DSP56009EVM

Advance Information
24-BIT DSP56009EVM EVALUATION MODULE

The DSP56009EVM Evaluation Module 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, the DSP56007, and the DSP56009. The DSP56009EVM features a DSP56009 with embedded software (including FFTs, FIR filters, and IIR filters) that is useful in a variety of user-developed audio software.

The DSP56009EVM is intended to provide a turnkey solution for digital audio decoding in audio / video applications, such as stereos and television sets. It provides full support for Dolby Pro Logic® and Dolby AC-3® Surround embedded in software. This on-board functionality is ready to use immediately.

This evaluation module is a complete system with high quality stereo Analog-to-Digital (A / D) conversion and six channels of Digital-to-Analog (D / A) conversion. The onboard circuitry includes a microcontroller, RS-232-to-On-Chip Emulation (OnCE™) port debug interface, LCD display, memory, and digital audio Input / Output (I / O). The user only needs to 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.

The DSP56009EVM also includes Motorola's DSP56000 cross assembler and Domain Technologies' Debug-56K debugging software, which runs under Microsoft® Windows™ 3.1 and Windows 95 on IBM PC-compatible computers (386 class or higher) and communicates with the evaluation module via an RS-232 serial port. **Figure 1** provides a block diagram of the DSP56009EVM.

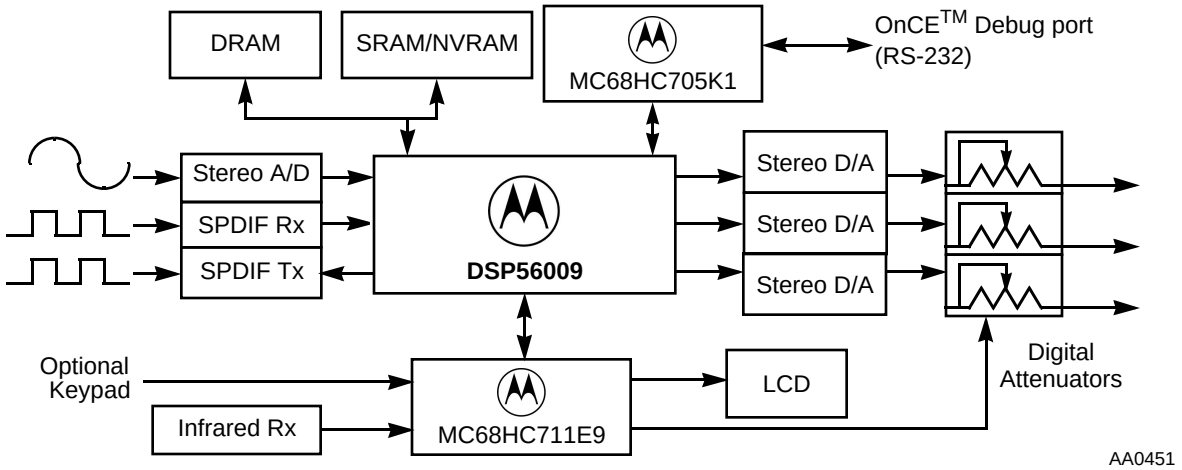

Figure 1 DSP56009EVM Block Diagram

This document contains information on a new product. Specifications and information herein are subject to change without notice.

DSP56009EVM FEATURES

Hardware

The DSP56009EVM includes a fully assembled and tested printed circuit board containing:

- 24-bit DSP56009 Digital Signal Processor operating at 81 MHz
  - 40.5 Million Instructions Per Second (MIPS), 24.7 ns instruction cycle at 81 MHz
  - Four 24-bit internal data buses and three 16-bit internal address buses for simultaneous accesses to one program and two data memories
  - 4608 × 24-bit on-chip X-data RAM and 3072 × 24-bit X-data ROM
  - 4352 × 24-bit on-chip Y-data RAM and 1792 × 24-bit Y-data ROM
  - 512 × 24-bit Program RAM
  - Additional 2304 × 24-bits X- and Y-data RAM configurable as Program RAM
  - 10240 × 24-bit on-chip Program ROM
  - OnCE port for unobtrusive, processor speed independent debugging
  - Software-programmable, Phase Lock 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, one wait state at 50, 66, and 81 MHz
  - Contents of SRAM and non-volatile RAM block-loadable into non-volatile RAM
  - Standard 30-pin SIMM slot addresses up to 4 M × 8 for easy DRAM expansion
- Complete user interface
  - One-time-programmable MC68HC711E9 (socketed 52-pin CLCC package) allows user-programmed 68HC11 and prototyping custom 68HC11 code
  - MC68705K1 performs RS-232-to-OnCE port command conversion
  - 2 × 16 character LCD display, four soft switches, and optional 16-key keypad
  - Infrared remote control of user interface with optional remote
- Convenient signal I/O
  - D/A outputs with programmable, analog-domain attenuators for channel trim and master volume control give maximum dynamic range at lower output levels
  - RCA jacks for all analog audio I/O
  - Optical and transformer-isolated SPDIF/CP340 stereo digital audio I/O
  - 50-pin expansion connector for expansion or substitution of other I/O peripherals

- Multi-channel audio conversion
  - Two-channel (stereo) A/D audio-quality conversion with 20-bit quality
  - Six-channel D/A audio-quality conversion with 18-bit quality
  - Selectable 44.1 and 48 kHz sample frequencies for A/D and D/A conversion
  - A/D clocked either by selected sample frequency or by received SPDIF signal
- Reference design information (including microcontroller code) provided on the Motorola DSP WWW site (http://www.motorola-dsp.com)

Software

Software included with the DSP56009EVM includes the following:

- Motorola's DSP5600x cross-assembler
  - Assembles binary code from source with labels, sections, and macro definitions using the full DSP instruction set, all addressing modes, and all memory spaces
  - Allows using macros, expression evaluation, and functions for strings, data conversion, and transcendentals
  - Generates reports for cross-references, instruction cycle count, and memory usage
  - Provides extensive error checking and reporting
- Domain Technologies' Debug-56K debugging software with windowed user interface
  - Provides four main windows for data, code, DSP registers, and commands
  - Performs symbolic debugging with eight simultaneous software breakpoints
  - Displays data and registers in fractional, decimal, or hexadecimal format
  - Graphically displays memory segments
  - Includes a built-in in-line assembler and disassembler
- Installation instructions and user notes on disk
- Demo software and example pass-through code
- Interface software, drivers, and microcontroller code for user I/F and DSP control

Requirements

The user must provide a ± 8–12 V DC linear power supply for the analog circuits, an 8–15 V AC or DC power supply for the digital circuits, an IBM PC-compatible computer (386 class or higher) running Windows 3.1 or Windows 95 with an RS-232 serial port capable of operation at 19,200 bits per second, and an RS-232 serial cable with DB9 connectors.

Order Numbers

The three documents listed in **Table 1** are required for a complete description of the DSP56009 and are necessary to design properly with the part. Documentation is available from a local Motorola distributor, a Motorola semiconductor sales office, a Motorola Literature Distribution Center listed below, or through the Motorola DSP home page on the Internet (the source for the latest information). Contact your nearest Motorola semiconductor sales office to order the DSP56009EVM Evaluation Module.

Table 1 DSP56009 Order Numbers

Part Name	Description	Order Number
DSP56000 Family Manual	Detailed description of the DSP56000 family core architecture, 24-bit core processor, and instruction set	DSP56KFAMUM/AD
DSP56009 User's Manual	Detailed description of DSP56009 memory, peripherals, and interfaces	DSP56009UM/AD
DSP56009 Data Sheet	Electrical and timing specifications, and pin and package description for DSP56009	DSP56009/D
DSP56009EVM	Evaluation module for the DSP56009	DSP56009EVM

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