Danville Signal Processing, Inc.

DSP Function Module
DSP-8300

Applications

- Audio Filtering
- Signal Generation
- Modems
- Noise Reduction
- Detectors
- Audio Delay Lines
- Signal Analyzers

Key Features

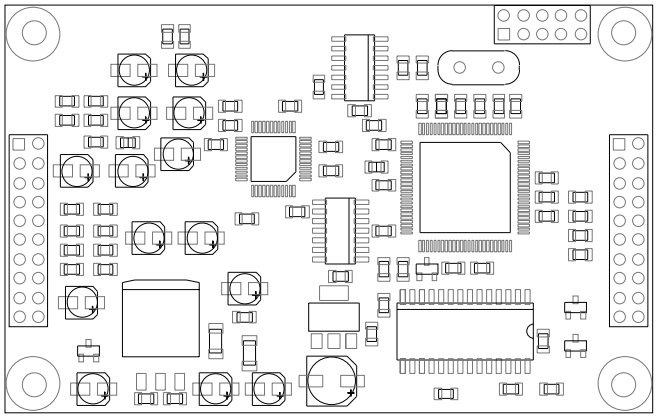
- Powerful DSP Processor
- Field Reprogrammable
- 20kHz Audio Bandwidth
- Digital & Serial I/O
- Small Size
- User Nonvolatile Memory
- Low Cost

General Description

The DSP-8300 DSP Function Module is intended for embedded applications requiring signal processing in the audio frequency range. Even though the DSP-8300 is only the size of a credit card, it is capable of up to 50 million operations per second.

The DSP-8300 was designed to serve a wide array of signal processing applications in a simple straightforward way. We created a product that is programmable and reprogrammable without the need for special hardware. The small size and flexible power requirements allow the DSP-8300 to be easily incorporated into an existing product or integrated as a subcomponent into a larger design.

With the addition of a daughterboard, the DSP-8300 makes an excellent DSP development platform. Add a housing or a rack mount panel and you can create custom instruments or test cells with minimal effort.



Actual Size

Since virtually every application of the DSP-8300 is unique, the DSP-8300 has an extensive set of library functions and tools to facilitate the software design process. This allows powerful signal processing modules to be built efficiently and economically for applications where a complete custom design would be expensive.

We recognize that the majority of our customers have their core skills in areas other than digital signal processing. Danville engineers are available to discuss your application's specific needs and then develop the necessary firmware and interfacing information.

The DSP-8300 Developer's Kit is available for those who wish to write their own applications. This kit includes sample code, device drivers and library functions. Programs are written in Analog Devices assembly language and downloaded via a standard terminal program. The kit also includes a companion I/O daughterboard with audio input and output connectors, RS-232 interfacing, test switches and leds.

38570 100th Avenue, Cannon Falls, MN 55009, USA
Tel: 507/263-5854 **Web: www.danvillesignal.com**
Fax: 877/230-5629 **Email: dsp@danvillesignal.com**

DSP Function Module
DSP-8300

Overview

The DSP-8300 has three main components: a powerful DSP processor (Analog Devices ADSP-2186M), an audio codec, and a flash-based PIC processor.

The DSP processor is bootloaded by the PIC and subsequently executes all of its instructions in high speed internal RAM.

DSP Processor

The DSP-8300 uses an Analog Devices ADSP-2186M DSP Microcomputer. This processor operates at a 50MIPs single cycle instruction rate. It has 40K bytes of on-chip RAM allowing very powerful signal processing functions to be executed at the full instruction rate.

In addition to its signal processing function, the DSP acts as the master processor. Commands and responses are sent to and received from the PIC processor for general purpose I/O functions. This allows the DSP maximum signal processing capability without having to manage those tasks better suited to a general purpose processor.

For more time critical digital I/O functions, the DSP can directly read two digital inputs and control two digital outputs. These outputs are available as both TTL compatible and open collector.

Audio Codec

The audio codec is an AC-97 (Rev 2.1) stereo 16 bit A/D and D/A converter. These codecs were designed for high quality audio in personal computers. The AC-97 codec used in the DSP-8300 supports variable sampling rates up to 48kHz.

Input gain and output attenuation are available for each channel in 1.5dB steps. Each DAC has two independent output attenuators to allow levels to be adjusted for two different signal paths from the same DAC.

PIC Processor

The PIC processor has three main functions: it bootloads the DSP processor, it acts as a watch-dog monitor for the DSP, and it provides additional I/O functions to the DSP.

The I/O functions include an A/D input for DC measurement such as the position of an on-board trimmer or external potentiometer, GPIO, a PWM output for DC results, and serial data communications. A on-board LED can also be programmed as a heartbeat monitor or other visual I/O function.

The serial communications port is a logic level (3.3 volts) interface that may be interfaced directly into an external system. The serial communications interface supports hardware handshaking and RS-485 multidrop modes. Danville has a variety of serial communication interface adapters available for RS-232, RS-485, LVDS, and USB interfacing that plug in directly above the DSP-8300.

Operation

The DSP-8300 automatically resets upon power up or may be externally reset by an external device. During this process, a new application program can be downloaded into the flash memory via the serial communications port. This means the module is field reprogrammable. For example, a new firmware update could be sent via the Internet and programmed with a notebook computer in the field using the notebook's RS-232 interface.

The user (as well as the DSP) can access nonvolatile EEProm memory via the serial interface. This allows for individual customization of each DSP-8300 module. For example, this space could be used for serialization, device addressing, calibration values or diagnostics.

After the initialization process, the DSP processor takes control. The serial interface is then

available to the DSP application. It can be reprogrammed to standard bauds up to 38.4k. Nine bit modes are also available.

Power Requirements

The DSP-8300 may be powered with either an unregulated 8 to 12 VDC supply or alternatively a clean 5VDC regulated supply. An on-board linear voltage regulator converts the unregulated 8 to 12 Volt supply to 5 volts. The DSP-8300 draws about 125mA.

Mounting & Connections

The DSP-8300 may be mounted on four 1/4″ standoffs using 4-40 screws. The DSP-8300 has provisions for connecting to other devices with standard 0.100″ spaced 0.025″ pin dual row headers. An alternate connection method is to solder wires directly to the pc board.

Options

Danville can supply the DSP-8300 with simple variations. These include:

- Different operating clocks (crystals) which may be more appropriate for modem design, line noise comb filtering or lower power consumption applications.
- Larger memory DSP processors such as the ADSP-2185M.
- On-board trim pots, connectors, wires, etc.

Related Products

DSP-8300 RS-232 Development Daughterboard
DSP-8300 RS-485 Daughterboard
DSP-8300 LVDS Daughterboard
DSP-8300 USB Daughterboard
DSP-8300 Developer's Kit

Connections

Digital I/O - JH1

Digital Gnd	1	2	DE/RE or CTS
TXD	3	4	RTS
RXD	5	6	Digital Gnd
Digital 3.3V	7	8	Clock
ADC/GPIO 0	9	10	Digital Gnd
Digital Gnd	11	12	GPIO 1
Reset	13	14	PWM/GPIO 2
DSP In 0	15	16	DSP In 1
DSP Out 0 (3.3V)	17	18	DSP Out 1 (3.3V)
DSP Out 0 (Open C)	19	20	DSP Out 1 (Open C)

Analog I/O - JH2

Analog Gnd	1	2	Analog Gnd
Audio In L	3	4	Audio In R
Mic Bias	5	6	Mic In
Analog Gnd	7	8	Analog Gnd
Analog Out L	9	10	Analog Out R
Analog Gnd	11	12	Analog Gnd
Line Audio Out L	13	14	Line Audio Out R
Analog Gnd	15	16	Analog Gnd
+5 V Power	17	18	+8 to +12 V Power
Power Gnd	19	20	Power Gnd

Serial Communications - JH3

Reset	1	2	+8 to +12 V Power
Digital Gnd	3	4	DE/RE or CTS
TXD	5	6	RTS
RXD	7	8	Digital Gnd
Digital 3.3V	9	10	+5V Power

Specifications

General Parameters:

Standard Operating Frequency	24.576MHz
Power Requirements	+8 VDC to +14 VCD or +5.0 VDC (regulated)
Current Consumption	125mA typical
Size	.50″ H x 2.125″ W x 3.375″ D (1.25 cm x 5.4 cm x 8.57 cm)
Weight	.1 pounds (50 g)

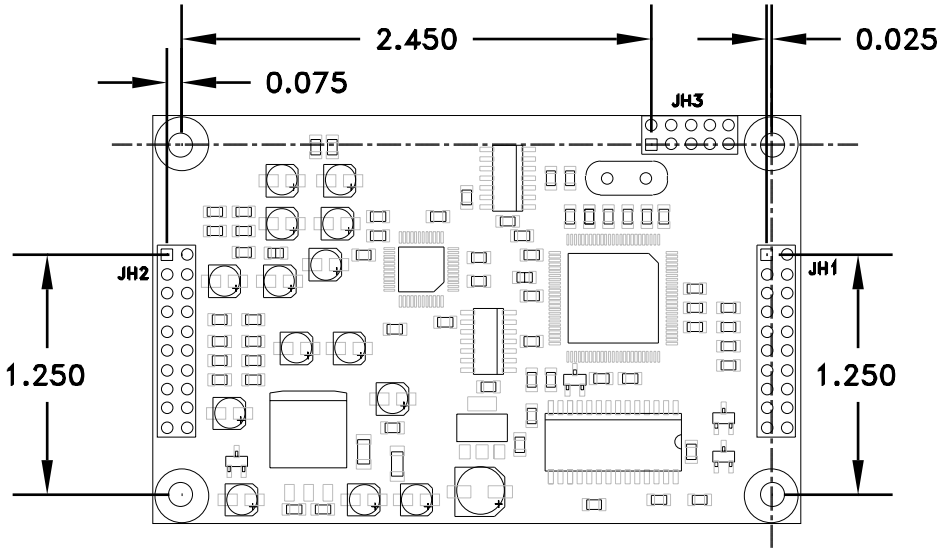
DSP Parameters:

Instruction Cycle Rate	49.152 MIPs
Maximum Boot Memory Image	8K Byte

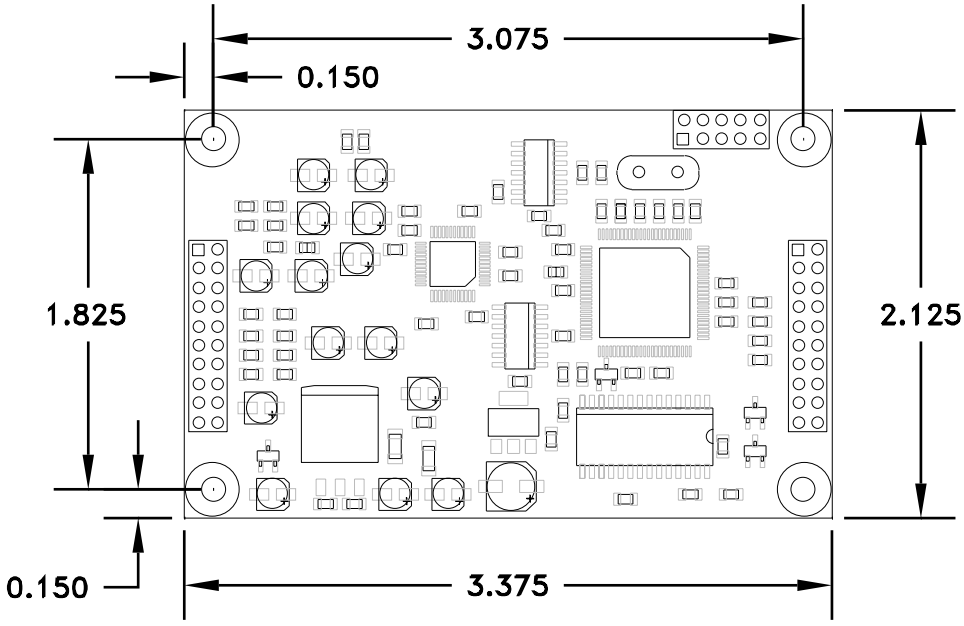
Codec Parameters:

Frequency Range	20 - 20000 Hz ± 1dB
Input Impedance	10K nominal
Full Scale Voltage	1.414 V
Sampling Rates	48000, 44100, 22050 16000, 11025, 8000

Mechanical Dimensions



Connector Pin 1 Dimensions



Mounting Hole - Board Dimensions

38570 100th Avenue, Cannon Falls, MN 55009, USA
Tel: 507/263-5854 Web: www.danvillesignal.com
Fax: 877/230-5629 Email: dsp@danvillesignal.com