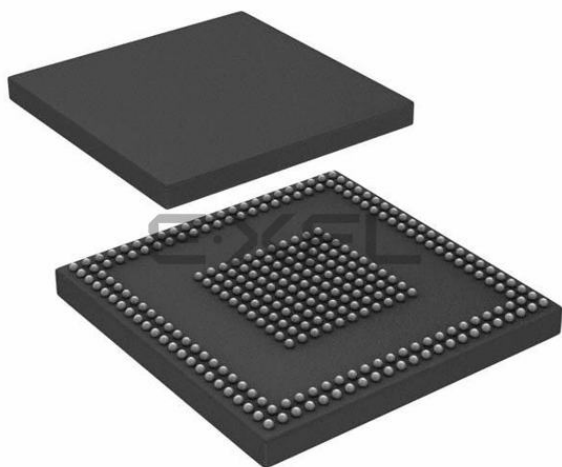




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### Understanding [Embedded - DSP \(Digital Signal Processors\)](#)

[Embedded - DSP \(Digital Signal Processors\)](#) are specialized microprocessors designed to perform complex mathematical computations on digital signals in real-time. Unlike general-purpose processors, DSPs are optimized for high-speed numeric processing tasks, making them ideal for applications that require efficient and precise manipulation of digital data. These processors are fundamental in converting and processing signals in various forms, including audio, video, and communication signals, ensuring that data is accurately interpreted and utilized in embedded systems.

### Applications of [Embedded - DSP \(Digital Signal Processors\)](#)

#### Details

|                         |                                                                                                                                                         |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status          | Active                                                                                                                                                  |
| Type                    | Fixed Point                                                                                                                                             |
| Interface               | DMA, I <sup>2</sup> C, PPI, SPI, SPORT, UART                                                                                                            |
| Clock Rate              | 300MHz                                                                                                                                                  |
| Non-Volatile Memory     | ROM (32kB)                                                                                                                                              |
| On-Chip RAM             | 132kB                                                                                                                                                   |
| Voltage - I/O           | 1.8V, 2.5V, 3.3V                                                                                                                                        |
| Voltage - Core          | 1.30V                                                                                                                                                   |
| Operating Temperature   | 0°C ~ 70°C (TA)                                                                                                                                         |
| Mounting Type           | Surface Mount                                                                                                                                           |
| Package / Case          | 289-LFBGA, CSPBGA                                                                                                                                       |
| Supplier Device Package | 289-CSPBGA (12x12)                                                                                                                                      |
| Purchase URL            | <a href="https://www.e-xfl.com/product-detail/analog-devices/adsp-bf522kbcz-3">https://www.e-xfl.com/product-detail/analog-devices/adsp-bf522kbcz-3</a> |

# Blackfin Processor Family



## Why Choose a Blackfin Processor?

- High performance, 16-/32-bit Blackfin® processor core with DSP and RISC functionality and programmability
  - Eliminates need for multiple separate processors
- Large portfolio of products ranging from 300 MHz to 600 MHz
  - Best-in-class MHz/mW performance
  - Best-in-class price performance
- Software controlled dynamic power management
  - Extends battery life in portable applications
- Application-tuned system peripherals
  - Provides glueless connectivity to a variety of external devices
- Many low cost pin- and code-compatible models
- Industrial temperature range allows for wide range of applications
- Supported by easy to use, world-class development tools
- System-level integration with integrated flash and ADC on certain models
- Processors available with Lockbox® Secure Technology
- World-class ecosystem components and RTOS offerings from leading partners
- On-chip low power codec available on certain models

## Blackfin Processors

| Part Number                   | Package <sup>1</sup> | Speed (MHz) | RAM Memory (kB)             | Ambient Temp Range (°C) | Key Peripherals                                                                       | Price Range @ 1k (\$U.S.) <sup>2</sup> |
|-------------------------------|----------------------|-------------|-----------------------------|-------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| ADSP-BF592BCPZ                | 64-lead LFCSP        | 400         | 68, L1 ROM 64               | −40 to +85              | SPI, PPI, SPORTs, UART                                                                | 4.33                                   |
| ADSP-BF592KCPZ                | 64-lead LFCSP        | 400         |                             | 0 to 70                 |                                                                                       | 3.55                                   |
| ADSP-BF504BCPZ-4 <sup>3</sup> | 88-lead LFCSP        | 400         | 68                          | −40 to +85              | SPI, PPI, SPORTs, UART, PWM, CAN, ADC control module                                  | 5.18 to 13.78                          |
| ADSP-BF504KCPZ-4              | 88-lead LFCSP        | 400         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF504BCPZ-3F             | 88-lead LFCSP        | 300         | 68, Flash memory 512k × 16  | −40 to +85              | SPI, PPI, SPORTs, UART, PWM, CAN, ADC control module, 4 MB parallel flash             |                                        |
| ADSP-BF504KCPZ-3F             | 88-lead LFCSP        | 300         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF504BCPZ-4F             | 88-lead LFCSP        | 400         |                             | −40 to +85              |                                                                                       |                                        |
| ADSP-BF504KCPZ-4F             | 88-lead LFCSP        | 400         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF506BSWZ-3F             | 120-lead LQFP_EP     | 300         |                             | −40 to +85              | SPI, PPI, SPORTs, UART, PWM, CAN, ADC control module, 4 MB parallel flash, 12-bit ADC |                                        |
| ADSP-BF506KSWZ-3F             | 120-lead LQFP_EP     | 300         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF506BSWZ-4F             | 120-lead LQFP_EP     | 400         |                             | −40 to +85              |                                                                                       |                                        |
| ADSP-BF506KSWZ-4F             | 120-lead LQFP_EP     | 400         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF512BBCZ-3              | 168-ball CSP_BGA     | 300         | 116                         | −40 to +85              | PPI, SPI, SPORTs, TWI, UART                                                           | 6.26 to 10.31                          |
| ADSP-BF512BBCZ-4              | 168-ball CSP_BGA     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF512BSWZ-3              | 176-lead LQFP_EP     | 300         |                             |                         |                                                                                       |                                        |
| ADSP-BF512BSWZ-4 <sup>3</sup> | 176-lead LQFP_EP     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF512KBCZ-3              | 168-ball CSP_BGA     | 300         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF512KBCZ-4              | 168-ball CSP_BGA     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF512KSWZ-3              | 176-lead LQFP_EP     | 300         |                             |                         |                                                                                       |                                        |
| ADSP-BF512KSWZ-4              | 176-lead LQFP_EP     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF512BBCZ-4F4            | 168-ball CSP_BGA     | 400         | 116, Flash memory 512k × 16 | −40 to +85              | PPI, SPI, SPORTs, TWI, UART, SPI flash                                                |                                        |
| ADSP-BF512BSWZ-4F4            | 176-lead LQFP_EP     | 400         |                             | −40 to +85              |                                                                                       |                                        |
| ADSP-BF512KBCZ-4F4            | 168-ball CSP_BGA     | 400         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF512KSWZ-4F4            | 176-lead LQFP_EP     | 400         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF514BBCZ-3              | 168-ball CSP_BGA     | 300         | 116                         | −40 to +85              | PPI, SPI, SPORTs, TWI, UART, SDIO, CE-ATA, eMMC                                       | 7.77 to 10.88                          |
| ADSP-BF514BBCZ-4              | 168-ball CSP_BGA     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF514BSWZ-3 <sup>3</sup> | 176-lead LQFP_EP     | 300         |                             |                         |                                                                                       |                                        |
| ADSP-BF514BSWZ-4              | 176-lead LQFP_EP     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF514KBCZ-3              | 168-ball CSP_BGA     | 300         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF514KBCZ-4              | 168-ball CSP_BGA     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF514KSWZ-3              | 176-lead LQFP_EP     | 300         |                             |                         |                                                                                       |                                        |
| ADSP-BF514KSWZ-4              | 176-lead LQFP_EP     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF514BBCZ-4F4            | 168-ball CSP_BGA     | 400         | 116, Flash memory 512k × 16 | −40 to +85              | PPI, SPI, SPORTs, TWI, UART, SDIO, CE-ATA, eMMC, SPI flash                            |                                        |
| ADSP-BF514BSWZ-4F4            | 176-lead LQFP_EP     | 400         |                             | −40 to +85              |                                                                                       |                                        |
| ADSP-BF514KBCZ-4F4            | 168-ball CSP_BGA     | 400         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF514KSWZ-4F4            | 176-lead LQFP_EP     | 400         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF516BBCZ-3              | 168-ball CSP_BGA     | 300         | 116                         | −40 to +85              | PPI, SPI, SPORTs, TWI, UART, 10/100 Ethernet, SDIO, CE-ATA, eMMC                      | 8.92 to 12.03                          |
| ADSP-BF516BBCZ-4              | 168-ball CSP_BGA     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF516BSWZ-3 <sup>3</sup> | 176-lead LQFP_EP     | 300         |                             |                         |                                                                                       |                                        |
| ADSP-BF516BSWZ-4              | 176-lead LQFP_EP     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF516KBCZ-3              | 168-ball CSP_BGA     | 300         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF516KBCZ-4              | 168-ball CSP_BGA     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF516KSWZ-3              | 176-lead LQFP_EP     | 300         |                             |                         |                                                                                       |                                        |
| ADSP-BF516KSWZ-4              | 176-lead LQFP_EP     | 400         |                             |                         |                                                                                       |                                        |
| ADSP-BF516BBCZ-4F4            | 168-ball CSP_BGA     | 400         | 116, Flash memory 512k × 16 | −40 to +85              | PPI, SPI, SPORTs, TWI, UART, 10/100 Ethernet, SDIO, CE-ATA, eMMC, SPI flash           |                                        |
| ADSP-BF516BSWZ-4F4            | 176-lead LQFP_EP     | 400         |                             | −40 to +85              |                                                                                       |                                        |
| ADSP-BF516KBCZ-4F4            | 168-ball CSP_BGA     | 400         |                             | 0 to 70                 |                                                                                       |                                        |
| ADSP-BF516KSWZ-4F4            | 176-lead LQFP_EP     | 400         |                             | 0 to 70                 |                                                                                       |                                        |

<sup>1</sup>Packages: LQFP\_EP (low profile quad flat pack exposed pad); CSP\_BGA (chip scale package ball grid array); PBGA (plastic ball grid array); LFCSP (lead frame chip scale package).

<sup>2</sup>All pricing is budgetary and subject to change.

<sup>3</sup>Available in automotive grade.

## Blackfin Processors (continued)

| Part Number                    | Package <sup>1</sup> | Speed (MHz) | RAM Memory (kB)             | Ambient Temp Range (°C) | Key Peripherals                                                                             | Price Range @ 1k (\$U.S.) <sup>2</sup>                                                      |                |
|--------------------------------|----------------------|-------------|-----------------------------|-------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------|
| ADSP-BF518BBCZ-4               | 168-ball CSP_BGA     | 400         | 116                         | −40 to +85              | PPI, SPI, SPORTs, TWI, UART, 10/100 Ethernet with 1588, SDIO, CE-ATA, eMMC, SPI flash       | 13.07 to 14.45                                                                              |                |
| ADSP-BF518BSWZ-4 <sup>3</sup>  | 176-lead LQFP_EP     |             | 116, Flash memory 512k × 16 |                         |                                                                                             |                                                                                             |                |
| ADSP-BF518BBCZ-4F4             | 168-ball CSP_BGA     |             |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF518BSWZ-4F4             | 176-lead LQFP_EP     |             |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF522KBCZ-3               | 289-ball CSP_BGA     | 300         | 132                         | 0 to 70                 | PPI, SPI, SPORTs, NAND interface, TWI, host DMA, UART, Lockbox                              | 8.18 to 12.04                                                                               |                |
| ADSP-BF522BBCZ-3A              | 208-ball CSP_BGA     |             |                             | −40 to +85              |                                                                                             |                                                                                             |                |
| ADSP-BF522KBCZ-3C2             | 289-ball CSP_BGA     |             |                             | 0 to 70                 |                                                                                             |                                                                                             |                |
| ADSP-BF522KBCZ-4               | 289-ball CSP_BGA     | 0 to 70     |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF522BBCZ-4A              | 208-ball CSP_BGA     | −40 to +85  |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF522KBCZ-4C2             | 289-ball CSP_BGA     | 0 to 70     |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF523KBCZ-5               | 289-ball CSP_BGA     | 533         |                             | 0 to 70                 |                                                                                             | PPI, SPI, SPORTs, 10/100 Ethernet, TWI, host DMA, NAND interface, UART, Lockbox, HS USB OTG | 13.46 to 19.24 |
| ADSP-BF523BBCZ-5A              | 208-ball CSP_BGA     |             |                             | −40 to +85              |                                                                                             |                                                                                             |                |
| ADSP-BF523KBCZ-5C2             | 289-ball CSP_BGA     |             |                             | 0 to 70                 |                                                                                             |                                                                                             |                |
| ADSP-BF523KBCZ-6               | 289-ball CSP_BGA     | 600         |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF523KBCZ-6A              | 208-ball CSP_BGA     |             |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF523KBCZ-6C2             | 289-ball CSP_BGA     |             |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF524KBCZ-3               | 289-ball CSP_BGA     | 300         | 132                         | 0 to 70                 | PPI, SPI, SPORTs, NAND interface, TWI, host DMA, UART, Lockbox, HS USB OTG                  | 9.58 to 13.74                                                                               |                |
| ADSP-BF524BBCZ-3A              | 208-ball CSP_BGA     |             |                             | −40 to +85              |                                                                                             |                                                                                             |                |
| ADSP-BF524KBCZ-3C2             | 289-ball CSP_BGA     |             |                             | 0 to 70                 |                                                                                             |                                                                                             |                |
| ADSP-BF524KBCZ-4               | 289-ball CSP_BGA     | 0 to 70     |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF524BBCZ-4A              | 208-ball CSP_BGA     | −40 to +85  |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF524KBCZ-4C2             | 289-ball CSP_BGA     | 0 to 70     |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF525KBCZ-5               | 289-ball CSP_BGA     | 533         |                             | 0 to 70                 |                                                                                             | PPI, SPI, SPORTs, 10/100 Ethernet, TWI, host DMA, NAND interface, UART, Lockbox, HS USB OTG | 15.17 to 21.00 |
| ADSP-BF525BBCZ-5A <sup>3</sup> | 208-ball CSP_BGA     |             |                             | −40 to +85              |                                                                                             |                                                                                             |                |
| ADSP-BF525KBCZ-5C2             | 289-ball CSP_BGA     |             |                             | 0 to 70                 |                                                                                             |                                                                                             |                |
| ADSP-BF525KBCZ-6               | 289-ball CSP_BGA     | 600         |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF525KBCZ-6A              | 208-ball CSP_BGA     |             |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF525KBCZ-6C2             | 289-ball CSP_BGA     |             |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF526KBCZ-3               | 289-ball CSP_BGA     | 300         | 132                         | 0 to 70                 | PPI, SPI, SPORTs, 10/100 Ethernet, TWI, host DMA, NAND interface, UART, Lockbox, HS USB OTG | 10.76 to 15.53                                                                              |                |
| ADSP-BF526BBCZ-3A              | 208-ball CSP_BGA     |             |                             | −40 to +85              |                                                                                             |                                                                                             |                |
| ADSP-BF526KBCZ-3C2             | 289-ball CSP_BGA     |             |                             | 0 to 70                 |                                                                                             |                                                                                             |                |
| ADSP-BF526KBCZ-4               | 289-ball CSP_BGA     | 0 to 70     |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF526BBCZ-4A              | 208-ball CSP_BGA     | −40 to +85  |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF526KBCZ-4C2             | 289-ball CSP_BGA     | 0 to 70     |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF527KBCZ-5               | 289-ball CSP_BGA     | 533         |                             | 0 to 70                 |                                                                                             | PPI, SPI, SPORTs, 10/100 Ethernet, TWI, host DMA, NAND interface, UART, Lockbox, HS USB OTG | 16.99 to 22.89 |
| ADSP-BF527BBCZ-5A              | 208-ball CSP_BGA     |             |                             | −40 to +85              |                                                                                             |                                                                                             |                |
| ADSP-BF527KBCZ-5C2             | 289-ball CSP_BGA     |             |                             | 0 to 70                 |                                                                                             |                                                                                             |                |
| ADSP-BF527KBCZ-6               | 289-ball CSP_BGA     | 600         |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF527KBCZ-6A              | 208-ball CSP_BGA     |             |                             |                         |                                                                                             |                                                                                             |                |
| ADSP-BF527KBCZ-6C2             | 289-ball CSP_BGA     |             |                             |                         |                                                                                             |                                                                                             |                |

<sup>1</sup>Packages: LQFP\_EP (low profile quad flat pack exposed pad); CSP\_BGA (chip scale package ball grid array); PBGA (plastic ball grid array); LFCSP (lead frame chip scale package).

<sup>2</sup>All pricing is budgetary and subject to change.

<sup>3</sup>Available in automotive grade.

## Blackfin Processors (continued)

| Part Number                     | Package <sup>1</sup> | Speed (MHz) | RAM Memory (kB) | Ambient Temp Range (°C) | Key Peripherals                                                            | Price Range @ 1k (\$U.S.) <sup>2</sup> |
|---------------------------------|----------------------|-------------|-----------------|-------------------------|----------------------------------------------------------------------------|----------------------------------------|
| ADSP-BF531SBB400                | 169-ball PBGA        | 400         | 52              | −40 to +85              | PPI, UART, SPI, 2 SPORTs,<br>3 timers, 16 GPIOs                            | 5.99 to 12.81                          |
| ADSP-BF531SBBC400               | 160-ball CSP_BGA     |             |                 |                         |                                                                            |                                        |
| ADSP-BF531SBBZ400 <sup>3</sup>  | 160-ball CSP_BGA     |             |                 |                         |                                                                            |                                        |
| ADSP-BF531SBBZ400 <sup>3</sup>  | 169-ball PBGA        |             |                 |                         |                                                                            |                                        |
| ADSP-BF531SBSTZ400 <sup>3</sup> | 176-lead LQFP        |             |                 |                         |                                                                            |                                        |
| ADSP-BF532SBBC400               | 160-ball CSP_BGA     | 400         | 84              | −40 to +85              |                                                                            | 9.33 to 17.31                          |
| ADSP-BF532SBBCZ400 <sup>3</sup> | 160-ball CSP_BGA     |             |                 |                         |                                                                            |                                        |
| ADSP-BF532SBSTZ400 <sup>3</sup> | 176-lead LQFP        |             |                 |                         |                                                                            |                                        |
| ADSP-BF532SBB400                | 169-ball PBGA        |             |                 |                         |                                                                            |                                        |
| ADSP-BF532SBBZ400               | 169-ball PBGA        |             |                 |                         |                                                                            |                                        |
| ADSP-BF533SBBC400               | 160-ball CSP_BGA     | 400         | 148             | −40 to +85              | PPI, UART, SPI, 2 SPORTs,<br>3 timers, 16 GPIOs                            | 12.19 to 23.32                         |
| ADSP-BF533SBBCZ400              | 160-ball CSP_BGA     | 400         |                 |                         |                                                                            |                                        |
| ADSP-BF533SBBZ400               | 169-ball PBGA        | 400         |                 |                         |                                                                            |                                        |
| ADSP-BF533SBSTZ400              | 176-lead LQFP        | 400         |                 |                         |                                                                            |                                        |
| ADSP-BF533SBBC500               | 160-ball CSP_BGA     | 500         |                 |                         |                                                                            |                                        |
| ADSP-BF533SBBCZ500 <sup>3</sup> | 160-ball CSP_BGA     | 500         |                 |                         |                                                                            |                                        |
| ADSP-BF533SBB500                | 160-ball CSP_BGA     | 500         |                 |                         |                                                                            |                                        |
| ADSP-BF533SBBZ500 <sup>3</sup>  | 169-ball PBGA        | 500         |                 |                         |                                                                            |                                        |
| ADSP-BF533SBBC-5V               | 160-ball CSP_BGA     | 533         |                 |                         |                                                                            |                                        |
| ADSP-BF533SBBCZ-5V              | 160-ball CSP_BGA     | 533         |                 |                         |                                                                            |                                        |
| ADSP-BF533SKBC-6V               | 160-ball CSP_BGA     | 600         |                 | 0 to 70                 |                                                                            |                                        |
| ADSP-BF533SKBCZ-6V              | 160-ball CSP_BGA     | 600         |                 |                         |                                                                            |                                        |
| ADSP-BF534BBC-4A                | 182-ball CSP_BGA     | 400         | 132             | −40 to +85              | CAN, <sup>®</sup> PPI/SPI, TWI, 8 timers,<br>48 GPIOs, 2 SPORTs/UARTs      | 12.40 to 18.53                         |
| ADSP-BF534BBCZ-4A <sup>3</sup>  | 182-ball CSP_BGA     | 400         |                 |                         |                                                                            |                                        |
| ADSP-BF534BBCZ-4B <sup>3</sup>  | 208-ball CSP_BGA     | 400         |                 |                         |                                                                            |                                        |
| ADSP-BF534BBC-5A                | 182-ball CSP_BGA     | 500         |                 |                         |                                                                            |                                        |
| ADSP-BF534BBCZ-5A               | 182-ball CSP_BGA     | 500         |                 |                         |                                                                            |                                        |
| ADSP-BF534BBCZ-5B               | 208-ball CSP_BGA     | 500         |                 |                         |                                                                            |                                        |
| ADSP-BF534YBCZ-4B3              | 208-ball CSP_BGA     | 400         |                 |                         |                                                                            |                                        |
| ADSP-BF535PBB-200               | 260-ball PBGA        | 200         | 308             | −40 to +85              | 2 SPIs, 2 SPORTs, USB device, PCI                                          | 31.27 to 48.22                         |
| ADSP-BF535PBBZ-200              | 260-ball PBGA        | 200         |                 | −40 to +85              |                                                                            |                                        |
| ADSP-BF535PKB-300               | 260-ball PBGA        | 300         |                 | 0 to 70                 |                                                                            |                                        |
| ADSP-BF535PKBZ-300              | 260-ball PBGA        | 300         |                 | 0 to 70                 |                                                                            |                                        |
| ADSP-BF535PBB-300               | 260-ball PBGA        | 300         |                 | −40 to +85              |                                                                            |                                        |
| ADSP-BF535PKB-350               | 260-ball PBGA        | 350         |                 | 0 to 70                 |                                                                            |                                        |
| ADSP-BF535PKBZ-350              | 260-ball PBGA        | 350         |                 | 0 to 70                 |                                                                            |                                        |
| ADSP-BF536BBC-3A                | 182-ball CSP_BGA     | 300         | 100             | −40 to +85              | 10/100 Ethernet, CAN, PPI, TWI, 8 timers,<br>48 GPIOs, 2 SPORTs/UARTs, SPI | 10.07 to 15.14                         |
| ADSP-BF536BBCZ-3A               | 182-ball CSP_BGA     | 300         |                 |                         |                                                                            |                                        |
| ADSP-BF536BBCZ-3B               | 208-ball CSP_BGA     | 300         |                 |                         |                                                                            |                                        |
| ADSP-BF536BBC-4A                | 182-ball CSP_BGA     | 400         |                 |                         |                                                                            |                                        |
| ADSP-BF536BBCZ-4A               | 182-ball CSP_BGA     | 400         |                 |                         |                                                                            |                                        |
| ADSP-BF536BBCZ-4B               | 208-ball CSP_BGA     | 400         |                 |                         |                                                                            |                                        |

<sup>1</sup>Packages: LQFP\_EP (low profile quad flat pack exposed pad); CSP\_BGA (chip scale package ball grid array); PBGA (plastic ball grid array); LFCSP (lead frame chip scale package).

<sup>2</sup>All pricing is budgetary and subject to change.

<sup>3</sup>Available in automotive grade.

## Blackfin Processors (continued)

| Part Number                     | Package <sup>1</sup> | Speed (MHz) | RAM Memory (kB) | Ambient Temp Range (°C) | Key Peripherals                                                         | Price Range @ 1k (\$U.S.) <sup>2</sup> |
|---------------------------------|----------------------|-------------|-----------------|-------------------------|-------------------------------------------------------------------------|----------------------------------------|
| ADSP-BF537BBC-5A                | 182-ball CSP_BGA     | 500         | 132             | −40 to +85              | 10/100 Ethernet, CAN, PPI, TWI, 8 timers, 48 GPIOs, 2 SPORTs/UARTs, SPI | 17.15 to 21.20                         |
| ADSP-BF537BBCZ-5A               | 182-ball CSP_BGA     | 500         |                 |                         |                                                                         |                                        |
| ADSP-BF537BBCZ-5B               | 208-ball CSP_BGA     | 500         |                 |                         |                                                                         |                                        |
| ADSP-BF537BBCZ-5AV              | 182-ball CSP_BGA     | 533         |                 |                         |                                                                         |                                        |
| ADSP-BF537BBCZ-5BV              | 208-ball CSP_BGA     | 533         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF537KBCZ-6AV              | 182-ball CSP_BGA     | 600         |                 |                         |                                                                         |                                        |
| ADSP-BF537KBCZ-6BV              | 208-ball CSP_BGA     | 600         |                 |                         |                                                                         |                                        |
| ADSP-BF538BBCZ-4A               | 316-ball CSP_BGA     | 400         | 148             | −40 to +85              | CAN 2.0B, 54 GPIOs, 4 SPORTs, 3 UARTs, 3 SPIs, 2 TWIs, PPI, 8 MB flash  | 16.03 to 20.67                         |
| ADSP-BF538BBCZ-4F8              | 316-ball CSP_BGA     | 400         |                 |                         |                                                                         |                                        |
| ADSP-BF538BBCZ-5A               | 316-ball CSP_BGA     | 533         |                 |                         |                                                                         |                                        |
| ADSP-BF538BBCZ-5F8              | 316-ball CSP_BGA     | 533         |                 |                         |                                                                         |                                        |
| ADSP-BF539BBCZ-5A <sup>3</sup>  | 316-ball CSP_BGA     | 533         |                 |                         |                                                                         |                                        |
| ADSP-BF539BBCZ-5F8 <sup>3</sup> | 316-ball CSP_BGA     | 533         |                 |                         |                                                                         |                                        |
| ADSP-BF542BBCZ-4A               | 400-ball CSP_BGA     | 400         | 132             | −40 to +85              | CAN, <sup>4</sup> HS USB OTG, 3 EPPIs, pixel comp, ATAPI-6, Lockbox     | 15.66 to 19.14                         |
| ADSP-BF542BBCZ-5A <sup>3</sup>  | 400-ball CSP_BGA     | 533         | 132             | −40 to +85              |                                                                         |                                        |
| ADSP-BF542KBCZ-6A               | 400-ball CSP_BGA     | 600         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF542MBBCZ-5M <sup>5</sup> | 400-ball CSP_BGA     | 533         |                 | −40 to +85              |                                                                         |                                        |
| ADSP-BF544BBCZ-4A               | 400-ball CSP_BGA     | 400         | 132             | −40 to +85              | CAN, <sup>4</sup> Host DMA, 3 EPPIs, pixel comp, Lockbox                | 16.56 to 18.40                         |
| ADSP-BF544BBCZ-5A <sup>3</sup>  | 400-ball CSP_BGA     | 533         | 196             |                         |                                                                         |                                        |
| ADSP-BF544MBBCZ-5M <sup>5</sup> | 400-ball CSP_BGA     | 533         | 132             |                         |                                                                         |                                        |
| ADSP-BF547BBCZ-5A               | 400-ball CSP_BGA     | 533         | 260             | −40 to +85              | HS USB OTC, 3 EPPIs, pixel comp, ATAPI-6, Lockbox                       | 20.11 to 22.12                         |
| ADSP-BF547KBCZ-6A               | 400-ball CSP_BGA     | 600         | 260             | 0 to 70                 |                                                                         |                                        |
| ADSP-BF547MBBCZ-5M <sup>5</sup> | 400-ball CSP_BGA     | 533         | 132             | −40 to +85              |                                                                         |                                        |
| ADSP-BF548BBCZ-5A               | 400-ball CSP_BGA     | 533         | 260             | −40 to +85              | HS USB OTG, 3 EPPIs, pixel comp, ATAPI-6, Lockbox, CAN                  | 20.71                                  |
| ADSP-BF548MBBCZ-5M <sup>5</sup> | 400-ball CSP_BGA     | 533         | 132             |                         |                                                                         |                                        |
| ADSP-BF561SKB500                | 297-ball PBGA        | 500         | 328             | 0 to 70                 | 2 PPIs, UART, 12 timers, 2 SPORTs                                       | 20.40 to 37.53                         |
| ADSP-BF561SKBZ500               | 297-ball PBGA        | 500         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF561SKBCZ-5A              | 256-ball CSP_BGA     | 500         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF561SKBCZ-5V              | 256-ball CSP_BGA     | 533         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF561SBB500                | 297-ball PBGA        | 500         |                 | −40 to +85              |                                                                         |                                        |
| ADSP-BF561SBBZ500 <sup>3</sup>  | 297-ball PBGA        | 500         |                 | −40 to +85              |                                                                         |                                        |
| ADSP-BF561SBBCZ-5A <sup>3</sup> | 256-ball CSP_BGA     | 500         |                 | −40 to +85              |                                                                         |                                        |
| ADSP-BF561SKB600                | 297-ball PBGA        | 600         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF561SKBZ600               | 297-ball PBGA        | 600         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF561SKBCZ500              | 256-ball CSP_BGA     | 500         |                 | −40 to +85              |                                                                         |                                        |
| ADSP-BF561SKBCZ-6A              | 256-ball CSP_BGA     | 600         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF561SKBCZ-6V              | 256-ball CSP_BGA     | 600         |                 | 0 to 70                 |                                                                         |                                        |
| ADSP-BF561SBB600                | 297-ball PBGA        | 600         |                 | −40 to +85              |                                                                         |                                        |
| ADSP-BF561SBBZ600               | 297-ball PBGA        | 600         |                 | −40 to +85              |                                                                         |                                        |

<sup>1</sup>Packages: LQFP\_EP (low profile quad flat pack exposed pad); CSP\_BGA (chip scale package ball grid array); PBGA (plastic ball grid array); LFCSP (lead frame chip scale package).

<sup>2</sup>All pricing is budgetary and subject to change.

<sup>3</sup>Available in automotive grade.

<sup>4</sup>Available on automotive-grade parts only.

<sup>5</sup>M designates support for 1.8 V mobile DDR memory.

## Development Tools

The Blackfin processor is supported by the Analog Devices CROSSCORE® line of robust and flexible development tools.

### VisualDSP++ Software

VisualDSP++® software delivers efficient project management, enabling programmers to move easily between editing, building, and debugging within a single interface. Key features include an optimizing C/C++ compiler, advanced plotting tools, embedded OS support (VDK), award-winning statistical profiling, TCP/IP and USB support, free software upgrades, and technical support.

### EZ-Board Evaluation Boards

The EZ-Board™ evaluation board provides developers with a low cost platform for initial evaluation of the processors via an external emulator or  $\mu$ Clinux.™ The EZ-Board evaluation board has an expansion interface that allows for modularity with different EZ-Extender boards.

### EZ-KIT Lite Evaluation Kit

The EZ-KIT Lite® evaluation kit is a standalone evaluation board and evaluation suite of VisualDSP++ software to facilitate architecture evaluation.

### EZ-Extender Daughter Boards

EZ-Extender® daughter boards enable developers to access and connect various peripherals from Analog Devices and third parties to the expansion interface of the EZ-KIT Lite evaluation kits.

### Emulators

Analog Devices cost-effective and high performance emulators provide an easy, portable, nonintrusive, target-based debugging solution for Analog Devices JTAG processors and DSPs.

These powerful emulators perform a wide range of emulation functions, including single-step and full-speed execution with predefined breakpoints, and viewing and/or altering of register and memory contents.

### Standalone Debug Agent Board

The Standalone Debug Agent is intended to provide a modular low cost emulation solution for EZ-Board evaluation boards as well as evaluation boards designed by third parties. The Standalone Debug Agent is very similar to the Debug Agent that is on existing EZ-KIT Lite evaluation boards but will have the flexibility to move from one board to another.

## Software Modules

Analog Devices has a wide range of tested and optimized software modules available, including decoders, encoders, codecs, and other algorithms that provide multimedia functions for the Blackfin and SHARC processor families. The software modules allow engineers to quickly and easily incorporate these functions, providing a faster development path to the end product. In addition, the highly optimized software modules feature a consistent API and framework to ensure rapid development of multiple functions. Visit [www.analog.com/software](http://www.analog.com/software) for more information.

## Platforms and Reference Designs

Platforms and reference designs help jump-start your design. They include comprehensive software suites with documented APIs running on application-specific evaluation boards. The easy to use APIs enable customization and control of core system functions, letting you focus on adding value through product differentiation. For more information on Analog Devices platforms, reference designs, and third-party reference designs, visit [www.analog.com/referencedesigns](http://www.analog.com/referencedesigns).

## Extended Development Tools and Support

### Starter Kits

Analog Devices starter kits provide everything you need to get started on an application. Kits contain a Blackfin EZ-KIT Lite, EZ-Extender daughter board(s), and the software development kit (SDK), which contains sample code, “how to” documents, and various encoders/decoders that make getting started on an application easy and shorten the learning curve.

### Software Development Kits

The SDK contains example software, source code, device drivers, algorithms, utilities information, and application notes that allow you to develop processor applications. The software can be used as a framework, or as examples of how to use certain aspects and peripherals, in conjunction with an ADI processor. The SDK is included in the starter kits and is also downloadable for free, provided you have the required hardware, at [www.analog.com/sdk/downloads](http://www.analog.com/sdk/downloads).

### $\mu$ Clinux

The  $\mu$ Clinux kernel and GNU toolchain are available for the Blackfin processor and can be downloaded from the  $\mu$ Clinux for Blackfin processor website ([www.blackfin.uclinux.org](http://www.blackfin.uclinux.org)), which is the central repository for all Blackfin processor open-source projects. One of the board support packages available is the ADSP-BF537 STAMP  $\mu$ Clinux kernel board support package (BSP). The BSP is composed of the ADSP-BF537 STAMP development board (including the full complement of memory along with serial and network interfaces), a recent copy of the open-source development tools,  $\mu$ Clinux kernel, and bootloader. The STAMP board is specifically designed to support the development and porting of open-source  $\mu$ Clinux applications.

## Blackfin Processor Development Tools

| Blackfin Processor                                                                                               | Hardware                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                         | Emulator                                        | VisualDSP++<br>Development Software                                                 | Additional<br>Software Available                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ADSP-BF592                                                                                                       | ADZS-BF592-EZLITE<br><i>Key Features</i> <ul style="list-style-type: none"> <li>ADSP-BF592 Blackfin processor</li> <li>SPI flash memory: Numonyx M25P16—16 MB</li> <li>Audio codec</li> <li>UART</li> </ul>                                                                                                                                                                                                                                  |                                                                                                                         |                                                 |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                       |
| ADSP-BF504<br>ADSP-BF504F<br>ADSP-BF506F                                                                         | ADZS-BF506F-EZLITE<br><i>Key Features</i> <ul style="list-style-type: none"> <li>ADSP-BF506F Blackfin processor with integrated 12-bit ADC and 4 MB stacked flash</li> <li>12-bit ADC input connectors</li> <li>UART interface/DB9 connector</li> <li>SDIO interface</li> <li>Expansion interface</li> <li>Standalone debug agent interface</li> </ul>                                                                                       |                                                                                                                         |                                                 |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                       |
| ADSP-BF512<br>ADSP-BF512F<br>ADSP-BF514<br>ADSP-BF514F<br>ADSP-BF516<br>ADSP-BF516F<br>ADSP-BF518<br>ADSP-BF518F | ADZS-BF518F-EZBRD<br><i>Key Features</i> <ul style="list-style-type: none"> <li>ADSP-BF518F Blackfin processor</li> <li>SDRAM</li> <li>Flash</li> <li>SPI flash</li> <li>Audio codec</li> <li>Power analysis interface</li> <li>Ethernet PHY</li> <li>Analog-to-digital converter</li> <li>Thumbwheel</li> <li>UART</li> <li>RTC battery</li> </ul>                                                                                          | ADZS-BF518F-EZLITE<br>ADZS-BFLLCD-EZEXT<br>ADZS-DBGAGENT-BRD<br>ADZS-BLUET-EZEXT<br>ADZS-BF5HUSB-EZEXT                  |                                                 |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                       |
| ADSP-BF522<br>ADSP-BF522C<br>ADSP-BF524<br>ADSP-BF524C<br>ADSP-BF526<br>ADSP-BF526C                              | ADZS-BF526-EZBRD<br><i>Key Features</i> <ul style="list-style-type: none"> <li>ADSP-BF526 Blackfin processor</li> <li>SDRAM</li> <li>Flash: 4 MB (2M × 16)</li> <li>NAND flash: 2 Gb</li> <li>SPI flash</li> <li>Audio codec</li> <li>Power analysis interface</li> <li>Ethernet PHY</li> <li>Battery or USB bus powered</li> </ul>                                                                                                          | ADZS-BF526-EZLITE<br>ADZS-DBGAGENT-BRD<br>ADZS-BFLLCD-EZEXT<br>ADZS-BLUET-EZEXT<br>ADZS-BF5HUSB-EZEXT                   | ADZS-ICE-100B<br>ADZS-USB-ICE<br>ADZS-HPUSB-ICE | VDSP-BKFN-PC-TEST<br>VDSP-BLKFN-PC-FULL<br>VDSP-BLKFN-PCFLOAT<br>VDSP-BLKFN-PCFLT-5 | Adeneo Embedded<br>(ADSP-BF51x parts only)<br><br>Arcturus<br>(ADSP-BF54x parts only)<br><br>MathWorks®<br>(ADSP-BF531/ADSP-BF532/<br>ADSP-BF533/ADSP-BF534/<br>ADSP-BF536/ADSP-BF537/<br>ADSP-BF538/ADSP-BF539 only)<br><br>µClinux—open source<br>(All parts except ADSP-BF535<br>and ADSP-BF50x family)<br><br>GNU toolchain<br>(Not available for the ADSP-BF535) |
| ADSP-BF523<br>ADSP-BF523C<br>ADSP-BF525<br>ADSP-BF525C<br>ADSP-BF527<br>ADSP-BF527C                              | ADZS-BF527-EZLITE<br><i>Key Features</i> <ul style="list-style-type: none"> <li>ADSP-BF527 Blackfin processor</li> <li>SDRAM</li> <li>NAND flash: 4 Gb</li> <li>Audio codec</li> <li>HS USB OTG</li> <li>Ethernet PHY</li> <li>LCD display</li> <li>Touch screen/keyboard controller</li> </ul>                                                                                                                                              | ADZS-BF527-MPSKIT<br>ADZS-BFAV-EZEXT<br>ADZS-BFFPGA-EZEXT                                                               |                                                 |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                       |
| ADSP-BF531<br>ADSP-BF532<br>ADSP-BF533                                                                           | ADZS-BF533-EZLITE<br><i>Key Features</i> <ul style="list-style-type: none"> <li>ADSP-BF533 Blackfin processor</li> <li>64 MB (32M × 16-bit) SDRAM</li> <li>2 MB (512k × 16-bit × 2) flash memory</li> <li>AD1836 96 kHz audio codec with 4 input and 6 output RCA jacks</li> <li>ADV7183 video decoder with 3 input RCA jacks</li> <li>ADV7171 video encoder with 3 output RCA jacks</li> <li>ADM3202 RS-232 line driver/receiver</li> </ul> | ADZS-BF-EZEXT-1<br>ADZS-BFAV-EZEXT<br>ADZS-USBLAN-EZEXT<br>ADZS-BFAUDIO-EZEXT<br>ADZS-BFFPGA-EZEXT<br>ADZS-BF533-MMSKIT |                                                 |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                       |

## Blackfin Processor Development Tools (continued)

| Blackfin Processor                                   | Hardware                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                  | Emulator                                        | VisualDSP++ Development Software                                                    | Additional Software Available                                                                                                                                                                                        |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ADSP-BF534<br>ADSP-BF536<br>ADSP-BF537               | ADZS-BF537-EZLITE<br><i>Key Features</i> <ul style="list-style-type: none"><li>• ADSP-BF537 Blackfin processor</li><li>• Max core clock rate of 600 MHz</li><li>• 64 MB (32M × 16) SDRAM, 4 MB (2M × 16) flash memory</li><li>• SMSC LAN83C185 10/100 PHY with RJ45 connector</li><li>• CAN TJA1041 transceiver with 2 RJ10 connectors</li><li>• AD1871 96 kHz stereo ADC with 1/8" jack connector</li><li>• AD1854 96 kHz stereo DAC with 1/8" jack connector</li><li>• RS-232 UART line driver/receiver</li><li>• National Instruments Educational Laboratory Virtual Instrumentation Suite (NI ELVIS) interface</li></ul>            | ADZS-BLUET-EZEXT<br>ADZS-BFAV-EZEXT<br>ADZS-BFLLCD-EZEXT<br>ADZS-USBLAN-EZEXT<br>ADZS-BFAUDIO-EZEXT<br>ADZS-BFFPGA-EZEXT<br>ADZS-BF537-ASKIT<br>Additional Hardware <ul style="list-style-type: none"><li>• ADSP-BF537-STAMP</li><li>• PHYTEC Phycore®</li></ul> |                                                 |                                                                                     |                                                                                                                                                                                                                      |
| ADSP-BF538<br>ADSP-BF538F                            | ADZS-BF538F-EZLITE<br><i>Key Features</i> <ul style="list-style-type: none"><li>• ADSP-BF538F Blackfin processor</li><li>• 64 MB (32M × 16) SDRAM</li><li>• 4 MB (2M × 16) flash memory</li><li>• ADM3202 RS-232 line driver/receiver</li><li>• AD1871 96 kHz stereo ADC</li><li>• AD1854 96 kHz stereo DAC</li><li>• TJA1041 transceiver</li><li>• 2 RJ10 connectors</li><li>• 9 LEDs</li></ul>                                                                                                                                                                                                                                        | ADZS-BFLLCD-EZEXT                                                                                                                                                                                                                                                |                                                 |                                                                                     | Adeneo Embedded<br>(ADSP-BF51x parts only)<br><br>Arcturus<br>(ADSP-BF54x parts only)<br><br>MathWorks<br>(ADSP-BF531/ADSP-BF532/<br>ADSP-BF533/ADSP-BF534/<br>ADSP-BF536/ADSP-BF537/<br>ADSP-BF538/ADSP-BF539 only) |
| ADSP-BF542<br>ADSP-BF544<br>ADSP-BF547<br>ADSP-BF548 | ADZS-BF548-EZLITE<br><i>Key Features</i> <ul style="list-style-type: none"><li>• ADSP-BF548 Blackfin processor</li><li>• DDR SDRAM</li><li>• BURST flash</li><li>• NAND flash</li><li>• Hard drive</li><li>• LCD display</li><li>• AC'97 codec</li><li>• Ethernet PHY</li><li>• Touch screen/keyboard controller</li></ul>                                                                                                                                                                                                                                                                                                              | ADZS-BLUET-EZEXT<br>ADZS-BFAV-EZEXT<br>ADZS-BFFPGA-EZEXT<br>ADZS-BFLLCD-EZEXT<br>ADZS-BF548-MPSKIT                                                                                                                                                               | ADZS-ICE-100B<br>ADZS-USB-ICE<br>ADZS-HPUSB-ICE | VDSP-BKFN-PC-TEST<br>VDSP-BLKFN-PC-FULL<br>VDSP-BLKFN-PCFLOAT<br>VDSP-BLKFN-PCFLT-5 | μClinux—open source<br>(All parts except ADSP-BF535<br>and ADSP-BF50x family)<br><br>GNU toolchain (Not available<br>for the ADSP-BF535)                                                                             |
| ADSP-BF561                                           | ADZS-BF561-EZLITE<br><i>Key Features</i> <ul style="list-style-type: none"><li>• ADSP-BF561 Blackfin processor</li><li>• 64 MB (16M × 16-bit × 2) SDRAM</li><li>• 8 MB (4M × 16-bit) flash memory</li><li>• AD1836 multichannel 96 kHz audio codec</li><li>• RCA jacks for stereo audio input/output</li><li>• ADV7183A advanced 10-bit video decoder</li><li>• 3 RCA jacks for composite (CVBS), differential component (YUV), or S-Video (Y/C) input</li><li>• ADV7179 chip scale NTSC/PAL video encoder</li><li>• 3 RCA jacks for composite (CVBS), component (RGB), differential component (YUV), or S-Video (Y/C) output</li></ul> | ADZS-BF561-MMSKIT                                                                                                                                                                                                                                                |                                                 |                                                                                     |                                                                                                                                                                                                                      |

## Blackfin Processor Product Portfolio

|                                          | Value ← → Highest Performance |                                           |             |                                         |                                        |                                         |                            |             |                                         |            |                           |                                                        |             |        |
|------------------------------------------|-------------------------------|-------------------------------------------|-------------|-----------------------------------------|----------------------------------------|-----------------------------------------|----------------------------|-------------|-----------------------------------------|------------|---------------------------|--------------------------------------------------------|-------------|--------|
|                                          | ADSP-BF592*                   | ADSP-BF504*<br>ADSP-BF504F<br>ADSP-BF506F | ADSP-BF512* | ADSP-BF514<br>ADSP-BF516<br>ADSP-BF518* | ADSP-BF522<br>ADSP-BF524<br>ADSP-BF526 | ADSP-BF523<br>ADSP-BF525*<br>ADSP-BF527 | ADSP-BF531*<br>ADSP-BF532* | ADSP-BF533* | ADSP-BF534*<br>ADSP-BF535<br>ADSP-BF536 | ADSP-BF537 | ADSP-BF538<br>ADSP-BF539* | ADSP-BF542*<br>ADSP-BF544*<br>ADSP-BF547<br>ADSP-BF548 | ADSP-BF561* | Future |
| Low BOM Cost                             | •                             | •                                         | •           |                                         | •                                      | •                                       | •                          |             |                                         |            |                           |                                                        |             |        |
| Baseline Connectivity                    | •                             | •                                         | •           |                                         | •                                      | •                                       | •                          | •           |                                         |            |                           |                                                        | •           |        |
| System-Level Connectivity                |                               | •                                         |             | •                                       | •                                      | •                                       |                            |             | •                                       | •          | •                         | •                                                      |             | •      |
| Low Standby                              | •                             | •                                         | •           | •                                       | •                                      |                                         |                            |             |                                         |            |                           |                                                        |             | •      |
| Lockbox Security                         |                               |                                           | •           | •                                       | •                                      | •                                       |                            |             |                                         |            |                           | •                                                      |             | •      |
| System Integration (Flash, Mixed-Signal) |                               | •                                         | •           | •                                       | •                                      | •                                       |                            |             |                                         |            | •                         |                                                        |             |        |
| 600 MHz or Greater                       |                               |                                           |             |                                         |                                        | •                                       |                            | •           |                                         | •          |                           | •                                                      | •           | •      |
| Multicore                                |                               |                                           |             |                                         |                                        |                                         |                            |             |                                         |            |                           |                                                        | •           | •      |

\*Automotive grade available.

## Blackfin Processor Target Applications

**ADSP-BF592:** Low cost DSP for audio and imaging applications.

**ADSP-BF504/ADSP-BF504F/ADSP-BF506F:** Optimized for industrial control and advanced power applications, as well as low cost general-purpose DSP applications.

**ADSP-BF512/ADSP-BF514/ADSP-BF516/ADSP-BF518:** Low cost, low power, general-purpose parts with enhanced Internet and consumer connectivity.

**ADSP-BF523/ADSP-BF525/ADSP-BF527 and ADSP-BF522/ADSP-BF524/ADSP-BF526:** Low power processors that balance the combination of high performance, power efficiency, and system integration to enable highly optimized designs.

**ADSP-BF531/ADSP-BF532:** Low power, general-purpose processors for audio, voice, imaging, biometrics, and industrial applications.

**ADSP-BF533:** High performance for consumer video, security/surveillance, broadband home gateways, and automotive vision systems.

**ADSP-BF534:** CAN connectivity for automotive, industrial, and medical applications.

**ADSP-BF535:** Optimized for networked Internet appliances, central office/network switches, industrial control, and automation applications.

**ADSP-BF536/ADSP-BF537:** Embedded network connectivity for video, industrial, biometrics, instrumentation, medical, and consumer appliances.

**ADSP-BF538/ADSP-BF538F:** Ideally suited for a broad range of industrial, instrumentation, and medical appliance applications.

**ADSP-BF542/ADSP-BF544/ADSP-BF547/ADSP-BF548:** High performance convergent multimedia processors with a flexible platform for industrial, instrumentation, consumer, communications, and automotive applications.

**ADSP-BF561:** Symmetric multiprocessor optimized for high performance signal and media processing.

## Third-Party Developers

More than 200 third parties provide software, hardware, and consulting services to support Blackfin embedded processors. For more information, visit [www.analog.com/processors/collaborative](http://www.analog.com/processors/collaborative).

### Hardware

- Companion chip/chipsets
- Development boards
- Development systems
- Emulators
- Evaluation/starter boards
- Reference designs
- COTS DSP boards
- Daughter boards

### Software and Algorithms

- Speech G.7xx
- Telephony (DTMF, caller ID, etc.)
- Echo cancellation
- Audio (MP3, AAC/AAC+, WMA9, Dolby,® DTS,® etc.)
- Video/imaging (JPEG, MPEG-2/MPEG-4, H.264, H.263, WMV9, etc.)
- Image processing
- Facial/object recognition software
- VoIP suites
- Embedded Web browser
- Voice recognition
- Proprietary algorithms (3D audio effects, etc.)

### OS/RTOS

- Green Hills® Software/Integrity®
- Green Hills Software/veIOSity™
- Green Hills Software/μ-veIOSity™
- Express Logic/ThreadX®
- Micrium μC/OS-II
- Quadros Systems/RTXC™ Quadros
- Unicoi Systems™/Fusion™
- KADAK Systems/KwikNet™
- Open Source/μClinux
- Analog Devices VisualDSP++ Kernel

### Design Test, Verification, and Validation

- National Instruments
- The MathWorks

### Software IDDE Tools

- Green Hills Software/MULTI®
- GAIO Technology/Blackfin design kit

### HW Development Kits

- PHYTEC/Rapid Development Kits
- Arcturus Networks

### Design Services

- Boston Engineering
- Schmid Engineering
- Advanced Energy Conversion

## Complimentary Support Resources

### EngineerZone Online Support Community

[www.EZ.analog.com](http://www.EZ.analog.com)

### Blackfin Visual Training and Development

[www.analog.com/vld](http://www.analog.com/vld)

### Analog Devices Sales and Distributors

[www.analog.com/salesdir](http://www.analog.com/salesdir)

### Worldwide Processor and Development Tools Technical Support

[www.analog.com/support](http://www.analog.com/support)

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[www.linkedin.com](http://www.linkedin.com)

## Companion Power Selection Guide for the Blackfin Processor

ADI power management products provide optimized power for Blackfin products—whether it's a single processor or multiple processors, in handheld or high power applications, ADI has a solution to meet your needs.

### How to Use This Guide

Determine the peak current requirement for each rail of your processor by referring to the relevant data sheets and engineer-to-engineer notes. Then, use this companion guide to select a power solution that offers the required  $V_{OUT}$  for that rail.

The ADIsimPower™ design tool offers a complete set of features to create a complete BOM for all of these solutions. Visit [www.analog.com/ADIsimPower](http://www.analog.com/ADIsimPower).

|                                       |                              | LDO Regulators          |                    |  |  |  |  |  |  | Switching Regulators and Controllers |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------|------------------------------|-------------------------|--------------------|--|--|--|--|--|--|--------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Maximum Output Current (A)            | Output Voltage Range (V)     | Input Voltage Range (V) | Part Number        |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 50 mA                                 | 1.23 to 5.0                  | 4.0 to 28               | ADP1720            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| Dual 200 mA                           | 0.8 to 2.8                   | 2.5 to 5.5              | ADP220             |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 300 mA                                | 0.8 to 3.0                   | 1.6 to 3.6              | ADP170             |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 300 mA                                | 0.8 to 5.0                   | 2.3 to 5.5              | ADP123             |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 500 mA                                | 0.8 to 5.0                   | 2.3 to 5.5              | ADP125             |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 800 mA                                | 0.75 to 3.0                  | 1.6 to 3.6              | ADP1752<br>ADP1753 |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1.0                                   | 0.8 to 5.0                   | 2.5 to 5.5              | ADP1708            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1.2                                   | 0.75 to 3.0                  | 1.6 to 3.6              | ADP1754<br>ADP1755 |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 2.0                                   | 0.75 to 3.0                  | 1.6 to 3.6              | ADP1740<br>ADP1741 |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 600 mA                                | 0.8 to 1.87                  | 2.7 to 5.5              | ADP2102            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| Buck and LDO<br>600 mA, 300 mA        | 0.8 to 3.3                   | 2.3 to 5.5              | ADP2140            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 600 mA                                | 1.0 to 3.3                   | 2.3 to 5.5              | ADP2108            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| Dual buck and LDO<br>0.6 + 0.25, 0.15 | 1.1 to 3.3<br>See data sheet | 2.4 to 5.5              | ADP5020            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| Dual buck and LDO<br>0.6 + 0.6, 0.15  | 1.2 to 3.3<br>See data sheet | 2.4 to 5.5              | ADP5022            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1.2                                   | 0.6 to 5.0                   | 2.3 to 5.5              | ADP2120            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1.2                                   | 0.8 to 12                    | 3.0 to 20               | ADP2300<br>ADP2301 |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1.5                                   | 0.8 to 5.0                   | 2.7 to 5.5              | ADP2106            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 2.0                                   | 0.6 to 5.0                   | 2.3 to 5.5              | ADP2119            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 2.0, 3.0                              | 0.8 to 12                    | 3.0 to 20               | ADP2302<br>ADP2303 |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 3.0                                   | 0.6 to 5.0                   | 2.3 to 5.5              | ADP2118            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| Dual buck<br>4.0 or 2.0 + 2.0         | 0.8 to 3.3                   | 2.7 to 5.5              | ADP2114            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| Dual buck<br>6.0 or 3.0 + 3.0         | 0.8 to 5.0                   | 2.75 to 5.5             | ADP2116            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| Controller 25                         | 0.6 to 12                    | 2.95 to 20              | ADP1871            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| Dual controller<br>25 + 25            | 0.6 to 5.0                   | 2.75 to 14.5            | ADP1877            |  |  |  |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |

| Blackfin Processors       |                                  | Speed (MHz)     | Min Voltage (V)      | Max Voltage (V) | Max $IDD_{NT}$ (mA) |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------|----------------------------------|-----------------|----------------------|-----------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VDD <sub>INT</sub> Domain | ADSP-BF50x                       | All             | 1.1                  | 1.47            | 300                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF51x                       | All             | 1.1                  | 1.47            | 250                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF522/ADSP-BF524/ADSP-BF526 | All             | 1.235                | 1.47            | 250                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF523/ADSP-BF525/ADSP-BF527 | All             | 0.95                 | 1.26            | 500                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF531/ADSP-BF532/ADSP-BF533 | 400             | 0.8                  | 1.32            | 350                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF533                       | 500, 533, 600   | 0.8                  | 1.45            | 900                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF534/ADSP-BF536            | 300, 400        | 0.8                  | 1.32            | 400                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF534/ADSP-BF536/ADSP-BF537 | 500, 533, 600   | 0.8                  | 1.43            | 900                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF538/ADSP-BF539            | 400, 533        | 0.8                  | 1.375           | 850                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF54x                       | 400             | 0.9                  | 1.43            | 750                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF54x                       | 533, 600        | 0.9                  | 1.43            | 1350                | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | ADSP-BF561                       | All             | 0.8                  | 1.42            | 1600                | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Other Domains*            |                                  | Min Voltage (V) | Nominal Voltages (V) | Max Voltage (V) | Max Current (mA)    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|                           | VDD <sub>EXT</sub>               | 1.7             | 1.8, 2.5, 3.3        | 3.6             | N/A                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | VDD <sub>MEM</sub>               | 1.7             | 1.8, 2.5, 3.3        | 3.6             | N/A                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | VDD <sub>DOR</sub>               | 2.5             | 2.6                  | 2.7             | N/A                 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | VDD <sub>USB</sub>               | 3               | 3.3                  | 3.6             | 30                  | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|                           | VDD <sub>OTP</sub>               | 2.25            | 2.5                  | 2.75            | 25                  | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |

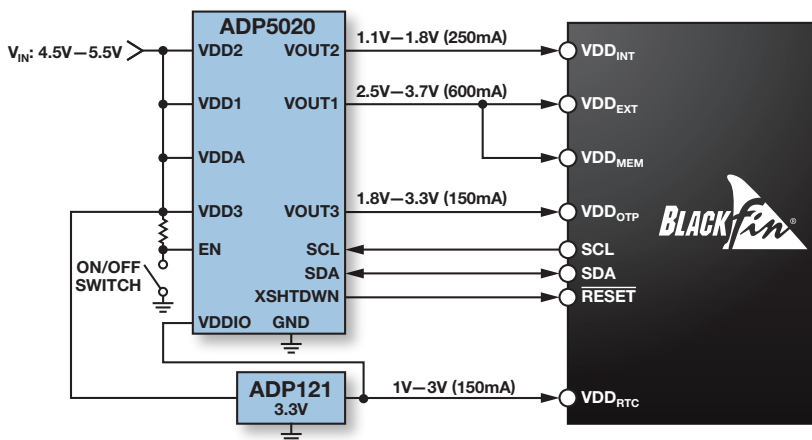
• Indicates that the regulator will support the current draw at the maximum specified frequency, voltage, and industrial temperature.

• Indicates that the regulator will support the current draw in some applications, but the maximum  $IDD_{INT}$  must be calculated using the appropriate Blackfin data sheet to ensure compatibility.

\*Refer to the relevant data sheet and engineer-to-engineer note to determine the exact "other domain" requirements of each individual processor.

Many applications power more than one device or domain using a single regulator. Compute and add the maximum current draw for each device and domain in a particular application before choosing a regulator.

## Example\* Power Solution for Blackfin Processors



\* Numerous variables affect the power requirements of an embedded system. Ambient temperature, core and system frequency, supply voltages, pin capacitances, power modes, application code, and peripheral utilization all contribute to the average power requirements; therefore, this is just one suggested solution.

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