MOTOROLA
SEMICONDUCTOR
PRODUCT INFORMATION

DSP56007EVM

Product Brief
24-Bit DSP56007 Evaluation Module

The DSP56007EVM Evaluation Module (EVM) is a low-cost platform for multichannel digital audio applications development and prototyping. It demonstrates the capabilities and features of Motorola's DSP Symphony™ audio products which include the DSP56004, the DSP56004ROM, and the DSP56007. The DSP56007EVM features a DSP56007 with embedded software including FFTs, FIRs, and IIR filters useful in a variety of user developed audio software.

Special versions of the DSP56007EVM are available to authorized licensees of Dolby Laboratories and Lucasfilms Ltd. for supporting Dolby ProLogic™, Home THX® Theater System, and Dolby AC-3®* Surround (using a DSP56009).

The DSP56007EVM is a complete system with high quality stereo analog to digital conversion and digital to analog conversion. It also includes microcontroller, RS-232 to OnCE™ Port debug interface, LCD display, memory, and digital audio I/O. The user need only supply a dual 8 to 12 volt power supply for analog circuits, an 8 to 15 volt power supply for digital circuits, and an RS-232 serial cable. A block diagram illustrates the hardware in Figure 1 below.

The DSP56007EVM comes with Motorola's DSP56000 cross assembler and Domain Technologies' debug software which features a windowed user interface. This software runs under MS-DOS on an IBM PC-compatible computer (386 class or higher) and communicates with the EVM over an RS-232 serial port.
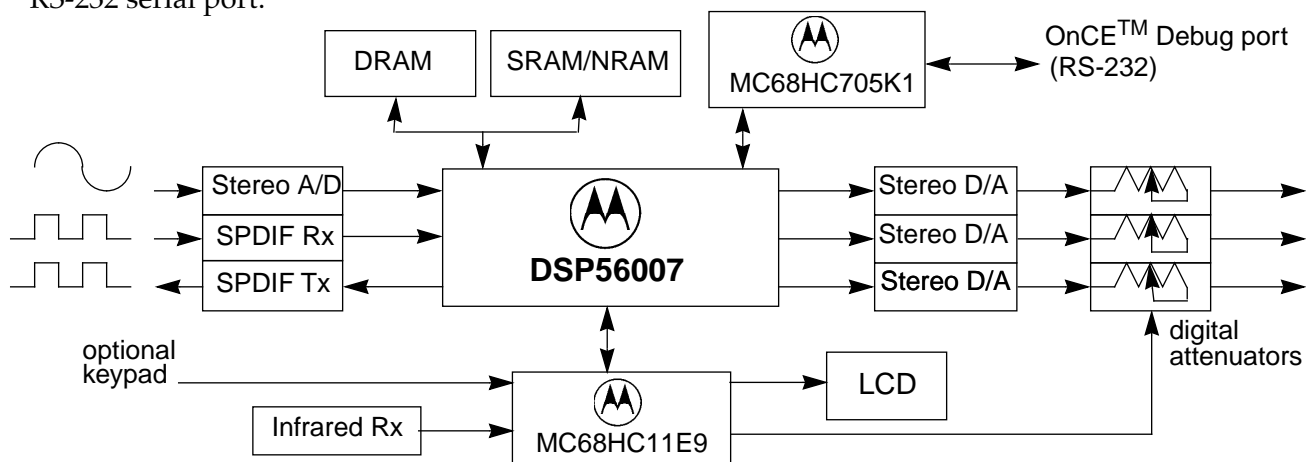

Figure 1   DSP56007EVM Block Diagram

*Licences may be obtained by contacting Doly Laboratories and Lucasfilms, Ltd.

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DSP56007EVM Features

Hardware

Fully assembled and tested printed circuit board containing:

- 24-bit DSP56007 Digital Signal Processor operating at 66 MHz
  - Up to 33 Million Instructions Per Second (MIPS) – 30.3 ns instruction cycle at 66 MHz
  - Four 24-bit internal data buses and three 16-bit internal address buses for simultaneous accesses to one program and two data memories
  - 2176×24-bit on-chip Y-Data RAM and 512×24 Bit Y-Data ROM
  - 1024×24-bit on-chip X-Data RAM and 512×24 Bit X-Data ROM
  - 6400×24-bit on-chip program ROM of which 6348 words are available for the user code and the remaining 52 words include proprietary code for initilization and bootstraps
  - 1024×24 bits of Y-Data RAM can be configured as program RAM, replacing 1280×24 bits of program ROM
  - On-Chip Emulation (OnCE™) port for unobtrusive, processor speed independent debugging
  - Software-programmable, Phase-Locked Loop (PLL)-based frequency synthesizer
- External DSP Memory
  - 8192 bytes SRAM, 8192 bytes non-volatile RAM
  - SRAM operates at zero wait states at 40 MHz DSP clock speed and with one wait state at 50 and 66 MHz
  - Contents of SRAM may be block loaded into non-volatile RAM, enabling storage of bootstrap code in the lowest 3072 bytes
  - Contents of non-volatile RAM may be block loaded into SRAM. This occurs automatically when DSP is bootstrapped in modes 1, 2 or 3
  - 30 pin SIMM slot for easy DRAM expansion. Addresses up to $4M \times 8$, uses a standard Macintosh or PC SIMM
- Multichannel audio conversion
  - 2 channels (stereo) A/D audio quality conversion with 20-bit quality
  - 6 channels D/A audio quality conversion with 18-bit quality
  - Selectable 44.1 and 48 kHz sample frequencies for A/D and D/As
  - A/D may be clocked by selected sample frequency or by received SPDIF signal
- Convenient Signal I/O
  - D/A outputs have programmable, analog-domain volume attenuators. These may be used for channel trim and master volume control to enable maximum use of D/A dynamic range at lower output levels
  - RCA jacks for all analog audio input/output
  - Optical and transformer-isolated electrical SPDIF/CP340 stereo digital audio inputs and outputs
  - 50-pin expansion connector allows easy expansion and/or substitution of other input/output peripherals.
- Complete User Interface
  - MC68HC11E9 (52-pin CLCC package) allows the user to substitute user-programmed 68HC11 and prototype custom 68HC11 code
  - 2×16 character Liquid Crystal Display and four soft switches for user interface
  - Enables use of standard 4×4 keypad matrix

- — Infrared remote control of user interface with optional remote
- — MC68705 K1 microcontroller performing RS-232-to-OnCE™ port command conversions
- All technical information available for use as a reference design

Software

- Motorola's DSP5600x cross assembler
  - — DSP56007 binary code from source code using labels, sections, and macro definitions incorporating the DSP's complete instruction set, all addressing modes, and all memory spaces
  - — Offers macros, expression evaluation, and functions for strings, data conversion, and transcendentals
  - — Reports for cross-references, instruction cycle count, and memory usage
  - — Extensive error checking and reporting
- Domain Technologies' debug software with windowed user interface
  - — Symbolic debugging
  - — Four main windows for data, code, DSP registers, and commands
  - — Data and registers displayed in fractional, decimal, or hexadecimal format
  - — Graphical display of memory segments
  - — Up to eight simultaneous software breakpoints
  - — Built-in in-line assembler and disassembler
- Installation instructions and user notes on disk
- Demo software illustrating the advantage of 24 bits over 16 bits in audio processing
- I/O drivers and microcontroller interface software
- Microcontroller code for user interface and DSP control
- Sound field processing demo software — executable and source code
- Self-test files — executable and source code

Requirements

The user must provide the following:

- Power supplies (± 8-12V DC linear supply for analog circuits, 8-15V AC or DC for digital circuits)
- RS-232 cable with DB9 connectors
- IBM PC compatible computer (386 class or higher) running MS-DOS with an RS-232 serial port capable of operation at 19,200 bits per second