



# HS9410 Series

Sipex Data Converter Line

## 8 Channel, 12 Bit Data Acquisition System With $\mu$ P Interface

### FEATURES

Complete 8 channel, 12-bit data acquisition system with MUX, S/H, REF, clock and three-state outputs

Full 8- or 16-bit microprocessor bus interface

Guaranteed linearity over temperature

High throughput rate: 25kHz

Hermetic 28-pin

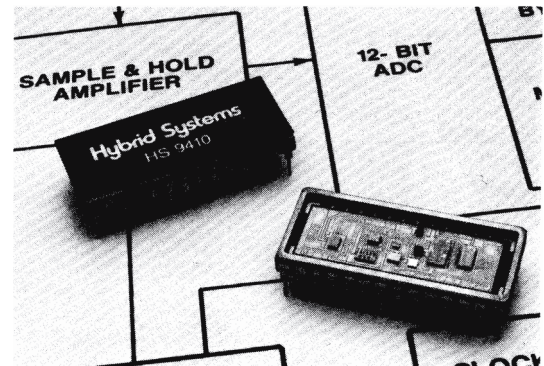
Low Power: 400mW

### DESCRIPTION

The HS9410 Series is a complete 8 channel, microprocessor compatible, 12-bit data acquisition system with all the interface logic to connect directly to 8- or 16-bit microprocessor buses. It is contained in a 28-pin DIP and includes an 8 channel multiplexer, a sample-and-hold amplifier, and a 12-bit A/D converter along with the control logic needed to perform a complete data acquisition function. System throughput rate is 25kHz for full rated accuracy.

The analog-to-digital converter section contains the HS574 12-bit ADC. The HS9410 Series is offered in a hermetically-sealed package for use over a wide temperature range and for MIL-STD-883 requirements.

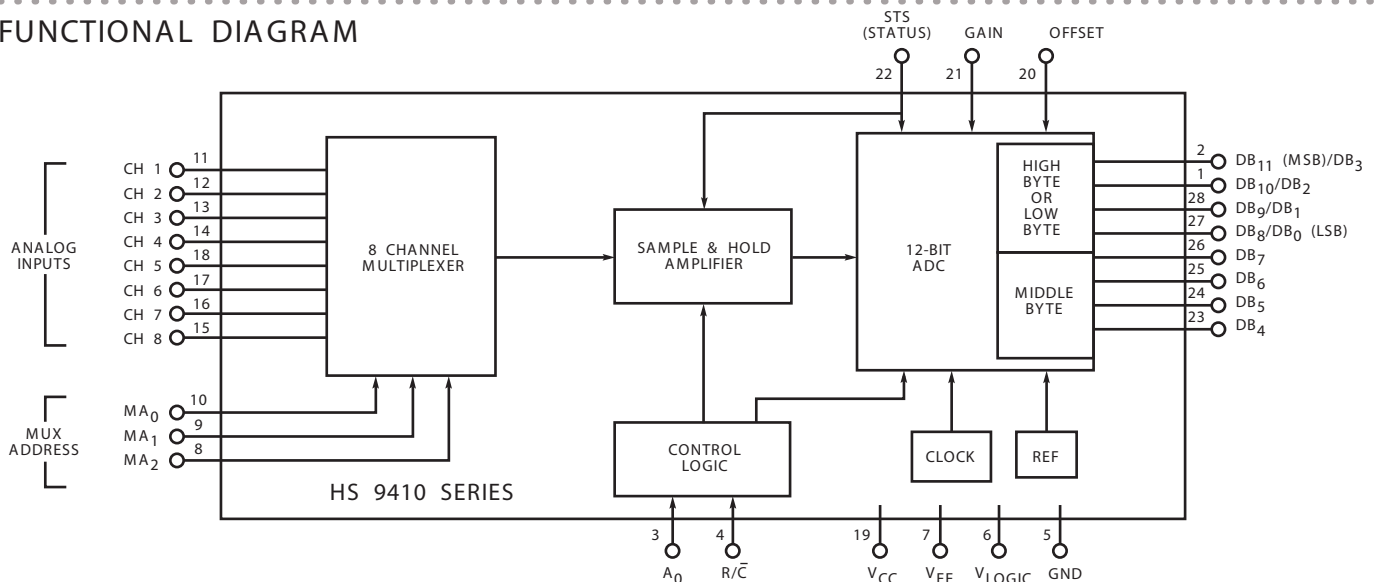
The HS9410 Series operates from  $\pm 15V^*$  and  $+5V$



with a total power consumption of 400mW. To take advantage of the 28-pin package the user must specify an input range of 0 to  $+10V$ ,  $\pm 5V$  or  $\pm 10V$  when ordering. Four basic product grades are available; J and K models are specified over a temperature range of  $0^{\circ}C$  to  $+70^{\circ}C$  while the S and T models are specified over an extended temperature range of  $-55^{\circ}C$  to  $+125^{\circ}C$ . Full screening to MIL-STD-883C and processing in accordance with Method 5008.1 is available with models specified as "B."

\*  $\pm 12V$  operation possible; consult factory for further information.

### FUNCTIONAL DIAGRAM



## SPECIFICATIONS

(Typical@ +25°C with  $V_{CC} = +V_{EE} = -15V$ ,  $V_{LOGIC} = +5V$ , unless otherwise specified)

MODEL	HS 941XJ	HS 941XK	HS 941XS	HS941XT
<b>TRANSFER CHARACTERISTICS</b>				
Resolution	12-Bits			
Number of Channels	8 Single-Ended			
Throughput Rate	25 kHz			
<b>ANALOG INPUTS</b>				
Input Ranges <sup>1</sup> (Specified as a suffix in the model number. See Ordering Guide.)				
HS9410	0 to +10V			
HS9411	±5V			
HS9412	±10V			
Input Bias Current per Channel				
$I_{B25°C}$	±10 nA typ			
-55°C to +125°C	± 250nA max			
Input Impedance				
ON Channel	10 <sup>10</sup>    100pf			
OFF Channel	10 <sup>10</sup>    10pf			
<b>DIGITAL INPUTS</b>				
Logic Inputs				
R/C.A <sub>0</sub>				
V <sub>IH</sub> min	+2.4V			
V <sub>IH</sub> max	+5.5V			
V <sub>IL</sub> max	+0.8V			
V <sub>IL</sub> min	-0.5V			
I <sub>IL</sub> max	±5μA max			
I <sub>IL</sub> min	±5μA max			
Multiplexer inputs				
V max	+0.8V			
V <sup>IL</sup> min	+4.0V		+4.0V <sup>2</sup>	+4.0V <sup>2</sup>
Input Capacitance (All Digital Inputs)	5pF typ			
Minimum Start Pulse				
R/C-Negative	50ns			
<b>SIGNAL DYNAMICS</b>				
Conversion Time				
12-Bit Conversion	25μs max			
8-Bit Conversion	9μs max			
<b>DIGITAL OUTPUTS</b>				
Logic Outputs				
DB <sub>11</sub> -DB <sub>0</sub> . STS				
Logic 0	+0.4V max. I <sub>OL</sub> 1.6mA			
Logic 1	+2.4V min. I <sub>OH</sub> 0.5mA			
Leakage (High 2 Slate)	±5μA typ (DB <sub>11</sub> DB <sub>0</sub> only)			
Capacitance	5pF typ			
Output Code Configuration				
Unipolar	Positive True Binary			
Bipolar	Positive True Offset Binary			
<b>POWER SUPPLY</b>				
V <sub>LOGIC</sub>	+4.5 to +5.5 Volts@11mA max			
V <sub>CC</sub>	+13.5 to +16.5 Volts@35mA max			
V <sub>EE</sub>	-13.5 to -16.5 Volts@15mA max			
Power Dissipation	700mW typ., 1W max.		700mW typ., 1W max.	700mW typ., 1W max.
Rejection <sup>3</sup>				
V <sub>LOGIC</sub>	0.002% /% lyp. 0 005% /% max			
V <sub>CC</sub>	0.002% /% lyp. 0 005% /% max			
V <sub>EE</sub>	0.002% /% lyp. 0 005% /% max			
<b>ACCURACY</b>				
Linearity Error (% of F.S.R. max)	±0.025	±0.012	±0.025	±0.012
Offset <sup>4</sup>				
Unipolar (% of F.S.R. max)	±0.05			
Bipolar (% of F.S.R. max)	±0.25	±0.01	±0.25	±0.01
Gain <sup>4</sup> (% of F.S.R. max)	±0.3			

SPECIFICATION (Continued)

STABILITY

Linearity (ppm/°C max)	±0.5	±0.5	±0.25	±0.25
Unipolar Offset (ppm/°C max)	±10	±5	±25	±20
Bipolar Offset (ppm/°C max)	±25	±20	±25	±20
Gain (Scale Factor)(ppm/°C max)				

TEMPERATURE RANGE

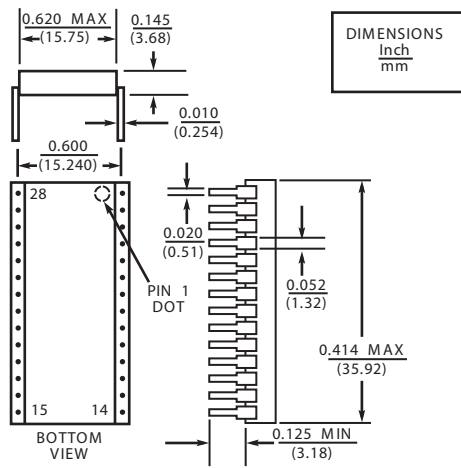
Operating	0° to +70°C	-55°C to +125°C	-55°C to +125°C
Storage	-25°C to +85°C	-65°C to +150°C	-55°C to +125°C

NOTES  
 1 For J and K models, positive analog input voltage should not exceed  $V_{CC} - 4$  volts. Exceeding  $V_{CC} - 4$  volts can cause an OFF channel to be turned ON. Negative input voltages and input voltages for S and T models may go to supply voltages. Input voliaiges exceeding these values will not result in permanent damage as long as the absolute maximum ratings are not exceeded. 2. 1 K pullup to +5V recommended for  $MA_0-MA_2$  when driven by TTL 3.Maximum change over rated supply voltage. 4. Externally adjustable to zero. See Applications Information.

\*Specifications same as HS 9410J

PACKAGE OUTLINE

Dimensions shown in inches and (mm)



PIN ASSIGNMENTS

PIN	FUNCTION	PIN	FUNCTION
1	DB <sub>8,0</sub> /DB <sub>2</sub>	28	DB <sub>9</sub> /DB <sub>1</sub>
2	DB <sub>n</sub> (MSB)/DB <sub>3</sub>	27	DB <sub>8</sub> /DB <sub>0</sub>
3	A <sub>0</sub>	26	DB <sub>7</sub>
4	R/C	25	DB <sub>6</sub>
5	GROUND	24	DB <sub>5</sub>
6	V <sub>LOGIC</sub>	23	08 <sub>4</sub>
7	VEE	22	STS(STATUS)
8	MUX ADDRESS A <sub>2</sub>	21	GAIN
9	MUX ADDRESS A <sub>1</sub>	20	OFFSET
10	MUX ADDRESS A <sub>0</sub>	19	V <sub>CC</sub>
11	INPUT CH 1	18	INPUT CH 5
12	INPUT CH 2	17	INPUT CH 6
13	INPUT CH 3	16	INPUT CH 7
14	INPUT CH 4	15	INPUT CH 8

ORDERING INFORMATION

Model Number1	Input Range	System Accuracy (% FSR)	Full Scale T.C. (ppm/°C)	Temp. Range	MIL Screening
HS 94XXJ	SEE NOTE1	±0.025	50.0	0°C to +70°C	—
HS 94XXK		±0.012	20.0	0°C to +70°C	—
HS 94XXS		±0.025	50.0	-55°C to +125°C	—
HS 94XXT		±0.012	25.0	-55°C to +125°C	—
HS 94XXS/B		±0.025	50.0	-55°C to +125°C	883C
HS 94XXT/B		±0.012	25.0	-55°C to +125°C	883C

NOTES  
 1.

HS 94XX

MODEL SUFFIX	INPUT RANGE
10	0 to +10V
11	±5V
12	±10V

Add letter suffix as required above

ABSOLUTE MAXIMUM RATINGS

- $V_{CC}$  to Common GND.....0 to +16.5V
- $V_{EE}$  to Common GND.....0 to -16.5V
- $V_{LOGIC}$  Common GND.....0 to +7V
- Control Inputs ( $A_{0+}$  R/C) to Common GND .....-0.5Vto $V_{LOGIC} + 0.5V$
- Power Dissipation.....1.3W
- Lead Temperature, Soldering..... 300°C, 10Sec
- Maximum Input Voltage..... $V_{CC} + 20V$
- Minimum Input Voltage..... $V_{EE} - 20V$
- Analog Input Maximum Current..... 25mA

