

SHARC Processor Family



Why Choose a SHARC® Processor?

SHARC is the name of a family of high performance 32-bit floating-point processors based on a Super Harvard Architecture. SHARC Processors dominate the floating-point digital signal processing market, delivering exceptional core and memory performance complemented by outstanding I/O throughput. The industry-standard SHARC family makes floating-point processing economical for applications where performance and dynamic range are key considerations, such as home audio, professional audio, automotive audio, medical, industrial, and instrumentation products.

The SHARC Processor portfolio currently consists of three generations of products providing code-compatible solutions ranging from entry-level products priced at less than \$10 to the highest performance products offering fixed- and floating-point computational power to 400 MHz/2400 MFLOPS. Irrespective of the specific product choice, all SHARC Processors provide a common set of features and functionality usable across many signal processing markets and applications. This baseline functionality enables the SHARC user to leverage legacy code and design experience while transitioning to higher performance, more highly integrated SHARC products.

By integrating on-chip, single-instruction, multiple-data (SIMD) processing elements, SRAM, and I/O peripherals, SHARC Processors deliver breakthrough signal processing performance.

- High performance 32-bit floating-point/fixed-point core for computationally intensive, real-time signal processing applications
- Ideal choice for audio, industrial, and medical applications
- High performance signal processing coupled with integrated system peripherals
- SIMD architecture with integrated application-specific system peripherals
- Exceptional core and memory performance with outstanding I/O throughput
- Wide range of code-compatible and pin-compatible products
- Supported by easy to use, world-class CROSSCORE® development tools

SHARC Processor Target Applications

ADSP-21371/ADSP-21375: value-priced processors positioned for professional audio, industrial and instrumentation, and medical applications

ADSP-21368/ADSP-21369: highest performing processors for professional audio and industrial/instrumentation applications

ADSP-21362/ADSP-21365: automotive audio

ADSP-21363/ADSP-21364: high performance processors for general-purpose and professional audio applications

ADSP-21266/ADSP-21366/ADSP-21367: highly integrated processors optimized for consumer audio, home theater, and next-generation DVD applications

ADSP-21262/ADSP-21261: low cost, floating-point processor created for consumer audio, wireless communication, medical appliances, and professional audio

ADSP-21161: optimized for single processor or small multiprocessor systems such as speech recognition, motor control, industrial, and medical applications

ADSP-21160: for multiprocessing applications such as medical, military, imaging, and communications

ADSP-21065L: outstanding price/performance value for a broad base of consumer, communications, automotive, industrial, and computer applications

SHARC Processors

Part Number	Package	Speed (MHz)	On-Chip Memory SRAM/ROM (Mb)	Temp Range (°C)	Key Peripherals	Price Range @ 1k (\$U.S.) ¹
ADSP-21375BSWZ-2B	208-lead LQFP E-pad	266	0.5/2	-40°C to +85°C ambient	2 timers, 1 UART, 4 SPORTs, 2 SPIs, 1 TWI, 4 PCGs, PWM, DAI, 16-bit SDRAM interface	9.71–11.65
ADSP-21375KSZ-2B	208-lead MQFP			0°C to 70°C ambient		
ADSP-21371BSWZ-2B	208-lead LQFP E-pad	266	1/4	-40°C to +85°C ambient	2 timers, 1 UART, 8 SPORTs, 2 SPIs, 1 TWI, S/PDIF Rx/Tx, 4 PCGs, PWM, DAI, 32-bit SDRAM interface	13.11–15.73
ADSP-21371KSZ-2B	208-lead MQFP			0°C to 70°C ambient		
ADSP-21369BSWZ-1A	208-lead LQFP E-pad	266	2/6	-40°C to +85°C ambient	3 timers, 2 UARTs, 8 SPORTs, 2 SPIs, 1 TWI, S/PDIF Rx/Tx, 4 PCGs, PWM, 8-channel ASRC, 32-bit SDRAM interface Shared external memory support (21368 only) Integrated audio decoders in ROM (21367 only) ²	19.46–35.67
ADSP-21369KSZ-1A	208-lead MQFP	266	2/6	0°C to 70°C ambient		
ADSP-21369BBP-2A	256-ball SBGA	333	2/6	-40°C to +85°C ambient		
ADSP-21369BPZ-2A	256-ball SBGA	333	2/6	-40°C to +85°C ambient		
ADSP-21369KBP-2A	256-ball SBGA	333	2/6	0°C to 70°C ambient		
ADSP-21369KBPZ-2A	256-ball SBGA	333	2/6	0°C to 70°C ambient		
ADSP-21369KBPZ-3A	256-ball SBGA	400	2/6	0°C to 70°C ambient		
ADSP-21368BBP-2A	256-ball SBGA	333	2/6	-40°C to +85°C ambient		
ADSP-21368BPZ-2A	256-ball SBGA	333	2/6	-40°C to +85°C ambient		
ADSP-21368KBP-2A	256-ball SBGA	333	2/6	0°C to 70°C ambient		
ADSP-21368KBPZ-2A	256-ball SBGA	333	2/6	0°C to 70°C ambient	30.67–44.99	
ADSP-21368KBPZ-3A	256-ball SBGA	400	2/6	0°C to 70°C ambient		
ADSP-21367BSWZ-1A	208-lead LQFP E-pad	266	2/6	-40°C to +85°C ambient	Integrated audio decoders in ROM (21367 only) ²	20.48–37.54
ADSP-21367KSZ-1A	208-lead MQFP	266	2/6	0°C to 70°C ambient		
ADSP-21367BBP-2A	256-ball SBGA	333	2/6	-40°C to +85°C ambient		
ADSP-21367BPZ-2A	256-ball SBGA	333	2/6	-40°C to +85°C ambient		
ADSP-21367KBP-2A	256-ball SBGA	333	2/6	0°C to 70°C ambient		
ADSP-21367KBPZ-2A	256-ball SBGA	333	2/6	0°C to 70°C ambient		
ADSP-21367KBPZ-3A	256-ball SBGA	400	2/6	0°C to 70°C ambient		
ADSP-21366YSWZ-2AA ³	144-lead LQFP E-pad	200	3/4	-40°C to +105°C ambient	3 timers, 6 SPORTs, DAI, 2 SPIs, 2 PCGs, PWM, 8-channel ASRC S/PDIF Rx/Tx Integrated audio decoders in ROM (21365 and 21366 only) ²	22.33–32.16
ADSP-21366BBCZ-1AA ³	136-ball MBGA	333	3/4	-40°C to +85°C ambient		
ADSP-21366BSWZ-1AA ³	144-lead LQFP	333	3/4	-40°C to +85°C ambient		
ADSP-21366KSWZ-1AA	144-lead LQFP E-pad	333	3/4	0°C to 70°C ambient		
ADSP-21366KBCZ-1AA	136-ball MBGA	333	3/4	0°C to 70°C ambient		
ADSP-21365YSWZ-2AA ³	144-lead LQFP E-pad	200	3/4	-40°C to +105°C ambient	DTCP acceleration hardware (21365 only) ²	28.21–33.85
ADSP-21365YSWZ-2CA ³	144-lead LQFP E-pad	200	3/4	-40°C to +105°C ambient		
ADSP-21365BBCZ-1AA ³	136-ball MBGA	333	3/4	-40°C to +85°C ambient		
ADSP-21365BSWZ-1AA ³	144-lead LQFP E-pad	333	3/4	-40°C to +85°C ambient		

¹All pricing is budgetary and subject to change.

²License agreement required from respective IP holders prior to purchase for all products containing integrated audio decoders or DTCP acceleration hardware.

³Available in automotive grade temperature range.

SHARC Processors (continued)

Part Number	Package	Speed (MHz)	On-Chip Memory SRAM/ROM (Mb)	Temp Range (°C)	Key Peripherals	Price Range @ 1k (\$U.S.) ¹
ADSP-21364YSWZ-2AA ³	144-lead LQFP E-pad	200	3/4	-40°C to +105°C ambient	3 timers, 6 SPORTs 2 SPLs S/PDIF Rx/Tx (not on 21363) 8-channel ASRC (not on 21363) 2 PCGs PWM, DAI	29.40–42.34
ADSP-21364BBC-1AA	136-ball MBGA	333	3/4	-40°C to +85°C ambient		
ADSP-21364BBCZ-1AA ³	136-ball MBGA	333	3/4	-40°C to +85°C ambient		
ADSP-21364BSWZ-1AA ³	144-lead LQFP E-pad	333	3/4	-40°C to +85°C ambient		
ADSP-21364KBC-1AA	136-ball MBGA	333	3/4	0°C to 70°C ambient		
ADSP-21364KBCZ-1AA	136-ball MBGA	333	3/4	0°C to 70°C ambient		
ADSP-21364KSWZ-1AA	144-lead LQFP E-pad	333	3/4	0°C to 70°C ambient		19.98–28.78
ADSP-21363YSWZ-2AA ³	144-lead LQFP E-pad	200	3/4	-40°C to +105°C ambient		
ADSP-21363BBC-1AA	136-ball MBGA	333	3/4	-40°C to +85°C ambient		
ADSP-21363BBCZ-1AA ³	136-ball MBGA	333	3/4	-40°C to +85°C ambient		
ADSP-21363BSWZ-1AA ³	144-lead LQFP E-pad	333	3/4	-40°C to +85°C ambient		
ADSP-21363KBC-1AA	136-ball MBGA	333	3/4	0°C to 70°C ambient		
ADSP-21363KBCZ-1AA	136-ball MBGA	333	3/4	0°C to 70°C ambient	26.80–32.16	
ADSP-21363KSWZ-1AA	144-lead LQFP E-pad	333	3/4	0°C to 70°C ambient		
ADSP-21362YSWZ-2AA ³	144-lead LQFP E-pad	200	3/4	-40°C to +105°C ambient		
ADSP-21362BBCZ-1AA ³	136-ball MBGA	333	3/4	-40°C to +85°C ambient	3 timers, 6 SPORTs 2 SPLs, 8-channel ASRC 2 PCGs, PWM, DAI DTCP acceleration hardware ²	14.24–17.80
ADSP-21362BSWZ-1AA ³	144-lead LQFP E-pad	333	3/4	-40°C to +85°C ambient		
ADSP-21266SKSTZ-1B	144-lead LQFP	150	2/4	0°C to 70°C ambient		
ADSP-21266SKSTZ-1C	144-lead LQFP	150	2/4	0°C to 70°C ambient	3 timers, 6 SPORTs 1 SPI Integrated audio decoders in ROM (21266 only) ² 2 PCGs DAI	16.95–23.85
ADSP-21266SKSTZ-1D	144-lead LQFP	150	2/4	0°C to 70°C ambient		
ADSP-21266SKBCZ-2B	136-ball MBGA	200	2/4	0°C to 70°C ambient		
ADSP-21266SKSTZ-2B	144-lead LQFP	200	2/4	0°C to 70°C ambient		
ADSP-21266SKBCZ-2C	136-ball MBGA	200	2/4	0°C to 70°C ambient		
ADSP-21266SKSTZ-2C	144-lead LQFP	200	2/4	0°C to 70°C ambient		
ADSP-21266SKSTZ-2D	144-lead LQFP	200	2/4	0°C to 70°C ambient		
ADSP-21262SBBC-150	136-ball MBGA	150	2/4	-40°C to +85°C ambient		
ADSP-21262SBBCZ150 ³	136-ball MBGA	150	2/4	-40°C to +85°C ambient		
ADSP-21262SKBC-200	136-ball MBGA	200	2/4	0°C to 70°C ambient		
ADSP-21262SKBCZ200	136-ball MBGA	200	2/4	0°C to 70°C ambient		
ADSP-21262SKSTZ200	144-lead LQFP	200	2/4	0°C to 70°C ambient		
ADSP-21261SBBCZ150	136-ball MBGA	150	1/3	-40°C to +85°C ambient	3 timers, 4 SPORTs, 1 SPI, 2 PCGs, DAI 4 SPORTs, 2 link ports 1 SPI DMA controller	25.86–34.13
ADSP-21261SKBC-150	136-ball MBGA	150	1/3	0°C to 70°C ambient		
ADSP-21261SKBCZ150	136-ball MBGA	150	1/3	0°C to 70°C ambient		
ADSP-21261SKSTZ150	144-lead LQFP	150	1/3	0°C to 70°C ambient		
ADSP-21161NCCA-100	225-ball MBGA	100	1/—	-40°C to +85°C ambient	2 SPORTs 4 link ports DMA controller	167.48–196.93
ADSP-21161NCCAZ100	225-ball MBGA	100	1/—	-40°C to +85°C ambient		
ADSP-21161NKCA-100	225-ball MBGA	100	1/—	0°C to 85°C case		
ADSP-21161NKCAZ100	225-ball MBGA	100	1/—	0°C to 85°C case		
ADSP-21160MKB-80	400-ball PBGA	80	4/—	0°C to 85°C case	2 SPORTs 4 link ports DMA controller	167.48–196.93
ADSP-21160MKBZ-80	400-ball PBGA	80	4/—	0°C to 85°C case		
ADSP-21160NCB-100	400-ball PBGA	100	4/—	-40°C to +100°C case		
ADSP-21160NCBZ-100	400-ball PBGA	100	4/—	-40°C to +100°C case		
ADSP-21160NKB-100	400-ball PBGA	100	4/—	0°C to 85°C case		
ADSP-21160NKBZ-100	400-ball PBGA	100	4/—	0°C to 85°C case		

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SHARC Processors (continued)

Part Number	Package	Speed (MHz)	On-Chip Memory SRAM/ROM (Mb)	Ambient Temp Range (°C)	Key Peripherals	Price Range @ 1k (\$U.S.) ¹
ADSP-21065LCCA-240	196-ball MBGA	60	0.5/—	−40°C to +100°C case	2 SPORTs DMA controller 2 timers	22.58–65.84
ADSP-21065LCCAZ-240	196-ball MBGA	60	0.5/—	−40°C to +100°C case		
ADSP-21065LCS-240	208-lead MQFP	60	0.5/—	−40°C to +100°C case		
ADSP-21065LCSZ-240	208-lead MQFP	60	0.5/—	−40°C to +100°C case		
ADSP-21065LKCA-240	196-ball MBGA	60	0.5/—	0°C to 85°C case		
ADSP-21065LKCAZ-240	196-ball MBGA	60	0.5/—	0°C to 85°C case		
ADSP-21065LKS-240	208-lead MQFP	60	0.5/—	0°C to 85°C case		
ADSP-21065LKSZ-240	208-lead MQFP	60	0.5/—	0°C to 85°C case		
ADSP-21065LKCA-264	196-ball MBGA	66	0.5/—	0°C to 85°C case		
ADSP-21065LKCAZ-264	196-ball MBGA	66	0.5/—	0°C to 85°C case		
ADSP-21065LKS-264	208-lead MQFP	66	0.5/—	0°C to 85°C case		
ADSP-21065LKSZ-264	208-lead MQFP	66	0.5/—	0°C to 85°C case		

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Development Tools

Analog Devices CROSSCORE development tools offer easy and robust methods for engineers to develop and optimize systems by shortening product development cycles, reducing time to market.

VisualDSP++[®] Integrated Development Environment

VisualDSP++ is an easy-to-install, easy to use, integrated software development and debugging environment (IDDE). For more information and to download a free 90-day test drive, visit <http://www.analog.com/testdrive>.

EZ-KIT Lite[®] Evaluation Kit

These systems consist of a standalone evaluation board and an evaluation suite of VisualDSP++ to facilitate architecture evaluations via a PC-hosted tool set. Users can evaluate ADI's processors, learn about digital signal processing applications, as well as simulate, debug, and prototype applications.

EZ-Extender[®] Daughter Boards

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

SHARC EZ-Extender

The SHARC EZ-Extender expands the capabilities of the evaluation system by providing a connection between the parallel data access port (PDAP) of the ADSP-21262 processor and an Analog Devices analog-to-digital high speed converter (ADC HSC) evaluation board. The extender also broadens the range of the EZ-KIT Lite applications by providing surface-mounted (SMT) footprints for breadboard capabilities and access to all of the pins on the EZ-KIT Lite's expansion interface.

SHARC USB EZ-Extender

The SHARC USB EZ-Extender expands the capabilities of the evaluation system by providing a connection between the parallel port or asynchronous memory bus of the SHARC Processor and a USB 2.0 device.

Universal Serial Bus-Based Emulators

Analog Devices' cost-effective USB-based emulator and high performance (HP) USB-based emulators provide an easy, portable, nonintrusive, target-based debugging solution for Analog Devices JTAG processors and DSPs. These powerful USB-based 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.

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. Also available is VisualAudio 2.5 which enables engineers from other backgrounds to leverage a set of basic audio libraries and tools to jump start their projects, modularize the development process, and shorten the learning curve.

SHARC Processor Development Tools

Processor	Evaluation Platform	Emulator	Software	Additional Software Available
ADSP-21161N	ADZS-21161N-EZLITE Key Features <ul style="list-style-type: none"> • ADSP-21161 processor • 48 MB (8M × 48-bit) SDRAM • AD1836 96 kHz audio codec • AD1852 96 kHz auxiliary DAC • Digital Audio Interface • USB-based debugger interface 	ADZS-USB-ICE ADZS-HPUSB-ICE	VDSP-SHARC-PC-TEST VDSP-SHARC-PC-FULL VDSP-SHARC-PCFLOAT VDSP-SHARC-PCFLT-5	
ADSP-21261 ADSP-21262 ADSP-21266	ADZS-21262-EZLITE Key Features <ul style="list-style-type: none"> • ADSP-21262 SHARC Processor • 1M × 8-bit flash memory • 512K × 8-bit SRAM • 512K bit SPI flash memory • AD1835 stereo, 96 kHz, 24-bit Σ-Δ codec • 4 × 2 RCA jack for 4 channels of stereo audio output • 1 × 2 RCA jack for 1 channel of stereo audio input • Headphone jack (connected to 1 of the stereo outputs) • 2 Mbit SPI flash memory • USB-based debugger interface ADDS-21262-1-EZEXT ¹ ADSZ-SHRCUSB-EZEXT ²		VDSP-SHARC-PC-TEST VDSP-SHARC-PC-FULL VDSP-SHARC-PCFLOAT VDSP-SHARC-PCFLT-5	VisualAudio (supports ADSP-21262 only)
ADSP-21362 ADSP-21363 ADSP-21364 ADSP-21365 ADSP-21366	ADZS-21364-EZLITE Key Features <ul style="list-style-type: none"> • ADSP-21364 SHARC Processor • 1M × 8-bit flash memory • 512K × 8-bit SRAM • 2M bit SPI flash memory • AD1835 stereo, 96 kHz, 24-bit codec • USB-based debugger interface ADSZ-SHRCUSB-EZEXT ²		VDSP-SHARC-PC-TEST VDSP-SHARC-PC-FULL VDSP-SHARC-PCFLOAT VDSP-SHARC-PCFLT-5	VisualAudio (supports ADSP-21364 only) Mathworks (supports ADSP-21363, ADSP-21364, ADSP-21365 only)
ADSP-21367 ADSP-21368 ADSP-21369	ADZS-21369-EZLITE Key Features <ul style="list-style-type: none"> • ADSP-21369 SHARC Processor • AD1835 stereo, 96 kHz, 24-bit codec • 1M × 8-bit flash memory • 1M × 32-bit x 4 banks SDRAM • 512K × 8-bit SRAM • 2M bit SPI flash memory • ADM3202 RS-232 driver/receiver • USB-based debugger interface ADSZ-SHRCUSB-EZEXT ²		VDSP-SHARC-PC-TEST VDSP-SHARC-PC-FULL VDSP-SHARC-PCFLOAT VDSP-SHARC-PCFLT-5	VisualAudio (supports ADSP-21369 only)
ADSP-21371 ADSP-21375	ADZS-21375-EZLITE Key Features <ul style="list-style-type: none"> • ADSP-21375 SHARC Processor • 1M × 8-bit flash memory • 8M × 16-bit (167MHz) SDRAM • 2M bit SPI flash memory • AD1835 stereo, 96 kHz, 24-bit codec • USB-based debugger interface 		VDSP-SHARC-PC-TEST VDSP-SHARC-PC-FULL VDSP-SHARC-PCFLOAT VDSP-SHARC-PCFLT-5	

¹SHARC EZ-Extender daughter board available for ADSP-21262 EZ-KIT Lite only (sold separately).

²SHARC USB EZ-Extender daughter board available for ADSP-21262 EZ-KIT Lite, ADSP-21364 EZ-KIT Lite, and ADSP-21369 EZ-KIT Lite only (sold separately).



SHARC Processor Product Portfolio



Third-Party Developers

Many third parties provide software, hardware, and consulting services to support SHARC Processors. For more information, visit 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

- Audio (MP3, AAC/+, WMA9, Dolby,® DTS,® etc.)
- Algorithms
- Code generation
- Tool suites
- Filter programs
- Graphical software programs
- Post analysis tools
- System integration
- System prototyping/simulation

Complimentary Support Resources

Analog Devices Sales and Distributors:

www.analog.com/salesdir

Processor and Development Tools

Technical Support:

www.analog.com/processors/technicalsupport

North America and Asia:

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