✧ **LT3027**
    Dual 100mA, Low Dropout, Low Noise, Micropower Regulator with Independent Inputs
  - ✧ **LT3023**
    Dual 100mA, Low Dropout, Low Noise, Micropower Regulator
  - ✧ **LT3510**
    Monolithic Dual Tracking 2A Step-Down Switching Regulator
  - ✧ **LTC2418**
    8-/16-Channel 24-Bit No Latency Delta Sigma ADCs

■ **Features**

- Featured device
  - ✧ Cyclone IV GX EP4CGX15BF14C8N FPGA
- Configuration status and set-up elements
- MAX II EPM2210 CPLD system
- Controller enabling passive serial (PS) configuration from flash
- Embedded USB-Blaster cable for using the Quartus II Programmer
- JTAG header for external USB-Blaster cable
- Altera EPCS serial configuration device
- Clocks
  - ✧ FPGA clock sources: 50 MHz, 125 MHz, and SMA clock input
  - ✧ Other on-board oscillators: 6 MHz, 24 MHz, and 25 MHz
  - ✧ General user input/output
- LEDs
  - ✧ Two-line character LCD display
- Push-buttons
- Memory devices
  - ✧ 16 MB of flash
  - ✧ 2 MB of synchronous SRAM
- Component 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

Cyclone IV GX Transceiver Starter Board



Block Diagram

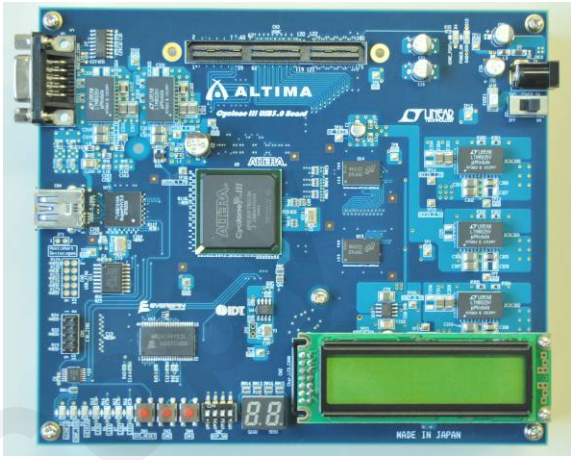
Cyclone III USB 3.0 Board

Altima Corp.

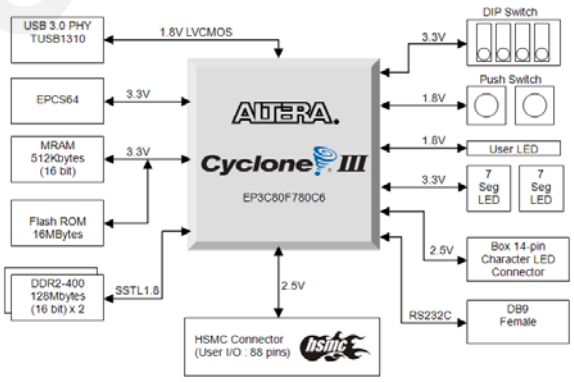
Altima's "Cyclone III USB 3.0 Board" is an evaluation board for USB 3.0 interface by combining FPGA and USB 3.0 PHY devices. The user of this board can attain higher flexibility in setting up different evaluation configurations in USB 3.0 controller functions implemented in Cyclone III low-cost FPGA. Also, the user can utilize HSMC connector to bridge to various interface standards at the same time.

- **Deliverables**
  - **Altima**
    - ✧ Cyclone III USB3.0 Board
  - **Inventure**
    - ✧ Z-Core USB3.0 Controller IP
  - **NEC Engineering**
    - ✧ Device Driver, Application Software
- Devices
  - **Altera**
    - ✧ Cyclone III EP3C80F780C6 FPGA
    - ✧ Configuration ROM EPCS64
  - **Linear Technology**
    - ✧ **LTM8025**
      36V,3°Step-Down µModule Converter
    - ✧ **LT M8032**
      Ultralow Noise EMC Compliant 36V, 2A DC/DC µModule
  - **Everspin Technologies**
    - ✧ MR2A16AYS35
      MRAM (512Kbyte)

- **Features**
  - Altera Cyclone III EP3C80F780C6FPGA FPGA
  - Texas Instruments (TI) - TSUB1310 USB 3.0 PHY
    - ✧ Can be configured for both host cost and function controllers
  - External I/O
    - ✧ Altera standard connector HSMC (High Speed Mezzanine Connector)
  - CPU
    - ✧ Altera Nios II processor (32-bit RISC)
  - Memory
    - ✧ Flash 16 MBytes
    - ✧ DDR2-400 128 MBytes x2
    - ✧ MRAM Everspin MR2A16AYS35 512 KByte
  - I/O Interface
    - ✧ USB 3.0 Standard-A Connector
    - ✧ RS232C
    - ✧ User I/F (Push SW, DIP SW, LED, 7-Seg, Char LCD etc)
  - AC Adapter (12V DC-IN)



Altima Cyclone III USB 3.0 Board



Cyclone III USB 3.0 Board I/O Block Diagram

Altera FPGA + Cypress PSoC EVK

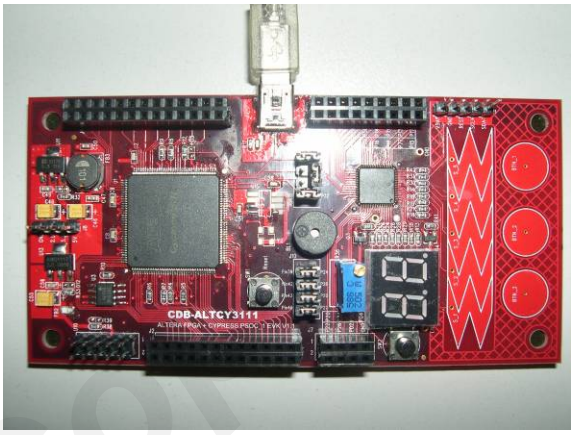
Cytech Technology, Ltd.

Cyctech's "Altera FPGA + Cypress PSoC EVK" is a starter kit for Altera Cyclone III FPGA and Cypress PSoC1. The kit provides a set of low cost, easy and convenient tool for learning FPGA and PSoC and for R&D using FPGA and PSoC.

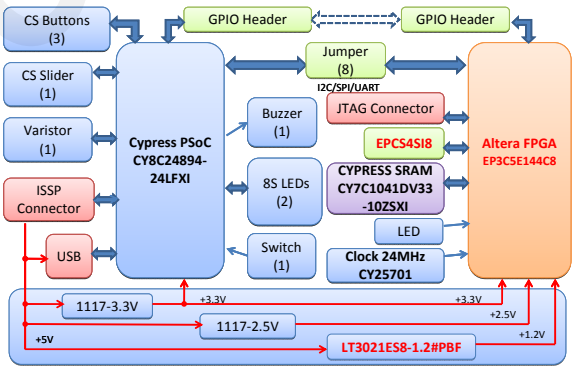
■ Devices
- **Altera**
  - ✧ Cyclone III EP3C5E144C8 FPGA
  - ✧ Configuration ROM EPCS4SI8
- **Linear Technology**
  - ✧ LT3021ES8-1.2#PBF
    500mA, Low Voltage, Very Low Dropout Linear Regulator
- **Cypress**
  - ✧ CY8C24894-24LFXI
  - ✧ CY7C1041DV33-10ZSXI
  - ✧ CY25701

■ **Features**
- PSoC + FPGA + SRAM integrated
- Two 8-Segment LEDs
- Three CapSense Buttons
- One CapSense Slider
- Buzzer
- 2 Switches
- ADC simulation on board
- I2C / SPI / JTAG / USB / UART interface
- GPIOs pulled out

■ **Documentation and support deliverables**
- Schematics
- PCB data
- BOM list
- User guide
- Firmware sample source code



Altera FPGA + Cypress PSoC EVK



Block Diagram

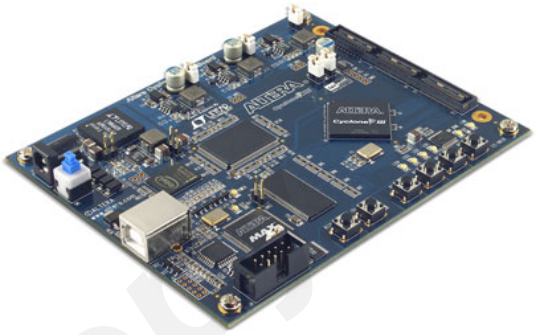
Cyclone III FPGA Starter Kit

Altera Corporation

The Altera economical Cyclone III FPGA Starter Kit is easy to use and an ideal introduction if you have never designed with FPGAs before. If you are an experienced FPGA designer considering the Cyclone III architecture, you'll love building systems leveraging the 60% (on average) faster performance that Cyclone III FPGAs offer over competitor offerings. Several design examples included in the kit make for a quick "out-of-the-box" evaluation experience.

■ **Devices**

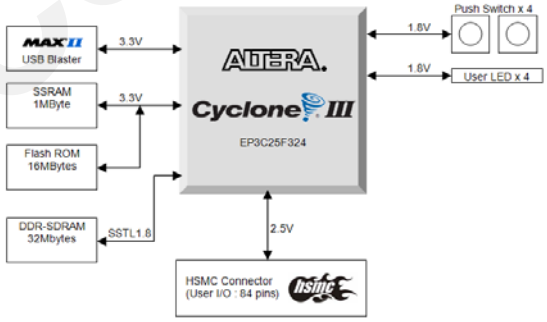
- **Altera**
  - ✧ **Cyclone III** EP3C25F324 FPGA
- **Linear Technology**
  - ✧ **LTM4603EV-1**
  - ✧ **LTC3413**
    3A, 2MHz Monolithic Synchronous Regulator for DDR/QDR Memory Termination
  - ✧ **LT1959**
    4.5A, 500kHz Step-Down Switching Regulator
  - ✧ **LT1117**
    800mA Low Dropout Positive Regulators Adjustable and Fixed 2.85V,3.3V, 5V



Cyclone III FPGA Starter Board

■ **Features**

- Cyclone III starter board
  - ✧ Cyclone III EP3C25F324 FPGA
  - ✧ Configuration
    - ➢ Embedded USB-Blaster circuitry (includes an Altera EPM3128A CPLD)
  - ✧ Memory
    - ➢ 256 MB of DDR SDRAM
    - ➢ 1 MB of synchronous SRAM
    - ➢ 16 MB of Intel P30/P33 flash
  - ✧ Clocking
    - ➢ 50-MHz on-board oscillator
  - ✧ Switches and indicators
    - ➢ Six push buttons in total, four user controlled
    - ➢ Seven LEDs in total, four user controlled
  - ✧ Connectors
    - ➢ HSMC
    - ➢ USB Type B
  - ✧ Cables and power
    - ➢ USB cable
    - ➢ External power supply
- Cyclone III FPGA Starter Kit CD-ROM
  - ✧ Example designs targeting the Cyclone III FPGA starter board
  - ✧ Complete documentation
- Download instructions to receive the latest version of the following software (at no charge):
  - ✧ Quartus II Web Edition (FPGA design software)
  - ✧ ModelSim-Altera Web Edition (FPGA simulation software from ModelSim)
- Nios II Embedded Design Suite, Evaluation Edition (32-bit microprocessor software)



Block Diagram

Cyclone III FPGA Development Kit

Altera Corporation

Altera's Cyclone III FPGA Development Kit combines the largest density low-cost, low-power FPGA available with a robust set of memories and user interfaces. The kit dramatically reduces the design and verification portion of your project, whether it's for automotive, consumer, wireless communications, video processing, or another high-volume, cost-sensitive application

■ **Devices**

- **Altera**

  Cyclone III FPGA EP3C120F780 FPGA
- **Linear Technology**

  Power Devices
  - ✧ **LTM4601**

    12A DC/DC µModules with PLL, Output Tracking and Margining
  - ✧ **LT1931**

    1.2MHz/2.2MHz Inverting DC/DC Converters in ThinSOT
  - ✧ **LT3481**

    36V, 2A, 2.8MHz Step-Down Switching Regulator with 50µA Quiescent Current
  - ✧ **LTC3418**

    8A, 4MHz, Monolithic Synchronous Step-Down Regulator
  - ✧ **LT1963**

    1.5A, Low Noise, Fast Transient Response LDO Regulators
  - ✧ **LT1761**

    100mA, Low Noise, LDO Micropower Regulators in TSOT-23

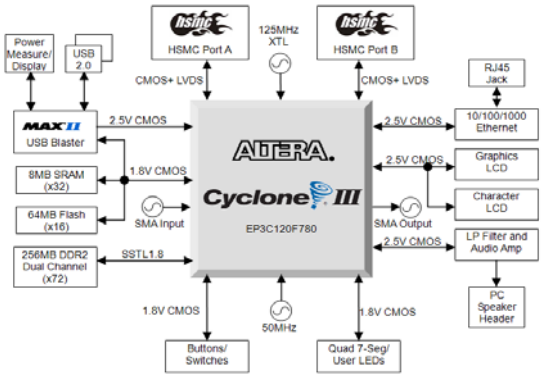
  AD Converter
  - ✧ **LTC1865**

    µPower, 16-Bit, 250ksps 1- and 2-Channel ADCs in MSOP

■ **Features**

- **Cyclone III development board**
  - ✧ Cyclone III EP3C120F780 FPGA
  - ✧ Embedded USB-Blaster™ circuitry (includes an Altera MAX II CPLD) allowing download of FPGA configuration files via the flash device or the host computer
- **Memory**
  - ✧ Dual-channel DDR2 SDRAM (w/ECC 256MB)
  - ✧ SSRAM (8MB), Flash (64MB)
- **Communication ports**
  - ✧ 10/100/1000 Ethernet
  - ✧ USB 2.0
- **Clocking**
  - ✧ SMA inputs/outputs
- **Display**
  - ✧ 128 x 64 graphics LCD
  - ✧ 2-line x 16-character LCD
- **Connectors**
  - ✧ Two HSMCs
  - ✧ USB type B
- **Debug tools**
  - ✧ Cyclone III FPGA Development Kit CD-ROM (download all CD contents via FTP)

Cyclone III FPGA Development Kit



Block Diagram

Cyclone III LS FPGA Development Kit

Altera Corporation

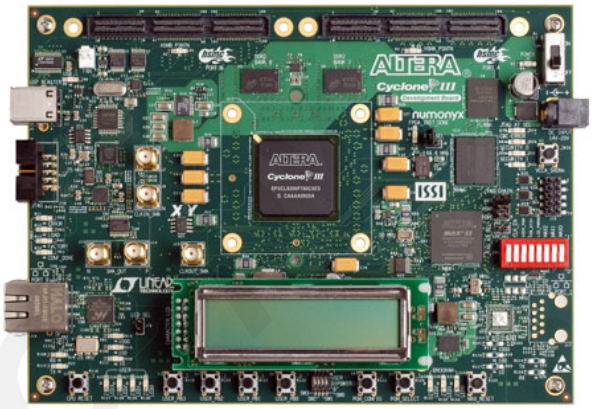
Altera's **Cyclone III LS FPGA Development Kit** combines the largest density, low-power FPGA available with a complete suite of security features implemented at the silicon, software, and intellectual property (IP) levels. These security features provide passive and active protection of your IP from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

■ **Devices**

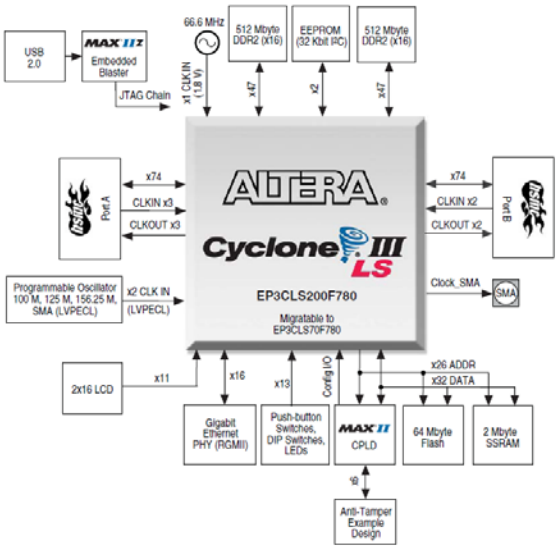
- **Altera**
  - ✧ **Cyclone III LS** EP3CLS200F780C7N FPGA
- **Linear Technology**
  - ✧ **LTC3853**
    Triple Output, Multiphase Synchronous Step-Down Controller
  - ✧ **LTC3418**
    8A, 4MHz, Monolithic Synchronous Step-Down Regulator
  - ✧ **LTC3414**
    4A, 4MHz, Monolithic Synchronous Step-Down Regulator
  - ✧ **LTC2418**
    8-/16-Channel 24-Bit No Latency Delta Sigma ADCs
  - ✧ **LT1761**
    100mA, Low Noise, LDO Micropower Regulators in TSOT-23
  - ✧ **LT3023**
    Dual 100mA, Low Dropout, Low Noise, Micropower Regulator

■ **Features**

- Featured device
  - ✧ **Cyclone III LS** EP3CLS200F780C7N FPGA
- Memory
  - ✧ 2 x 512-MB DDR2 SDRAMs, 2-MB synchronous SRAM and 64 MB of flash
- Communication port
  - ✧ 10/100/1000 Ethernet
- Display
  - ✧ 2-line x 16-character LCD
- Connectors
  - ✧ Two HSMC connectors
  - ✧ USB type B
- Debug tools
  - ✧ Three HSMC debug cards (two loop-back and a debug header)
- Cyclone III LS FPGA Development Kit, CD-ROM
- Altera Complete Design Suite DVD



Cyclone III LS FPGA Development Board



Block Diagram

Altera Embedded Systems Development Kit, Cyclone III Edition

Altera Corporation

The Altera Embedded Systems Development Kit, Cyclone III Edition is a complete development platform for prototyping embedded systems on Altera's low-cost, low-power FPGA family.
This kit is an ideal choice for developers running Linux on the Nios II processor. Download the Nios II Hardware Reference Design for Linux, Cyclone III (EP3C120) Edition Release R15 to give your design a head start.

Embedded Systems Development Kit, Cyclone III Edition

■ **Deviecs**

- **Altera**
  - ✧ **Cyclone III** EP3C120F780 FPGA
- **Linear Technology**

  Power Devices
  - ✧ **LTM4601**
    12A DC/DC µModules with PLL, Output Tracking and Margining
  - ✧ **LT1931**
    1.2MHz/2.2MHz Inverting DC/DC Converters in ThinSOT
  - ✧ **LT3481**
    36V, 2A, 2.8MHz Step-Down Switching Regulator with 50µA Quiescent Current
  - ✧ **LTC3418**
    8A, 4MHz, Monolithic Synchronous Step-Down Regulator
  - ✧ **LT1963**
    1.5A, Low Noise, Fast Transient Response LDO Regulators
  - ✧ **LT1761**
    100mA, Low Noise, LDO Micropower Regulators in TSOT-23

  AD Converter
  - ✧ **LTC1865**
    µPower, 16-Bit, 250ksps 1- and 2-Channel ADCs in MSOP

■ **Features**

- Cyclone III development board
  - ➢ Cyclone III EP3C120F780 FPGA
  - ➢ Embedded USB-Blaster circuitry
  - ✧ Memory
    - ➢ 256 Mbytes of dual-channel DDR2 SDRAM with ECC
    - ➢ 8 Mbytes of pseudo SRAM
    - ➢ 64 Mbytes of flash
  - ✧ Communication ports
    - ➢ 10/100/1000 Ethernet
    - ➢ USB 2.0
  - ✧ Power and analog devices from Linear Technology
    - ➢ Switching power supply LTM4601
    - ➢ Switching and step-down regulators LT1931, LT3481, and LTC3418
    - ➢ Analog-to-digital converter LTC1865
    - ➢ LDO regulators LT1963 and LT1761
  - ✧ Clocking
    - ➢ 50-MHz and 125-MHz on-board oscillators
    - ➢ SMA inputs/outputs
  - ✧ Inputs/outputs for the two HSMCs
  - ✧ Various buttons, switches, and indicators
  - ✧ Display
    - ➢ 128 x 64 graphics LCD
    - ➢ 2-line x 16-character LCD
  - ✧ Connectors
    - ➢ Two HSMCs
    - ➢ USB type B
  - ✧ Debug tools
    - ➢ Three HSMC debug cards (two loop-back and a debug header)
- LCD Multimedia HSMC Card
  - ✧ LCD touch-screen display
    - ➢ 800 x 480 pixel size
  - ✧ Audio CODEC
  - ✧ SD Flash
  - ✧ 10/100 Ethernet physical layer/media access control (PHY/MAC)
  - ✧ Connectors
    - ➢ VGA output, Composite digital TV in, Serial connector (RS-232 DB9 port), PS/2, Ethernet connector (RJ-45)
- HSMC to Santa Cruz/USB/Mictor Card
  - ✧ Santa Cruz header
  - ✧ Mictor connector for software debugging
  - ✧ Adjustable logic levels between HSMC and SC interface signals
  - ✧ High-speed USB 2.0 On-The-Go transceiver
  - ✧ SMA connector for external clock input
  - ✧ SD card socket
- Altera Embedded Systems Development Kit, Cyclone III Edition CD-ROM
  - ✧ Design examples, demos, and prebuilt processor systems
  - ✧ Tutorials (hardware and software)
  - ✧ Board documentation
- Cables and Accessories
- Altera Complete Design Suite DVD

Nios II Embedded Evaluation Kit (NEEK), Cyclone III Edition

Altera Corporation

The Nios II Embedded Evaluation Kit, Cyclone III Edition makes evaluating Altera's embedded solutions easier than ever. You can evaluate a dozen different processor systems targeting the low-cost, low-power Cyclone III FPGA by simply using the LCD color touch panel to scroll through and load your demo of choice.

These processor systems showcase the unique benefits of FPGA-based processors such as reducing bill of material (BOM) costs by integrating powerful graphics engines within the FPGA, reducing operating costs by upgrading your system over the Internet, or increasing system performance while reducing power using the C-to-Hardware (C2H) Acceleration Compiler.

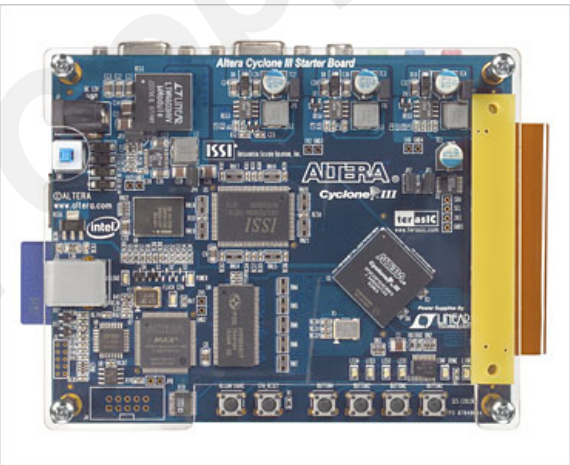
The Nios II Embedded Evaluation Kit, Cyclone III Edition comes with a comprehensive suite for software development—the Nios II Embedded Design Suite (EDS)—as well as sample Nios II processor systems that include full source code.

■ **Deviecs**

- **Altera**
  Cyclone III EP3C25F324 FPGA
- **Linear Technology**
  Power Devices
  - ✧ **LTM4603EV-1**
    6A DC/DC µModule with PLL, Output Tracking and Margining
  - ✧ **LTC3413**
    3A, 2MHz Monolithic Synchronous Regulator for DDR/QDR Memory Termination
  - ✧ **LT1959**
    4.5A, 500kHz Step-Down Switching Regulator

■ **Features**

- **Cyclone III Starter Board**
- **Memory**
  - ✧ 32 MB DDR SDRAM
  - ✧ 1 MB of synchronous SRAM
  - ✧ 16 MB of Intel P30/P33 flash
- **Clocking**
  - ✧ 50-MHz, on-board oscillator
- **Switches and indicators**
  - ✧ Six push buttons total, four user controlled
  - ✧ Seven LEDs total, four user controlled
- **LCD daughter card**
  - ✧ Color LCD touch-screen display
  - ✧ 800 x 480 resolution
  - ✧ 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)
  - ✧ Connectors
- **Nios II Evaluation Kit CD-ROM**
- **Cables and accessories**



The Nios II Embedded Evaluation Kit, Cyclone III Edition

DSP Development Kit, Cyclone III Edition

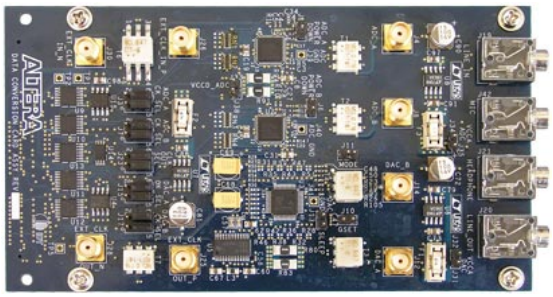
Altera Corporation

The DSP Development Kit, Cyclone III Edition delivers a complete digital signal processing (DSP) development environment. The kit facilitates the entire design process from design conception through hardware implementation. The DSP Development Kit, Cyclone III Edition includes the Cyclone III development board, the data conversion high-speed mezzanine card (HSMC), Quartus II development software, MATLAB/Simulink evaluation software, evaluation intellectual property (IP) cores, design examples, power supplies, cables, and documentation. For further DSP based design productivity, the DSP Builder development tool is available separately.

■ **Devices**

- **Altera**
  - ✧ **Cyclone III** EP3C120F780 FPGA
- **Linear Technology**
  - ✧ **LTC1865LACMS#PBF**
    µPower, 16-Bit, 250ksps 1- and 2-Channel ADCs in MSOP
  - ✧ **LT1931AES5#TRMPBF**
    1.2MHz/2.2MHz Inverting DC/DC Converters in ThinSOT
  - ✧ **LT1963AES8#TRPBF**
    1.2MHz/2.2MHz Inverting DC/DC Converters in ThinSOT
  - ✧ **LT1963AES8-2.5#PBF**
    1.2MHz/2.2MHz Inverting DC/DC Converters in ThinSOT
  - ✧ **LT3481EDD#PBF**
    1.2MHz/2.2MHz Inverting DC/DC Converters in ThinSOT
  - ✧ **LT1761ES5-SD#PBF**
    100mA, Low Noise, LDO Micropower Regulators in TSOT-23
  - ✧ **LTC3418EUHF#PBF**
    8A, 4MHz, Monolithic Synchronous Step-Down Regulator
  - ✧ **LTM4601EV#PBF**

Cyclone III FPGA Development Board



Cyclone III Data Conversion HSMC

■ **Features**

- **Display and general user input/output**
  - ✧ 128 x 64 graphics LCD
  - ✧ 2-line x 16-character LCD
  - ✧ Buttons, dip-switches, LEDs, 7-segment display, speaker header
- **Memory**
  - ✧ 256 Mbytes of dual-channel DDR2 SDRAM with ECC
  - ✧ 8 Mbytes of synchronous SRAM
  - ✧ 64 Mbytes of flash
- **Components and interfaces**
  - ✧ 10/100/1000 Ethernet (RGMII)
  - ✧ USB 2.0 (Type B)
  - ✧ Two HSMC connectors
- **Data conversion HSMC**
  - ✧ Dual 14-bit, 150-MSPS A/D converter
  - ✧ Dual 14-bit, 250-MSPS D/A converter
  - ✧ Audio in/out/mic
- **Reference Designs**
  - ✧ Video demos of Quartus II software and the Nios II processor
  - ✧ System reference designs and labs
  - ✧ DSP Builder filtering design
  - ✧ Nios II processor reference designs

MAX II Development Kit

Altera Corporation

The MAX II Development Kit enables you to evaluate the MAX II CPLD feature set or begin prototyping your own design. It includes reference designs (LCD controller, PCI™, USB, and slot machine), demo designs, software, cables, and all the accessories needed to ensure fast and easy use of the MAX II CPLD.

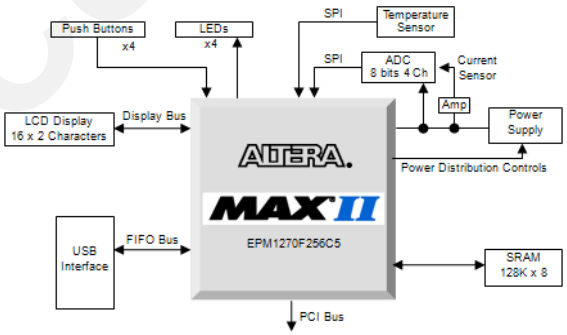
■ **Devices**

- **Altera**
  - ✧ **MAX II** EPM1270F256C5ES CPLD

■ **Features**

- Featured Circuits
  - ✧ Active I/O sense circuit—Allows users to load VCCINT and observe the effect on MAX II user I/O ramp times
  - ✧ Power measuring circuit—Allows users to measure the stand-by and nominal power consumed by the MAX II device
  - ✧ Schmitt trigger circuit—Allows users to generate a custom clock using the internal Schmitt trigger
- **Components**
  - ✧ MAX II EPM1270F256C5 device
  - ✧ 66-MHz oscillator
  - ✧ Temperature sensor
  - ✧ Four user-definable push-button switches
  - ✧ Four user-definable LEDs
  - ✧ 16 x 2 character LCD
  - ✧ SRAM
- **Interfaces**
  - ✧ USB interface
  - ✧ V1.1 or V2.0
  - ✧ Type B connector
  - ✧ 32-bit PCI edge connector
  - ✧ Altera expansion prototype header
  - ✧ Prototyping area

MAX II Development Kit



Block Diagram

LINEAR TECHNOLOGY ANALOG SOLUTIONS FOR ALTERA

Power Management Solutions for Altera FPGA, CPLD & ASIC

Linear Technology Corporation

Altera's PowerPlay power estimation tools are available to help determine power consumption before and during the design process.

Stratix IV and Stratix III FPGAs					Selectable Core Voltage: 0.9V to 1.1V	
Input Supply	***≤200mA***	***≤500mA***	***≤1A – 1.5A***	***≤2A – 5A***	***5A – 10A***	***Up to 25A***
1.8V	LT®3020 Linear LTC®3549 Buck	**LT3085 Linear** LTC3409 Buck	LT3080 Linear **LTC3026 Linear**	**LTC3713 Controller**	**LTC3713 Controller**	N/A
2.5V to 5V	LT3020 Linear LTM8020 µModuleR	**LT3080 Linear** LTM8021 µModule	**LTC3411A Buck** LTC3417A Buck LTC3569 Buck	LTC3414 Buck **LTM4604 µModule** LTM4614 µModule	LTC3608 Buck LTC3610 Buck **LTM4608 µModule** LTM4616 µModule	LTC3811 Controller **2 x LTM4601 µModule*** LTM4616 µModule
≤12V to 24V	LT3502 Buck	**LT3503 Buck**	**LT3503 Buck** **LT3505 Buck**	LTM8023 µModule LTM4603 µModule LTC3850 Controller	LTM4601 µModule	LTC3811 Controller LTC3823 Controller 2 x LTM4601 µModule*

Arria II GX FPGAs					Core Voltage: 0.9V	
Input Supply	***≤200mA***	***≤500mA***	***≤1A – 1.5A***	***≤2A – 5A***	***5A – 10A***	***Up to 25A***
1.8V	LT®3020 Linear LTC®3549 Buck	**LT3085 Linear** LTC3409 Buck	LT3080 Linear LTC3026 Linear	LTC3713 Controller	LTC3713 Controller	N/A
2.5V to 5V	LT3020 Linear **LTC3544 µModule**	**LT3085 Linear** **LTC3025-1**	**LTC3411A Buck** LTC3417A Buck LTC3569 Buck	LTC3414 Buck	LTC3608 Buck LTC3610 Buck **LTC3418 Buck**	LTC3811 Controller LTM4616 µModule
≤12V to 24V	**LT3502 Buck**	LT3503 Buck	**LT3503 Buck** **LT3505 Buck**	LT3501 Buck LTC3850 Controller	LTC3605 Buck	LTC3850 Controller LTC3811 Controller **LTC3823 Controller**

HardCopy II ASICs, Stratix II, Stratix II GX, Cyclone III, Cyclone II, and Arria GX FPGAs					Core Voltage: 1.2V	
Input Supply	***≤200mA***	***≤500mA***	***≤1A – 1.5A***	***≤2A – 5A***	***5A – 10A***	***Up to 25A***
1.8V	LT1761 Linear LTC3035 Linear LTC3549 Buck	**LT1965 Linear** **LT3080 Linear** LT1763 Linear LTC3409 Buck	**LT1965 Linear** **LT3080 Linear** LTC3026 Linear	**LTC3713 Controller**	**LTC3713 Controller**	LTC3713 Controller
2.5V to 5V	LT3020 Linear LTC3035 Linear LTC3410 Buck **LTC3549 Buck**	**LT1965 Linear** LT1763 Linear **LTC3542 Buck** LTC3560 Buck	**LT1965 Linear** **LT3080 Linear** **LTC3411A Buck** LTC3564/8 Bucks	LTC3412A Buck LTC3414 Buck LTC3801/9 Controllers LTC1773 Controller	LTC3418 Buck LTC3822 Controller **LTM4601 µModule*** **LTC1778 Controller**	LTC3713 Controller LTC3832 Controller LTC1778 Controller **LTC3778 Controller**
≤12V to 24V	LT3502 Buck	LT1933 Buck LT3493 Buck LT3502 Buck	**LT3503 Buck** **LT3505 Buck** LT1936 Buck LT3481Buck	**LT3680 Buck** LTC1771 Controller **LTM4603 µModule*** LTC1778 Controller	**LTM4601 µModule*** LTC3772 Controller LTC1778 Controller **LTC3823 Controller**	**2 x LTM4601 µModule*** LTC1778 Controller LTC3823 Controller

HardCopy ASICs, Stratix, Stratix GX, and Cyclone FPGAs						Core Voltage: 1.2V
Input Supply	*≤200mA*	*≤500mA*	*≤1A – 1.5A*	*≤2A – 5A*	*5A – 10A*	*Up to 25A*
1.8V	LTC1844 Linear LTC3035 Linear LT1962 Linear LTC3549 Buck	LT1763 Linear **LT1965 Linear** **LT3080 Linear** LTC3409 Buck	**LT1965 Linear** **LT3080 Linear** LTC3026 Linear	**LTC3713 Controller**	**LTC3713 Controller**	LTC3713 Controller
2.5V to 5V	LT1762 Linear LTC3035 Linear LTC3410 Buck **LTC3549 Buck**	**LT1965 Linear** **LT3080 Linear** LT1763 Linear **LTC3542 Buck** **LTC3406A Buck**	**LT1965 Linear** **LT3080 Linear** LT1963A Linear **LTC3561 Buck** **LTC3411A Buck**	LTC3412A Buck LTC3414 Buck LTC3801 Controller LTC3809 Controller	LTC3418 Buck LTC3822 Controller **LTM4601 µModule*** LTC1778 Controller	LTC3713 Controller LTC3832 Controller LTC1778 Controller LTC3778 Controller
≤12V to 24V	LT3470 Buck **LT3502 Buck** LT1616 Buck	LT1616 Buck LT1933 Buck LT3493 Buck	**LT3503 Buck** **LT3505 Buck** **LT3481 Buck** **LT3684 Buck**	**LT3680 Buck** LTC1771 Controller **LTM4603 µModule*** LTC1778 Controller	**LTM4601 µModule*** **LTC3610 Buck** LTC3772 Controller LTC1778 Controller LTC3823 Controller	**2 x LTM4601 µModule*** LTC1778 Controller LTC3823 Controller LT1952 Controller

MAX IIG CPLDs						Core Voltage: 1.8V
Input Supply	*≤200mA*	*≤500mA*	*≤1A – 1.5A*	*≤2A – 5A*	*5A – 10A*	*Up to 25A*
1.8V	LTC3525 Boost LTC3429 Boost LTC3526 Boost	LT1613 Boost	N/A	N/A	N/A	N/A
2.5V to 5V	LTC1844 Linear LTC3035 Linear LT1762 Linear LTC3405A Buck LTC3410 Buck	**LT1965 Linear** **LT3080 Linear** **LTC3542 Buck** **LTC3406A Buck**	**LT1965 Linear** **LT3080 Linear** LT1963A Linear **LTC3561 Buck** **LTC3411A Buck**	LTC3414 Buck LTC3801/9 Controllers **LTM4603 µModule*** LTC1773 Controller	LTC3418 Buck LTC3822 Controller **LTM4601 µModule*** **LTC3610 Buck**	LTC3822 Controller LTC3713 Controller LTC3832 Controller LTC3778 Controller
≤12V to 24V	LT3470 Buck LT1934 Buck LT1616 Buck **LT3502 Buck**	LT1616 Buck **LT3502 Buck** LT1933 Buck LT3493 Buck	**LT3503 Buck** **LT3505 Buck** LT3481 Buck **LT3684 Buck**	**LT3680 Buck** LTC1771 Controller **LTM4603 µModule*** LTC1778 Controller	**LTM4601 µModule*** **LTC3610 Buck** LTC1778 Controller LTC3823 Controller	**2 x LTM4601 µModule*** LTC1778 Controller LTC3823 Controller LT1952 Controller

MAX II CPLDs						Core Voltage: 2.5V
Input Supply	*≤200mA*	*≤500mA*	*≤1A – 1.5A*	*≤2A – 5A*	*5A – 10A*	*Up to 25A*
1.8V	LTC3525 Boost LTC3427 Boost LTC3429 Boost LTC3499 Boost	LTC3499 Boost LTC3426 Boost LTC3422 Boost	LTC3421 Boost LTC3428 Boost LTC3426 Boost	LTC3425 Boost LTC1872 Boost Controller LTC1700 Boost Controller	N/A	N/A
2.5V to 5V	LTC1844 Linear LTC3035 Linear LT1962 Linear LTC3410 Buck	**LT3080 Linear** LT1763 Linear **LT1965 Linear** **LTC3542 Buck** **LTC3560 Buck**	**LTC3561 Buck** **LTC3411A Buck** LT1619 SEPIC Controller	LTC3414 Buck LTC3801 Controller LTC3809 Controller LT1619 SEPIC Controller	LTC3418 Buck **LTM4601 µModule*** **LTC3610 Buck** LTC3822 Controller	LTC3822 Controller LTC3713 Controller LTC3832 Controller LTC1778 Controller
≤12V to 24V	LT3470 Buck LT1934 Buck LT1616 Buck **LT3502 Buck**	LT1616 Buck **LT3502 Buck** LT1933 Buck LT3493 Buck	**LT3503 Buck** **LT3505 Buck** **LT3684 Buck** LT1936 Buck	**LT3680 Buck** LTC1771 Controller **LTM4603 µModule*** LTC1778 Controller	**LTM4601 µModule*** **LTC3610 Buck** LTC1778 Controller LTC3823 Controller	**2 x LTM4601 µModule*** LTC1778 Controller **LTC3823 Controller** **LT1952 Controller**

Power Supply for I/O

I/O Voltage	Input Voltage	500mA	1A	2A – 5A	6A – 10A	20A
3.3V	12V	LT1616, LT1933	LT1936, LT1767	**LT3680**, LTC1778, LTC3770	**LTM4601**, LTC1778	**2 x LTM4601**, LTC1778
	5V	**LTC3406A**, LT1962, **LT1965**	**LT1965**, **LTC3411A**	LTC3412/A, LTC3414, LTC3809	LTC3415, LTC3418, LTC1778	LTC1778
2.5V	12V	LT1616, LT1933	LT1936, LT1767	**LT3680**, LTC1778, LTC3770	**LTM4601**, LTC1778	LTC1778
	5V	**LTC3560**, LT1962, **LT1965**	LT1963A, **LT1965**, **LTC3411A**	LTC3412/A, LTC3414, LTC3809	**LTM4601**, LTC3415, LTC3418	**2 x LTM4601**, LTC1778
	3.3V	**LTC3560**, LT1962, **LT1965**	LT1963A, **LT1965**, **LTC3411A**	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	**LTC3836**, **LT3740**
1.8V	5V	**LTC3560**	**LTC3411A**, LT1767	LTC3412/A, LTC3414, LTC3809	**LTM4601**, LTC3418	**2 x LTM4601**, LTC1778
	3.3V	**LTC3560**	LT1963A, **LT1965**, **LTC3411A**	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	**LTC3836**, **LT3740**
	2.5V	**LTC3560**, **LTC3406A**, **LT1965**	LT1963A, **LT1965**, **LTC3411A**	LTC3412/A, LTC3414, LTC3801	LTC3418, **LT3740**	**LT3740**
1.5V	5V	**LTC3560**	**LTC3411A**, LT1767	LTC3412/A, LTC3414, LTC3809	**LTM4601**, LTC3418	**2 x LTM4601**, LTC1778
	3.3V	**LTC3560**	LT1963A, **LT1965**, **LTC3411A**	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	**LTC3836**, **LT3740**
	2.5V	**LTC3560**, **LTC3406A**, LT3021	LT1963A, **LT1965**, **LTC3411A**	LTC3412/A, LTC3414, LTC3809	LTC3415, LTC3418, **LT3740**	**LT3740**
	1.8V	**LTC3406A**, LT3021, **LT1965**	**LT3080**, **LT1965**, LT1764A	LT1764A, **2 x LT3080**, LT3150	LT3150, LTC3713	LTC3713

Dual Output Switching Regulators

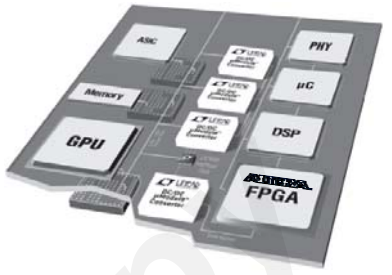
Part Number	Architecture	V_{IN} Range (V)	Max $I_{OUT(1)}$ / $I_{OUT(2)}$ (A)	Part Number	Architecture	V_{IN} Range (V)	Max $I_{OUT(1)}$ / $I_{OUT(2)}$ (A)
LTC3547	Monolithic	2.5 – 5.5	0.3/0.3	**LT3546**	Monolithic	2.25 – 5.5	2/2 or 3/1
LTC3548	Monolithic	2.5 – 5.5	0.4/0.8	LT3501	Monolithic	3 – 30	3/3
LT3419	Monolithic	2.5 – 5.5	0.6/0.6	LTC3736/-1	Controller	2.7 – 9.8	5/5
LTC3407-2	Monolithic	2.5 – 5.5	0.8/0.8	LTC3737	Controller	2.7 – 9.8	5/5
LTC3417	Monolithic	2.25 – 5.5	0.8/1.4	LTC3850	Controller	4 – 24	20/20
LTC3417A	Monolithic	2.25 – 5.5	1.0/1.5	LTC3728	Controller	4 – 36	20/20
LT3508	Monolithic	3.7 – 36	1.4/1.4	LTC3808	Controller	4 – 36	20/20
LT1940	Monolithic	3.6 – 25	1.4/1.4	LTC3728	Controller	4 – 36	20/20
LT3506/A	Monolithic	3.6 – 25	1.6/1.6	LTC3827	Controller	4 – 36	25/25
LT3510	Monolithic	3.6 – 25	2/2	LTC3727	Controller	4.5 – 36	25/25

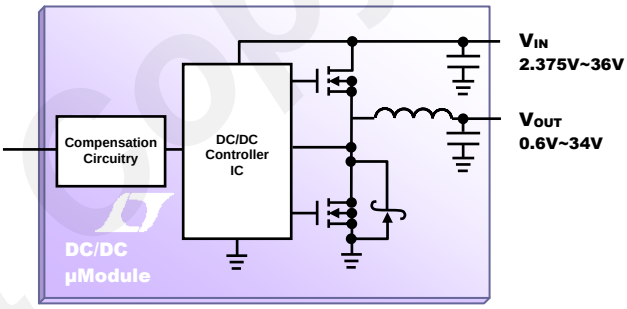
DC/DC µModule "Instant 200mA~16A Power Supply" - LTM®4600 Family / LTM8020 Family

Linear Technology Corporation

Linear Technology's "DC/DC µModule" is a series of "complete," "easy-to-use," "instant" power modules.

Linear Technology's recent technical achievements in the performance of switching regulators and innovative packaging methods have finally allowed a new generation of point-of-load DC/DC regulators, including all the circuit components such as the inductor and power MOSFETs, to be shrunk and encapsulated in such a tiny size that they resemble a surface mount IC. These high-end point-of-load µModule regulators are complete solutions containing the DC/DC controller, MOSFETs, inductor, input and output bypass capacitors and compensation circuitry in only 2.25cm². Supported by Linear Technology's rigorous testing and high reliability processes, the µModule family simplifies the design and layout of your next power supply.

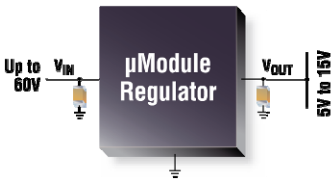




Part Number	V_{IN} (min)	V_{IN} (max)	V_{OUT} (min)	V_{OUT} (max)	I_{OUT}	PLL	Tracking Margining	Remote Sense	LGA Package Dimensions (mm)	Comments
■ Ultra Low Noise Buck	V_{IN} < 28V & 36V ; V_{OUT} < 5V, 10V & 15V									
LTM8023	3.6V	36V	0.8V	10V	2A				9x15x2.8	Low EMI, wide in/out range, Aux Synch, Power Good
LTM4612	5V		3.3V	15V	5A	✓	✓		15x15x2.8	Low EMI, Aux Synch, PLL, Power Good, Soft Start
LTM4606	4.5V	28V	0.6V	5V	6A	✓	✓			
■ Dual Output Buck	V_{IN} < 5.5V, 26.5V & 36V ; V_{OUT} < 5V & 10V									
LTM8024	3.7V	36V	0.8V	10V	1.2A x 2				9x15x2.8	High Voltage
LTM4619	4.5V	26.5V		5V	4A x 2	✓	✓		15x15x2.8	Current can increase by paralleling
LTM4614	2.375V	5.5V				✓	✓			Current can increase by paralleling
LTM4615					4A x 2 1.5A VLDO	✓	✓			VLDO included
LTM4616					8A x 2	✓	✓			Spread Spectrum, 12 phases max.
■ High Voltage Buck	V_{IN} < 36V ; V_{OUT}< 5V, 10V & 24V									
LTM8020	4V	36V	1.25V	5V	200mA				6.25x6.25x2.32	Ultra small package
LTM8021	3.6V		0.8V		500mA				6.25x11.25x2.8	Smaller than an LDO Plus Heat Sink
LTM8022				10V	1A				11.25x9x2.8	Pin compatible with LTM8023
LTM8023					2A					Pin compatible with LTM8022
LTM8025				24V	3A				9x15x4.32	Current can increase by paralleling
■ Low Voltage Buck	V_{IN} < 5.5V ; V_{OUT}< 5V									
LTM4604	2.375V	5.5V	0.8V	5V	4A		✓		9x15x2.3	Low package height only 2.3mm
LTM4608			0.6V		8A	✓	✓		9x15x2.8	8A in 9x15mm LGA
■ Buck – Boost	V_{IN} < 20V & 36V ; V_{OUT}< 16V, 24V & 34V									
LTM4609	4.5V	36V	0.8V	34V	4A (10A*)	✓			15x15x2.8	94% to 98% Efficiency, External Inductor
LTM4605		20V		16V	5A (12A*)	✓				
LTM4607		35V		24V	5A (10A*)	✓				
■ Buck (Step-Down)	V_{IN} < 20V & 28V ; V_{OUT}< 5V									
LTM4602	4.5V	20V	0.6V	5V	6A				15x15x2.8	Current can increase by paralleling
LTM4602HV		28V								
LTM4603		20V				✓	✓	✓		
LTM4603HV		28V				✓	✓	✓		
LTM4600		20V			10A					
LTM4600HV		28V								
LTM4601		20V			12A	✓	✓	✓		
LTM4601HV		28V				✓	✓	✓		

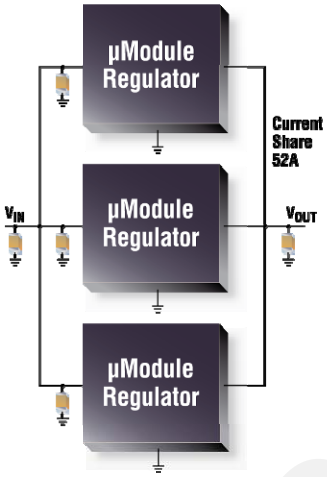
High Reliability DC/DC µModule Regulators

Linear Technology Corporation



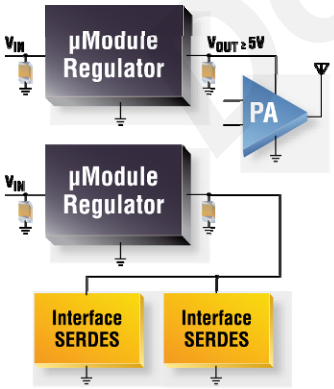
Low Current Buck (Step-Down)

Part Number	V_{IN} Min (V)	V_{IN} Max (V)	V_{OUT} Min (V)	V_{OUT} Max (V)	Output Current (A)	PLL	Track, Margin	Remote Sense	Current Share	LGA Package Dimensions
LTM®8020	4	36	1.25	5	0.2				-	6.25mm x 6.25mm x 2.3mm
LTM8021	3	36	0.8	5	0.5				-	6.25mm x 11.25mm x 2.8mm
LTM8022	3.6	36	0.8	10	1				-	9mm x 11.25mm x 2.8mm
LTM8023	3.6	36	0.8	10	2				Up to 2	10mm x 11.25mm x 2.8mm
LTM8025	3.6	36	0.8	24	3				Up to 2	9mm x 15mm x 4.32mm
LTM8027	4.5	60	2.5	24	4				-	15mm x 15mm x 4.32mm
LTM4604A	2.375	5.5	0.8	5	4		•		Up to 2	9mm x 15mm x 2.3m
LTM4602	4.5	20	0.6	5	6				-	15mm x 15mm x 2.8mm
LTM4602HV	4.5	28	0.6	5	6				Up to 2	15mm x 15mm x 2.8mm
LTM4603	4.5	20	0.6	5	6	•	•	•	Up to 4	15mm x 15mm x 2.8mm
LTM4603HV	4.5	28	0.6	5	6	•	•	•	Up to 4	15mm x 15mm x 2.8mm



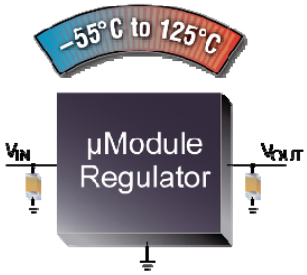
High Current Buck (Step-Down)

Part Number	V_{IN} Min (V)	V_{IN} Max (V)	V_{OUT} Min (V)	V_{OUT} Max (V)	Output Current (A)	PLL	Track, Margin	Remote Sense	Current Share	LGA Package Dimensions
LTM4608A	2.7	5.5	0.6	5	8	•	•		Up to 3	9mm x 15mm x 2.8mm
LTM4600	4.5	20	0.6	5	10				-	15mm x 15mm x 2.8mm
LTM4600HV	4.5	28	0.6	5	10				Up to 2	15mm x 15mm x 2.8mm
LTM4601	4.5	20	0.6	5	12	•	•	•	Up to 4	15mm x 15mm x 2.8mm
LTM4601HV	4.5	28	0.6	5	12	•	•	•	Up to 4	15mm x 15mm x 2.8mm
LTM4601A	4.5	20	0.6	5	12	•	•	•	Up to 4	15mm x 15mm x 2.8mm
LTM4601AHV	4.5	28	0.6	5	12	•	•	•	Up to 4	15mm x 15mm x 2.8mm



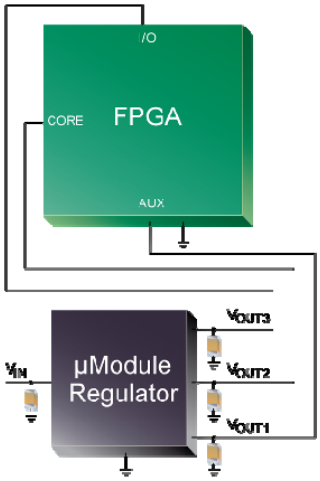
Ultralow EMI Buck (Step-Down)

Part Number	V_{IN} Min (V)	V_{IN} Max (V)	V_{OUT} Min (V)	V_{OUT} Max (V)	Output Current (A)	PLL	Track, Margin	Remote Sense	Current Share	LGA Package Dimensions
LTM8020	4	36	1.25	5	0.2				-	6.25mm x 6.25mm x 2.3mm
LTM8021	3	36	0.8	5	0.5				-	6.25mm x 11.25mm x 2.8mm
LTM8031	3.6	36	0.8	10	1				Up to 2	9mm x 15mm x 2.8mm
LTM8032	3.6	36	0.8	10	2				Up to 2	10mm x 15mm x 2.8mm
LTM4606	4.5	28	0.6	5	6	•	•		-	15mm x 15mm x 2.8mm
LTM4612	4.5	36	3.3	15	6	•	•		-	16mm x 15mm x 2.8mm



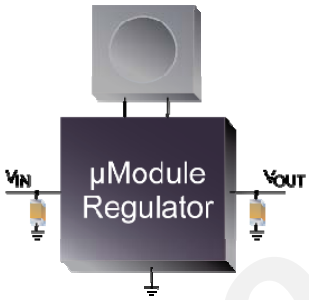
–55°C to 125°C Fully Tested Buck (Step-Down)

Part Number	V_{IN} Min (V)	V_{IN} Max (V)	V_{OUT} Min (V)	V_{OUT} Max (V)	Output Current (A)	PLL	Track Margin	Remote Sense	Current Share	LGA Package Dimensions
LTM8020MPV	4	38	1.25	5	0.2				-	6.25mm x 6.25mm x 2.3mm
LTM8022MPV	3.6	36	0.8	10	1				-	9mm x 15mm x 2.8mm
LTM8032MPV	3.6	36	0.8	10	1				-	9mm x 15mm x 2.8mm
LTM8023MPV	3.6	36	0.8	10	2				Up to 2	9mm x 15mm x 2.8mm
LTM8025MPV	3.6	36	0.8	24	3				Up to 2	9mm x 15mm x 4.32mm
LTM8027MPV	4.6	60	2.5	24	4				-	16mm x 15mm x 4.32mm
LTM4608MPV	4.6	28	0.8	6	8	•	•		-	15mm x 15mm x 2.8mm
LTM4612MPV	4.5	36	3.3	15	8	•	•		-	15mm x 15mm x 2.8mm
LTM4620AMPV	2.375	5.5	0.8	5	8	•	•		Up to 3	9mm x 15mm x 2.8mm
LTM4620HVMPV	4.5	28	0.8	5	10				Up to 2	15mm x 15mm x 2.8mm
LTM4630*AHVMPV	4.5	28	0.8	6	12	•	•	•	Up to 4	15mm x 15mm x 2.8mm



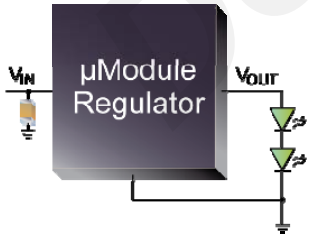
Dual and Triple Buck (Step-Down)

Part Number	V_{IN} Min (V)	V_{IN} Max (V)	V_{OUT} Min (V)	V_{OUT} Max (V)	Output Current (A)	PLL	Track Margin	Remote Sense	Current Share	LGA Package Dimensions
LTM4614	2.375	5.5	0.8	5	4, 4		•		Up to 2	15mm x 15mm x 2.8mm
LTM4615 (triple)	2.375	5.5	0.8	5	4, 4, 1.5		•		-	15mm x 15mm x 2.8mm
LTM4619	4.5	26.5	0.8	5	4, 4	•	•		-	15mm x 15mm x 2.8mm
LTM4618	2.7	5.5	0.6	5	6, 6	•	•		Up to 2	15mm x 15mm x 2.8mm



Buck-Boost (External Inductor)

Part Number	V_{IN} Min (V)	V_{IN} Max (V)	V_{OUT} Min (V)	V_{OUT} Max (V)	Output Current (A)	PLL	Track Margin	Remote Sense	Current Share	LGA Package Dimensions
LTM4605	4.5	20	0.8	16	5 to 12	•			Up to 2	15mm x 15mm x 2.8mm
LTM4607	4.6	38	0.8	24	5 to 12	•			Up to 2	15mm x 15mm x 2.8mm
LTM4609	4.6	36	0.8	34	5 to 12	•			Up to 2	15mm x 15mm x 2.8mm

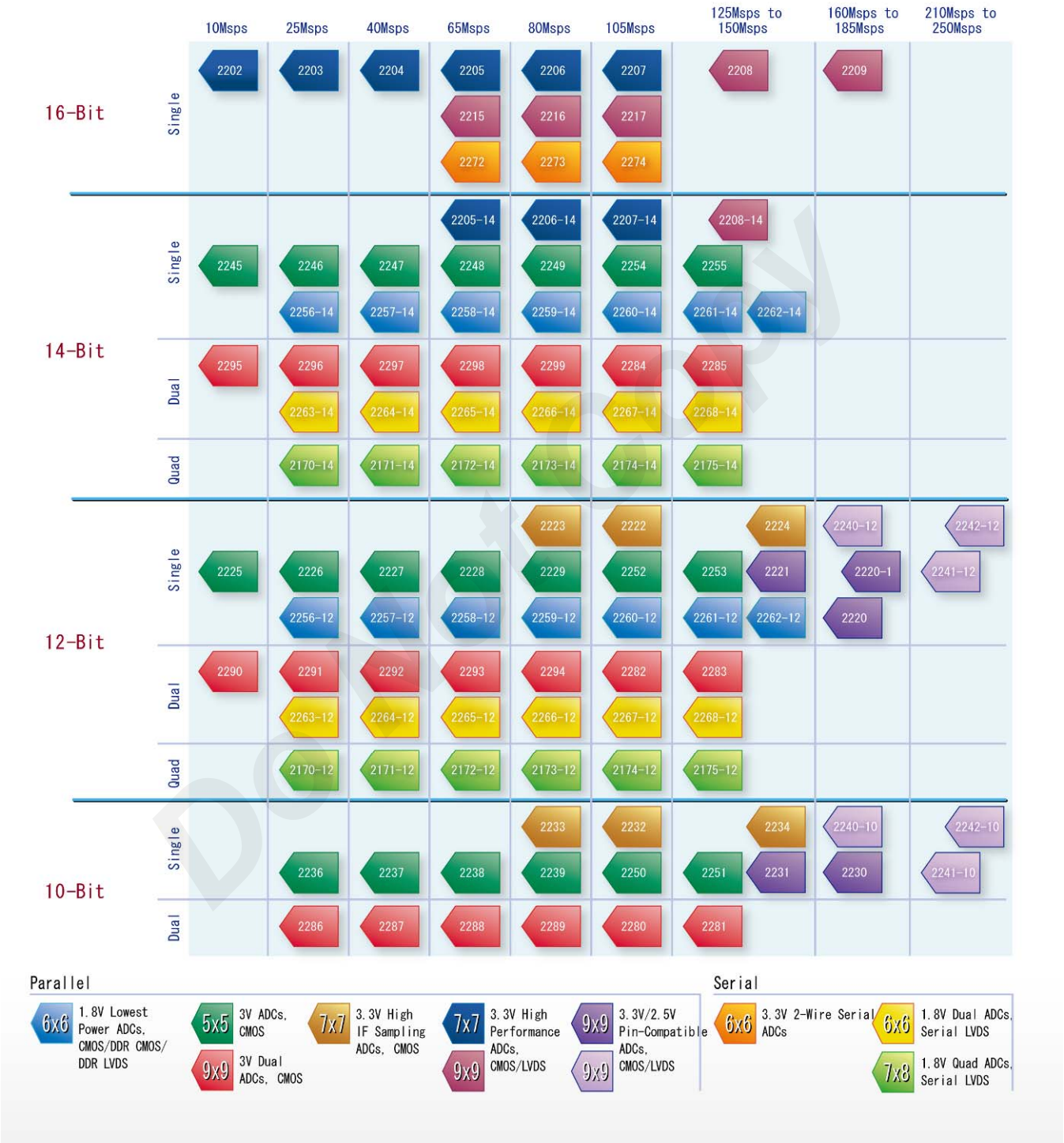


LED Driver and Current Source Buck (Step-Down)

Part Number	V_{IN} Min (V)	V_{IN} Max (V)	V_{OUT} Min (V)	V_{OUT} Max (V)	Output Current (A)	PLL	Track Margin	Remote Sense	Current Share	LGA Package Dimensions
LTM8040	4	36	2.5	13	1				-	9mm x 15mm x 4.32mm

Lowest Power High Speed ADCs

Linear Technology Corporation

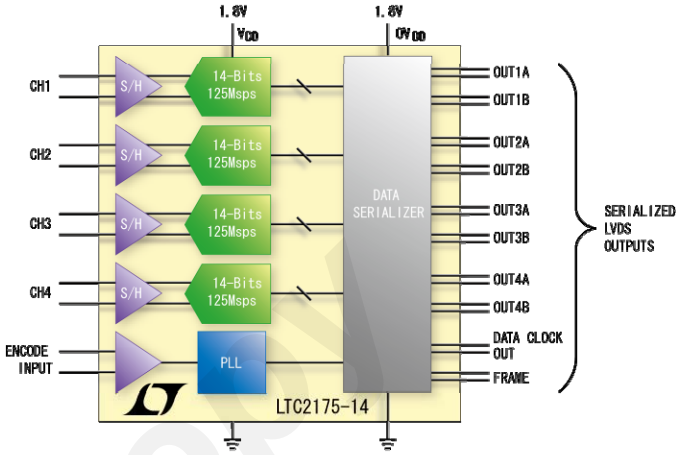


LTC2175 14-Bit/12-Bit 25Msps to 125Msps Quad/Dual ADC Family

Linear Technology Corporation

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: 1VP-P to 2VP-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 LTC®2175 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.

Ultra-Tiny 16-Bit ΔΣ ADC Family

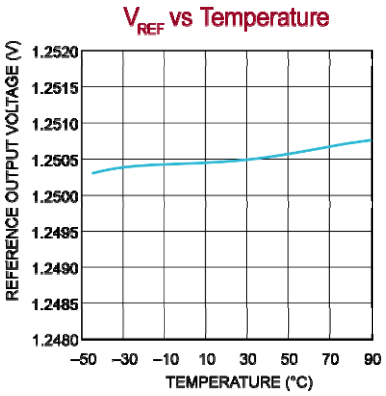
Linear Technology Corporation

		30Hz/60Hz ADCs with External Reference	60Hz ADCs with 10ppm/°C Reference	Fast (250Hz/100Hz) ADCs with 10ppm/°C Reference
SPI	Single-Ended	2550/ 2450-1	2460	2470
	Differential	2452	2462	2472
	Packages	2mm x 2mm DFN 3mm x 2mm DFN 8-Lead TSOT-23	3mm x 3mm DFN 12 Lead-MSOP	3mm x 3mm DFN 12-Lead MSOP
I^2C	Single-Ended	2451	2461	2471
	Differential	2453	2463	2473
	Packages	2mm x 2mm DFN 3mm x 2mm DFN 8-Lead TSOT-23	3mm x 3mm DFN 12 Lead-MSOP	3mm x 3mm DFN 12-Lead MSOP

LTC2470–LTC2473: Fast, 16-Bit ΔΣ ADCs with 10ppm/°C Reference

Features

- 16-Bit Resolution, No Missing Codes, at Maximum Output Rate (1ksps)
- Internal, High Accuracy Reference – 10ppm/°C (Max)
- 0V to 1.25V Single-Ended Input or ±1.25V Differential Inputs
- Selectable 250sps/1ksps Output Rate
- 1mV Offset Error, 0.01% Gain Error
- 3.5mA (Typ) Supply Current
- 2μA (Max) Sleep Current
- 2.7V to 5.5V Single Supply
- Internal Oscillator – No External Components Required
- Small 12-Lead, 3mm × 3mm DFN and MSOP Packages



Applications

- System Monitoring
- Environmental Monitoring
- Direct Temperature Measurements
- Instrumentation
- Industrial Process Control
- Data Acquisition
- Embedded ADC Upgrades

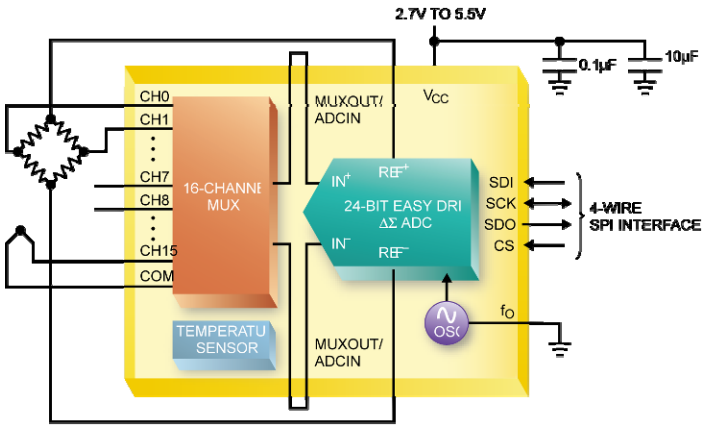
Complete Easy Drive ADC Family

Linear Technology Corporation

LTC2498: 24-Bit, 16-Channel Easy Drive ΔΣ ADC

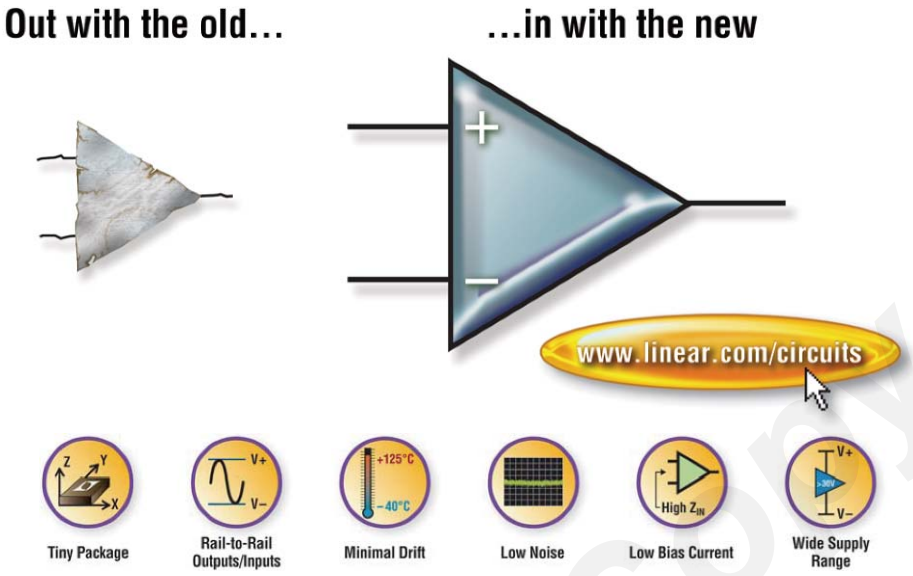
Features

- 8 Differential/16 Single-Ended Input Channels
- Easy Drive™Technology Enables Rail-to-Rail Inputs with Zero Differential Current
- Directly Digitizes High Impedance Sensors with Full Accuracy
- 600nVRMS Noise
- Internal Temperature Sensor (2°C Maximum), Internal Oscillator
- Selectable 50Hz, 60Hz Rejection, Up to 15Hz Output Rate



Industrial Precision Op Amps

Linear Technology Corporation



Give Your Industrial Design a Facelift

Our precision amplifiers provide the ideal combination of specs for the industrial market. We have improved on industry standard amplifiers with wider supply ranges, higher precision, lower noise and supply current, along with rail-to-rail outputs. These amplifiers minimize board space, extend battery life and improve system performance, driving your product's performance to the next level.

LTC6247: Power Efficient Rail-to-Rail Op Amp

- Gain Bandwidth Product: 180MHz
- -3dB Frequency (AV = 1): 120MHz
- Low Quiescent Current: 1mA Max
- High Slew Rate: 90V/µs
- Input Common Mode Range Includes Both Rails
- Output Swings Rail-to-Rail
- Low Broadband Voltage Noise: 4.2nV/√Hz
- Power-Down Mode: 42µA
- Fast Output Recovery
- Supply Voltage Range: 2.5V to 5.25V
- Input Offset Voltage: 0.5mV Max
- Input Bias Current: 100nA
- Large Output Current: 50mA
- LTC6246: Single, LTC6247: Dual, LTC6248: Quad

LT6004: 1µA Precision Rail-to-Rail Op Amp

- Wide Supply Range: 1.6V to 16V
- Low Supply Current: 1µA/Amplifier Max
- Low Input Bias Current: 90pA Max
- Low Input Offset Voltage: 500µV Max
- Low Input Offset Voltage Drift: 2µV/°C
- CMRR: 100dB
- PSRR: 95dB
- AVOL Driving 20kΩ Load: 100,000 Min
- Capacitive Load Handling: 500pF
- Specified from: –40°C to 85°C
- Available in Tiny 2mm × 2mm DFN and Low Profile (1mm) ThinSOT™ Packages
- LT6003: Single, LT6004: Dual, LT6005: Quad

LT6231: 1.1nV/√Hz Precision Rail-to-Rail Out Op Amp

- Low Noise Voltage: 1.1nV/√Hz
- Low Supply Current: 3.5mA/Amp Max
- Low Offset Voltage: 350µV Max
- Gain Bandwidth Product: LT6230: 215MHz; AV ≥ 1 LT6230-10: 1450MHz; AV ≥ 10
- Wide Supply Range: 3V to 12.6V
- Output Swings Rail-to-Rail
- Common Mode Rejection Ratio: 115dB Typ
- Output Current: 30mA
- Operating Temperature Range: -40°C to 85°C
- LT6230: Single, LT6231: Dual, LT6232: Quad

Selected Operational Amplifiers

Highest Precision ↑ Fastest ↓

Single Part Number	Dual Part Number	Quad Part Number	V_{OS} Max 25°C (μV)	TCV_{OS} Max 25°C (μV/°C)	I_B Max 25°C (nA)	GBW Typ 25°C (MHz)	Slew Rate Typ 25°C (V/μs)	e_n Typ 25°C (nV/√Hz)	I_{OUT} Min 25°C (mA)	I_S Max 25°C (mA)	V_S Min (V)	V_S Max (V)	Rail-to-Rail I/O
LTC2054	LTC2055		3	0.03	0.15	0.5	0.5		1	0.15	2.7	12	Out
LTC2050	LTC2051	LTC2052	3	0.03	0.075	3	2		2.4	1.2	2.7	12	Out
LTC1050	LTC1051		5	0.05	0.03	2.5	4	90		1.5	4.75	18	Out
LTC1150	LTC1151		10	0.05	0.1	2.5	3		1.35	1.5	4.75	32	SS
	LTC6078	LTC6079	25	0.7	0.001	0.75	0.05	18	5	0.072	2.7	6	Yes
LT1037			25	0.6	35	8	2.5	2.5	18.3	4	4	44	
LT1028			40	0.8	90	75	15	0.85	18.3	9.5	8	44	
LT1097			50	1.2	0.25	0.7	0.2	14	5.75	0.56	2	40	
	LT1884	LT1885	50	0.8	0.4	2	0.9	9.5	15	0.9	2.4	40	Out
LT6010	LT6011	LT6012	60	0.8	0.3	0.33	0.09	14	1	0.15	2.7	40	Out
	LT1112	LT1114	60	0.5	0.25	0.75	0.3	14	5.5	0.4	2	40	
LT6013	LT6014		60	0.8	0.25	1.6	0.2	9.5	8	0.165	2.7	40	Out
LT1677			60	1.5	20	7.2	2.5	3.2	25	3.5	2.5	44	Yes
	LT2178	LT2179	70	1.8	5	0.08	0.025	49	5.5	0.018	2.2	44	SS
	LTC6081	LTC6082	70	0.8	0.001	3.6	1	13	5	0.425	2.7	5.5	Yes
	LT1124	LT1125	70	1	20	12.5	4.5	2.7	6.25	2.75	8	44	
	LT1468	LT1469	75	2	40	90	22	5	15	5	9	36	
	LT1468-2	LT1469-2	75	2	40	200	30	5	15	5	9	36	
	LT1875	LT1879	100	3	20	20	6	3.9	15	3.4	3	36	Yes
	LTC6244		100	2.5	0.075	50	35	8	25	7.4	2.8	12	Out
LTC6240	LTC6241	LTC6242	125	2.5	0.075	18	10	7	15	2.2	2.8	12	Out
	LT1013	LT1014	150	2	20	0.8	0.4	22	8.5	0.5	4	44	SS
LT1880	LT1881	LT1882	150	1.2	0.9	1.1	0.55	13	1	1.9	2.4	40	Out
	LT1211	LT1212	150	1.5	100	13	7	12	20	1.8	2.5	36	SS
	LT1492	LT1493	180	3	100	4.5	1.8	16.5	20	0.55	2.1	36	SS
LT1115			200	8.6 Typ	380	70	15	0.9	18.3	11.5	8	44	
LT1637	LT1638	LT1639	350	3	50	1	0.35	27	15	0.25	1.8	44	Yes, OTT
LT6220	LT6221	LT6222	350	5	150	60	20	10	20	1	2.2	12.6	Yes
LT6233	LT6234	LT6235	350	3	3000	60	17	1.9	40	1.25	3	12.6	Out
LT1800	LT1801	LT1802	350	5	250	80	25	8.5	20	2	2.3	12.6	Yes
LT1494	LT1495	LT1496	375	2	1	0.0027	0.001	135	0.7	0.0015	2.1	36	Yes, OTT
LT1672	LT1673	LT1674	375	2	1	0.012	0.005	185	0.7	0.002	2.1	36	Yes, OTT
LT1722	LT1723	LT1724	400	7	300	200	70	3.8	35	4.5	4.6	12.6	
	LT1057	LT1058	450	10	0.05	5	14	13	20 Typ	2.5	8	40	
	LT1366	LT1367	475	6	35	0.4	0.13	29	30	0.52	2	36	Yes
	LT1496	LT1499	475	2.5	650	10.5	4.5	12	12.5	2.2	2.2	36	Yes
LT6003	LT6004	LT6005	500	5	0.09	0.002	0.0008	325	2	0.001	1.6	16	Yes
LT6000	LT6001	LT6002	750	5	5	0.05	0.015	75		0.016	1.8	18	Yes
LT1635			1300	7	4.5	0.175	0.045	50	20	0.2	1.1	14	Out
LT1638	LT1490A	LT1491A	500	4	8	0.18	0.08	50	15	0.055	2	44	Yes, OTT
LT1782			800	5	15	0.2	0.07	50	20	0.055	2.2	18	Yes, OTT
LT1783			800	5	80	1.25	0.42	20	20	0.3	2.2	18	Yes, OTT
	LTC6084	LTC6085	750	5	0.04	1.5	0.5	27	7.7	0.13	2.5	5.5	Yes
LT1784			3000	15	500	2.5	2.1	25	20	0.75	2	18	Yes, OTT
LT1351	LT1352	LT1353	600	8	50	3	200	14	30	0.33	5	36	
LT1970			600	10	600	3.6	1.6	15	500	13	5	36	
LT1793			800	13	0.01	4.2	3.4	6	12	5.2	10	40	
LT1797			1500	20	300	10	2.25	20	25	1.5	2.1	12.6	Yes
LT1354	LT1355	LT1356	800	8	300	12	400	10	25	1.25	5	36	
	LTC6087	LTC6088	750	5	0.04	14	7.2	12	5	1.2	2.7	5.5	Yes
LT1357	LT1358	LT1359	600	8	500	25	600	8	24	2.5	5	36	
	LT1630	LT1631	525	5.5	1000	30	9.2	6	20	4.4	2.6	36	Yes
LT1010			150000		250000	30	200	20	150	9	4.5	44	
LT1360	LT1361	LT1362	1000	12	1000	50	800	9	26	4.8	3	36	
LT1210			15000	35 Typ		66	900	3	1100	50	8	36	
LT1363	LT1364	LT1365	1500	13	2000	70	1000	9	50	7.5	3	36	
LT1803	LT1804	LT1805	2000	35	750	80	100	21	20	3	2.3	12.6	Yes
LT6202	LT6203	LT6204	500	24	7000	100	25	1.9	30	3.5	2.5	12.6	Yes
LT6205	LT6206	LT6207	4500	18	30000	100	600	9	25	5.6	3	12.6	Out
LT6200	LT6201		1000	24	40000	165	50	0.95	60	23	2.5	12.6	Yes
LTC6246	LTC6247	LTC6248	500	2.5 Typ	350	180	90	4.2	35	1	2.5	5.25	Yes
	LT6300	LT6301	9000	4 Typ	4000	200	600	8	500	13.5	8	27	
LT6230	LT6231	LT6232	500	3	10000	215	70	1.1	30	3.75	3	12.6	Out
LT1815	LT1816	LT1817	1500	15	6000	220	1500	6	50	7.8	2.5	12.6	
LT1806	LT1807		550	5	4000	325	125	3.5	35	13	2.5	12.6	Yes
LT1818	LT1819		1500	15	8000	400	2500	6	40	10	3.5	12.6	
LT1395	LT1396	LT1397	10000	15 Typ		400	800	4.5	80	6.5	3	12.6	
	LT6411		10000			650	3300	8	50	11	4.5	12.6	
LT1226			1000	7 Typ	8000	1000	400	2.6	24	9	5	36	
LT6230-10			500	3	10000	1450	320	1.1	30	3.75	3	12.6	Out

*Some parameters vary between single/dual/quad versions. For a complete list of products and full specifications visit www.linear.com
OTT = Over-The-Top® - This feature allows full functionality when the input voltage exceeds the supply voltage. See data sheet for details.
SS = Single Supply - The input common mode voltage range includes ground.

Good Better Best

Contact Information

Altera & Linear Technology Development Board Solution Book

Prepared by MACNICA Group Companies: Altima Corp. and Cytech Technology, Ltd.

For product details and inquiries, please contact your local Macnica Companies

JAPAN

ALTIMA Corp.

■ Headquarters: Shin-Yokohama

1-5-5 Shin-Yokohama, Kouhoku-ku, Yokohama, 222-8563 Japan

Tel: 045-476-2155 Fax: 045-476-2156 http://www.altima.co.jp

■ Sales Offices

- Osaka Tel: 06-6397-1053 Fax: 06-6397-1054
- Nagoya Tel: 052-533-0252 Fax: 052-533-0253
- Utsunomiya Tel: 028-627-1071 Fax: 028-627-1072

Hong Kong / China

Cytech Technology, Inc.

■ Headquarters: Hong Kong

Unit 205-206, 2/F, No. 1 Hung To Road, Kwun Tong, Kowloon, Hong Kong

Tel: (852) 2375 8866 Fax: (852) 2375 7700 http://www.cytech.com

■ Sales Offices

- ShenZhen Tel: (86755) 2693 5811 Fax: (86755) 2693 5400
- Wuhan Tel: (8627) 8756 8665 Fax: (8627) 8756 8690
- Xiamen Tel: (86592) 2681022 Fax: (86592) 2681023
- Nanjing Tel: (8625) 8481 0877 Fax: (8625) 8480 8023
- HangZhou Tel: (86571) 8755 2869 Fax: (86571) 8755 2657
- QingDao Tel: (86532) 8598 8435
- ChengDu Tel: (8628) 8652 7116 Fax: (8628) 8652 7556
- Xi'An Tel: (8629) 8836 2820 Fax: (8629) 8837 8919
- Shanghai Tel: (8621) 6440 1373 Fax: (8621) 6440 0166
- Beijing Tel: (8610) 8260 7990 Fax: (8610) 8260 7570
- Guangzhou Tel: (8620) 3839 3844 Fax: (8620) 3839 3848
- Chongqing Tel: (8623) 6707 1435

MACNICA GROUP