Digital Signal Controllers

DSP56854

Ideal for audio and video applications

The 56800E core is based on a Harvard-style architecture consisting of three execution units operating in parallel, allowing as many as six operations per instruction cycle. The microprocessor-style programming model and optimized instruction set allow straightforward generation of efficient, compact code for both DSP and microcontroller (MCU) applications. The instruction set is also highly efficient for C compilers, enabling rapid development of optimized control applications.

Target Applications
• Stand-alone MP3 players
• Digital telephone answering devices
• Feature phones
• Voice recognition and command
• Embedded modem/data pump
• Voice processing
• Multiprocessor telephony systems
• LCD and keypad support
• General-purpose devices
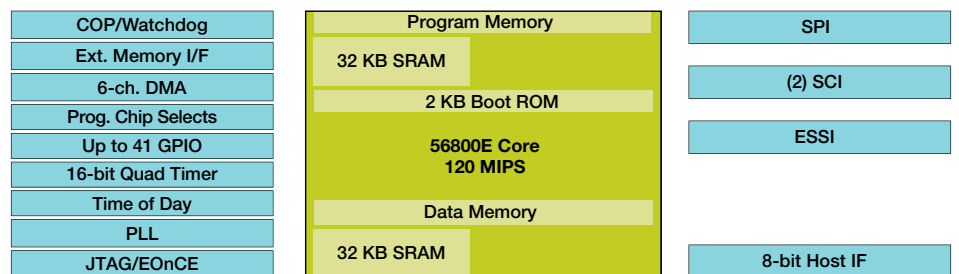• Hands-free automotive devices

Overview
The 56854 core offers a total of 32 KB of on-chip program SRAM and 32 KB of on-chip data SRAM. It is pin-to-pin compatible with the 56853 and can be dropped in as a replacement when applications require more on-chip memory. The 56854 core provides ease of use and flexibility in your design process, and enables you to retain your investment through design changes or future product enhancements via a cost-effective upward migration path.

56800E Core Features
• Efficient 16-bit digital signal controller engine with dual Harvard architecture
• 120 MIPS at 120 MHz core frequency
• Single-cycle 16 x 16-bit parallel multiplier-accumulator (MAC)
• Four 36-bit accumulators, including extension bits

• 16-bit bidirectional shifter
• Parallel instruction set with unique addressing modes
• Hardware DO and REP loops
• Three internal address buses and one external address bus
• Four internal data buses and one external data bus
• Instruction set supports both DSP and controller functions
• Four hardware interrupt levels
• Five software interrupt levels
• Controller-style addressing modes and instructions for compact code
• Efficient C compiler and local variable support
• Software subroutine and interrupt stack with depth limited only by memory
• JTAG/enhanced on-chip emulation (EOnCE) debug programming interface

DSP56854

| COP/Watchdog |
| Ext. Memory I/F |
| 6-ch. DMA |
| Prog. Chip Selects |
| Up to 41 GPIO |
| 16-bit Quad Timer |
| Time of Day |
| PLL |
| JTAG/EOnCE |

Program Memory
32 KB SRAM
2 KB Boot ROM
56800E Core
120 MIPS
Data Memory
32 KB SRAM

| SPI |
| (2) SCI |
| ESSI |
| 8-bit Host IF |

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Benefits

- Easy to program with flexible application development tools
- Supports multiple processor connections
- 16-bit quad timer module (with four external pins) that allows capture/compare functionality and can be cascaded
- Quad timer module can also be used for simple digital-to-analog conversion functionality
- Enhanced synchronous serial interface (ESSI) with enhanced network and audio modes
- Time of day (TOD) module for applications requiring clock display
- Flexible 6-channel direct memory access (DMA) allows both internal and external memory transfers with almost no CPU interruption
- Serial peripheral interface (SPI) with master and slave mode supporting connection to other processors or serial memory devices
- External memory expansion up to 4 MB words program memory or up to 16 MB words data memory increases capabilities of device for larger algorithms

Energy Information

- Fabricated in high-density CMOS with 3.3V, TTL-compatible digital inputs
- Wait and stop modes available

56854 16-bit Digital Signal Processors

- 120 MIPS at 120 MHz
- 32 KB program SRAM
- 32 KB data SRAM
- 2 KB boot ROM
- Access up to 4 MB of program or 16 MB data memory
- Chip select logic for glueless interface to ROM and SRAM
- Six independent channels of DMA
- ESSIs
- Two serial communications interfaces (SCIs)
- SPI
- 8-bit parallel host interface
- General-purpose 16-bit quad timer

- JTAG/EOnCE for unobtrusive, real-time debugging
- Computer operating properly (COP)/watchdog timer
- TOD
- 128-pin LQFP package
- Up to 41 general-purpose input/output (GPIO) pins

56854 Memory Features

- Harvard architecture permits up to three simultaneous accesses to program and data memory
- On-chip memory
  - 32 KB program SRAM
  - 32 KB data SRAM
  - 2 KB boot ROM
- Off-chip memory expansion
  - Access up to 4 MB of program memory or up to 16 MB of data memory
  - Chip select logic for glueless interface to ROM and SRAM

56854 Peripheral Circuit Features

- General-purpose 16-bit quad timer with four external pins*
- Two SCIs*
- SPI*

- ESSI module*
- Computer operating properly (COP)
- Watchdog timer
- JTAG/EOnCE for unobtrusive, real-time debugging
- Six independent channels of DMA
- 8-bit parallel host interface*
- TOD
- Up to 41 GPIO pins

*Each peripheral I/O can be used alternately as a GPIO.

Award-Winning Development Environment

- Processor Expert technology provides a rapid application design (RAD) tool that combines easy-to-use, component-based software application creation with an expert knowledge system.
- The CodeWarrior Integrated Development Environment is a sophisticated tool for code navigating, compiling and debugging. A comprehensive set of evaluation modules (EVMs) and development system cards will support concurrent engineering. Together, Processor Expert technology, the CodeWarrior tool suite and EVMs create a comprehensive, scalable tools solution for easy, fast and efficient development.

Product Documentation

Product	Order Number	Description
DSP56800E Reference Manual	**DSP56800ERM**	Detailed description of the 56800E architecture, 16-bit DSP core processor and the instruction set
DSP5685x User's Manual	**DSP5685xUM**	Detailed description of memory, peripherals and interfaces of the 56853, 56854, 56855, 56857 and 56858
DSP56854 Technical Data Sheet	**DSP56854**	Electrical and timing specifications, pin descriptions and package descriptions
DSP56854 Product Brief	**DSP56854PB**	Summary description and block diagram of the core, memory, peripherals and interfaces

Ordering Information

Part	DSP56854
Supply Voltage	1.8V, 3.3V
Package Type	Low-Profile Quad Flat Pack (LQFP)
Pin Count	128
Frequency (MHz)	120
Order Number	DSP56854FG120

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