FREQUENCY DEVICES™, INC.

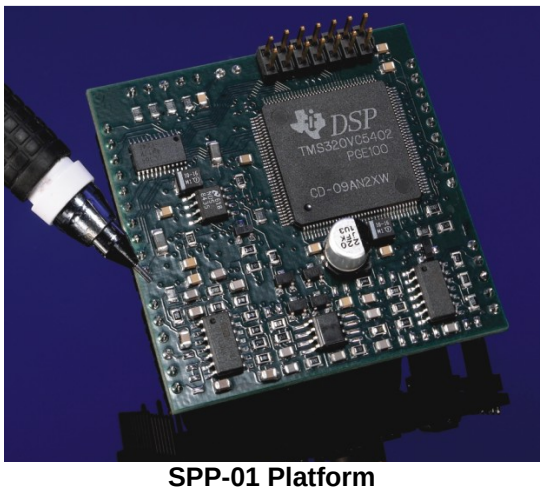
SPP-01 Series

2" X 2" Precision Hardware Solution

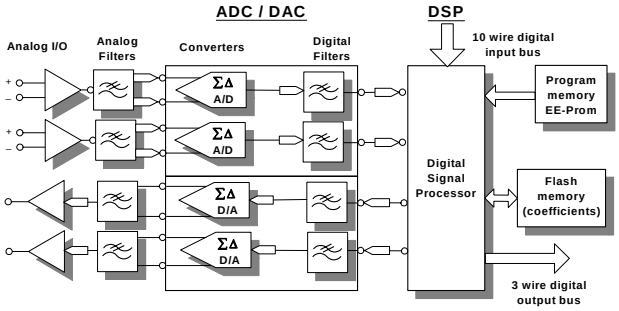
Dual Channel, Differential Input Signal Processing Platform

Design engineers now have a precision dual channel hardware solution that acts as its own evaluation board to facilitate algorithm development.

After the unit is programmed, SPP-01's can be directly inserted into production applications as a finished subassembly, minimizing product development time and space while shortening manufacturing cycle-time and providing repeatability.



SPP-01 Platform



SPP-01 Block diagram

Description

The SPP-01 Series of Signal Processing Platforms are programmable over a 20 kHz audio frequency range and offer up to 9-bits of addressing. This dual channel DSP design and development solution, in a 2" x 2" footprint, contains anti-alias filters, reconstruction filters, ADC's and DAC's sampling at 48 kHz. SPP-01 platforms are small subassemblies that provide low noise and distortion signal processing with THD approaching –100 dB. The fixed point DSP utilizes 32-bit math to achieve 24-bits of precision.

SPP-01's can be programmed with standard or customer specific algorithms. Algorithms are easily verified via an on-board JTAG port that allows the emulator to communicate with the SPP-01 hardware. Designers can directly load algorithms into the SPP-01 via the RS232 interface on the SPPDB-01 development board.

Features/ Benefits:

- Compact 2" x 2" dual channel design combined with large program memory (256 k EE-Prom) and 4 Mbits of flash memory optimizes your DSP processing power in minimal board space.
- Socketed SPPDB-01 development hardware offers rapid set-up, programming and performance evaluation, shortening the product development cycle while insuring high precision field installation.
- Analog inputs, storage for 100's of standard or customer application specific algorithms, and analog or digital outputs, provides unmatched flexibility for design and implementation.
- For multi-channel applications, design engineers can have phase synchronous operation by providing an external buffer to the SLAVE clock input.

Applications

- Brick-Wall; High-Pass, Low-Pass, Band-Pass, Band-Reject and Multi-Rate filters with Linear Phase and Signal Generators for Data Acquisition Systems.
- Speech analysis, research, pathology
- Sound and vibration testing
- Signal correlation / data analysis
- Low distortion waveform generator: sine / cosine, quadrature or custom.

AVAILABLE PLATFORM PRODUCTS

SPP-01: Plug and play hardware / evaluation board, programmable with turnkey or customer generated algorithms.
SPPDB-01: Development Board, for SPP-01 family products. Also may be used as a mounting assembly.
SPPDS-01: Development Suite for all SPP platform products. Requires TI's Code Composer Studio™.
SPPDF-01: Development Suite for SPPDM-01 FIR filter products. Requires MatLab™ V5.3 or V6.0.

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Typical Program Selection Port Protocol

Data Format

- Logic "0" 0VDC Min – 2VDC Max
- Logic "1" 3.5VDC Min – 5Vdc Max

Bit Weighting (Binary Coded)

D_0 LSB

D_7 or D_8 MSB

Program Selection: 256 or 512

1. The program selection data word bus consists of D_0 to D_7 for 8 - bit programming ($D_8 = 0$ Channel 1 and logic 1 for Channel 2) and D_0 to D_8 for 9-bit programming.
2. D_9 channel 1or 2 select. Low is channel 1 and is logic 0. Channel 2 is a logic 1 and is high at 5 volts.

Suggested 8 - Bit programming table

MSB	---	---	---	---	---	---	LSB	Bit Weight
2^7 D_7	2^6 D_6	2^5 D_5	2^4 D_4	2^3 D_3	2^2 D_2	2^1 D_1	2^0 D_0	Program address
0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	1	2
0	0	0	0	0	0	1	1	4
0	0	0	0	0	1	1	1	8
0	0	0	0	1	1	1	1	16
0	0	0	1	1	1	1	1	32
0	0	1	1	1	1	1	1	64
0	1	1	1	1	1	1	1	128
1	1	1	1	1	1	1	1	256

Suggested 9 - Bit programming table

MSB	---	---	---	---	---	---	---	LSB	Bit Weight
2^8 D_8	2^7 D_7	2^6 D_6	2^5 D_5	2^4 D_4	2^3 D_3	2^2 D_2	2^1 D_1	2^0 D_0	Program address
0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	1	2
0	0	0	0	0	0	0	1	1	4
0	0	0	0	0	0	1	1	1	8
0	0	0	0	0	1	1	1	1	16
0	0	0	0	1	1	1	1	1	32
0	0	0	1	1	1	1	1	1	64
0	0	1	1	1	1	1	1	1	128
0	1	1	1	1	1	1	1	1	256
1	1	1	1	1	1	1	1	1	512

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2" X 2" Precision Hardware Solution

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SPP-01 Performance Specifications	
Available bandwidth	DC to 20 kHz
Frequency Accuracy	< ± 0.05 %
Amplitude Accuracy at unity gain.	< ± 0.1 dB
Total Broad Band Noise (Ref to input 3.53 VRMS)	< -100dB Max
Total Harm. Dist.(THD) (10V peak to peak)	<-100 dB Max. to 20 kHz
Channel to Channel phase tracking	< ± 0.10°
Cross talk dual channel version with different signals on each channel	DC to 20K < - 100 dB Typ.

There are two development systems available for SPP platforms.

Development Options:

1. **SPPDS-01:** Suite for all SPP platform products.
   Requires TI's Code Composer Studio™.
2. **SPPDF-01:** Suite for SPPDM-01 FIR filters.
   Requires MatLab™ V5.3 or V6.0.

All SPP-01 Family Platforms can be purchased with standard and custom algorithms.

Consult factory for a quotation.

Custom programs will be assigned a unique suffix (CXX) at the time of order.

(@25°C and Vs = ±15 Vdc)

Analog Input Characteristics

Maximum Input Impedance	1.0 MΩ
Input voltage	± 10 V peak

Analog Output Characteristics

Minimum load Impedance	10 kΩ
Maximum capacitive load	50 pF
Output voltage	± 10 V peak
Offset Voltage	2 mV Typ. 10mV Max.

Power Supply (±Vs)

Analog Vs range	±12Vdc Min to ±15 Vdc Max.
Analog supply current at Max. Vs	70 mA Typ.
Digital PS Voltage	+5 Vdc
Digital supply current	370 mA Typ.
Power consumption at Max. Vs	4.0 watts Typ.

Care must be taken to stay above the minimum Vs in order to maintain the linearity and distortion performance of the DSP platform.

Temperature

Operating	0 to +70°C
Storage	-25 to +85°C

Size 2.0" x 2.0" x 0.5"

The **SPPDB-01** development board can double as an SPPDM-01 mounting assembly, to facilitate product evaluation or laboratory use. The **SPPDB-01** development board is specified and sold separately or is shipped as part of the SPPDS-01 and SPPDF-01 development suites.

Specifications

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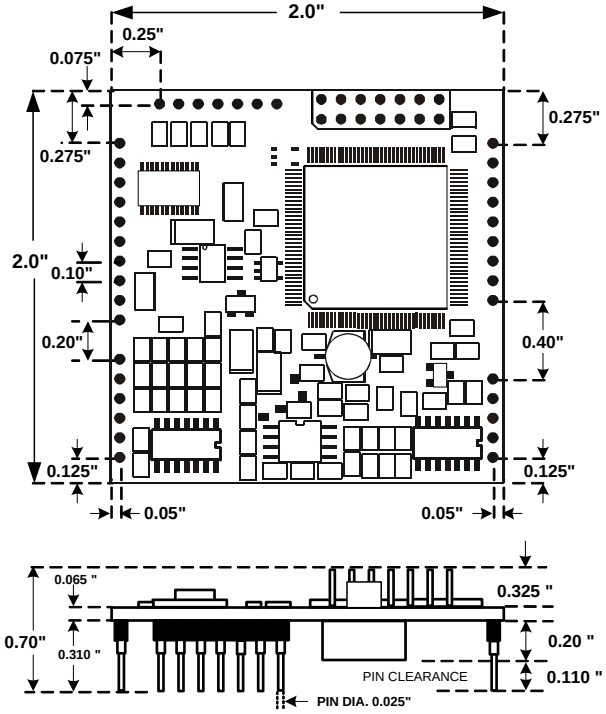
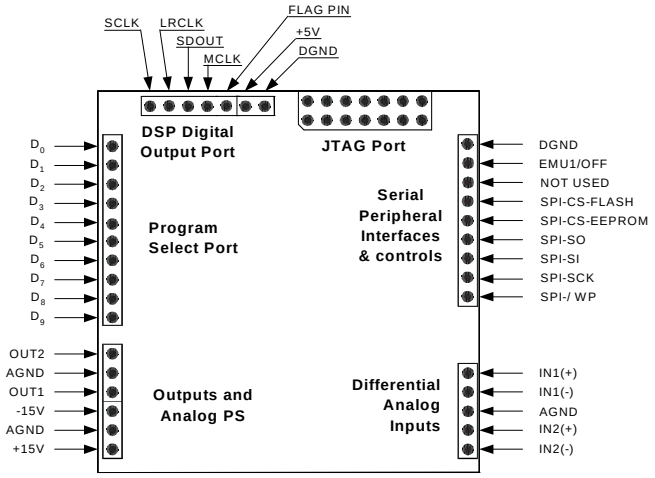


SPP-01 AND SPPPF-01
TOP VIEW
AND DIMENSIONS
All normal pin spacing 0.10"



SPP-01 TOP VIEW
PIN IDENTIFICATION

D_0 – D_8	9–bit program select pins
D_{8*}	*8-bit Ch select; Ch 1= 0, Ch 2=1
D_9	Channel 1 or 2 select
Out 1 & 2	Analog outputs
±Inputs 1&2	Differential analog inputs
± 15 Vdc	Analog Dc power In
+ 5 Vdc	Digital Power In
A Gnd	Analog Grounds (3)
D Gnd	Digital Grounds (2)
JTAG™	JTAG port, see SPPDS-01

Ordering information

SPP-01M	**MASTER**
SPP-01S	**SLAVE**
SPP-01M or S- CXX	**Custom algorithms will be individually quoted.**

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