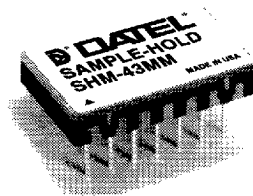


FEATURES

- 35ns maximum acquisition time to $\pm 0.01\%$
- 30ns maximum hold-mode settling to $\pm 0.01\%$
- 1ps aperture uncertainty
- 150MHz small signal bandwidth
- 545mW power dissipation
- Small 14-pin DIP package
- CMOS control signal



GENERAL DESCRIPTION

The SHM-43 sample-hold utilizes a proprietary architecture to deliver acquisition times of 35 nanoseconds maximum to $\pm 0.01\%$ accuracy and 25 nanoseconds maximum to $\pm 0.1\%$ accuracy.

Operation requires +15V and $\pm 5V$ supplies, and the analog input range is $\pm 1V$. Packaged in a small 14-pin DIP, the SHM-43 offers a CMOS compatible sample command while dissipating just 545 milliwatts.

The SHM-43 has been designed for applications that demand fast acquisition times (25ns, $\pm 0.01\%$), fast hold-mode settling (20ns, $\pm 0.01\%$), wide bandwidth, and the ability to drive resistive (100 Ω) and capacitive (50pF) loads with no compromise in performance. These features make the SHM-43 an ideal choice for driving flash A/D converters in applications such as radar and communications.

Two temperature ranges are offered; commercial 0 to +70°C and military -55 to +125°C.

INPUT/OUTPUT CONNECTIONS

PIN	FUNCTION
1	INPUT
2	REF BYPASS
3	POWER GROUND
4	DIGITAL +5V SUPPLY
5	S/H OR \bar{S}/\bar{H}
6	S/H CONTROL
7	DIGITAL GROUND
8	S/H OUTPUT
9	+5V BYPASS
10	-5V BYPASS
11	ANALOG GROUND
12	+15V SUPPLY
13	-5V SUPPLY
14	ANALOG +5V SUPPLY

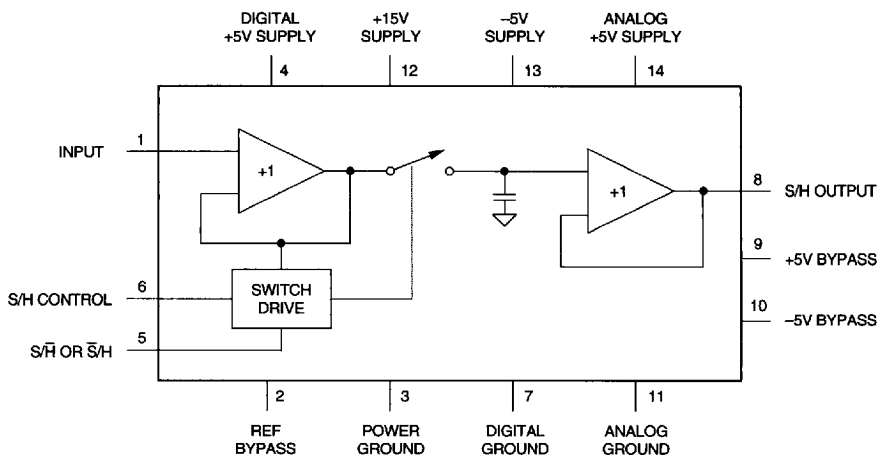


Figure 1. SHM-43 Functional Block Diagram

ABSOLUTE MAXIMUM RATINGS

PARAMETERS	LIMITS	UNITS
+15V Supply, Pin 12	-0.5 to +18	Volts
+5V Supplies, Pins 4, 14	-0.5 to +7	Volts
-5V Supply, Pin 13	+0.5 to -7	Volts
Analog Input, Pin 1	+5V Supply +1	Volts
	-5V Supply -1	Volts
Digital Inputs, Pins 5, 6	-0.5 to +7	Volts
Lead Temperature (10 seconds)	300	°C
Short circuit to ground	70	mA
Output shorted to any supply will cause permanent damage.		

FUNCTIONAL SPECIFICATIONS

(Apply over the operating temperature range with $\pm 1V$ input range, 100 Ω load, +15V and $\pm 5V$ nominal supplies, unless otherwise specified.)

INPUTS	MIN	TYP	MAX	UNITS
Input Voltage Range	± 1	± 2	—	Volts
Input Impedance	50	160	—	k Ω
Digital Inputs (Digital Supply = +5V)				
Logic Levels				
Logic 1	+3.8	—	—	Volts
Logic 0	—	—	+1.35	Volts
Logic Loading				
Logic 1	—	+1	+5	μA
Logic 0	—	-1	-5	μA
OUTPUTS				
Voltage Range	± 1	± 2	—	Volts
Output Current	± 30	—	—	mA
Output Impedance (dc)	—	0.1	0.25	Ohms
Stable Capacitive Load	50	—	—	pF

PERFORMANCE

Nonlinearity, DC ($\pm 1V$)				
+25°C	—	—	± 0.01	%
0 to +70°C	—	—	± 0.01	%
-55 to +125°C	—	—	± 0.02	%
Sample Mode Offset, +25°C	—	± 5	± 30	mV
0 to +70°C	—	± 25	± 35	mV
-55 to +125°C	—	± 25	± 35	mV
Pedestal, +25°C	—	± 5	± 15	mV
0 to +70°C	—	—	± 20	mV
-55 to +125°C	—	—	± 20	mV
Gain, +25°C	—	1	—	V/V
Gain Error, +25°C	—	—	± 2	%
0 to +70°C	—	—	± 2.25	%
-55 to +125°C	—	—	± 2.25	%
Aperture Delay, +25°C	—	5	10	ns
0 to +70°C	—	10	20	ns
-55 to +125°C	—	10	20	ns
Aperture Jitter, +25°C	—	1	3	ps
0 to +70°C	—	2	6	ps
-55 to +125°C	—	2	6	ps
Slew Rate	± 190	± 250	—	V/ μs
Full Power BW, $\pm 1.5V$	20	25	—	MHz
Small Signal Bandwidth	100	150	—	MHz
Harmonic Distortion				
$\pm 1V$, DC to 5MHz	-70	-74	—	dB
$\pm 1V$, 5 to 10MHz, +25°C	-60	-70	—	dB
0 to +70°C	-50	—	—	dB
-55 to +125°C	-50	—	—	dB
Acq. Time $\pm 0.01\%$, $\pm 1V$, +25°C ①	—	25	35	ns
0 to +70°C	—	—	35	ns
-55 to +125°C	—	—	45	ns
Acq. Time $\pm 0.1\%$, $\pm 1V$, +25°C ①	—	15	25	ns
0 to +70°C	—	—	35	ns
-55 to +125°C	—	—	35	ns

PERFORMANCE (Cont.)	MIN.	TYP.	MAX.	UNITS
Hold Mode Settling $\pm 0.01\%$, +25°C	—	20	30	ns
0 to +70°C	—	—	50	ns
-55 to +125°C	—	—	50	ns
Hold Mode Settling, $\pm 0.1\%$, +25°C	—	—	20	ns
0 to +70°C	—	—	35	ns
-55 to +125°C	—	—	35	ns
Output Noise, Hold Mode	—	270	—	μV_{rms}
Feedthrough Rejection 2V Step	76	80	—	dB
Droop Rate, +25°C	—	± 1	± 5	$\mu V/\mu s$
0 to +70°C	—	—	± 50	$\mu V/\mu s$
-55 to +125°C	—	± 25	± 50	$\mu V/\mu s$

POWER SUPPLY REQUIREMENTS

Range				
Analog +5V	+4.75	+5.0	+5.25	Volts
Digital +5V	+4.75	+5.0	+5.25	Volts
-5V	-4.75	-5.0	-5.25	Volts
+15V	+14.25	+15.0	+15.75	Volts
Current Drain				
Analog +5V	—	+38	+45	mA
Digital +5V	—	+10	+50	mA
-5V	—	-47	-50	mA
+15V	—	8	12	mA
Power Dissipation	—	545	655	mW
Power Supply Rejection Ratio	52	60	—	dB

PHYSICAL/ENVIRONMENTAL

Operating Temp. Range, Case				
SHM-43MC	0	—	+70	°C
SHM-43MM	-55	—	+125	°C
Storage Temp. Range	-65	—	+150	°C
Package Type	14-pin ceramic DIP			

① DATEL uses the conservative definition of acquisition time, which includes the aperture delay time.

TECHNICAL NOTES

1. Bypass the $\pm 5V$ and +15V supplies with a $1\mu F$, 25V tantalum capacitor in parallel with a $0.01\mu F$ ceramic capacitor mounted as close to the pin as possible.

To achieve optimum performance —

- Additional bypass capacitors are necessary, because of internal high switching speeds and the high slew rates of internal components. REF BYPASS (pin 2), +5V BYPASS (pin 9), and -5V BYPASS (pin 10) are internal connections that must be bypassed with a minimum $1\mu F$ tantalum capacitor mounted as close to the pins as possible. The polarity of the connections are shown in Figure 2.
- As with all high-speed analog circuits, it is essential that good grounding techniques be used. Tie all ground pins together at a single ground point beneath the device, and use a short low-impedance run to the ground of the analog power supplies. The ground point should be a solid ground plane under the device and any associated data converter.
- The offset, pedestal and gain errors of the SHM-43 are laser trimmed at DATEL, and no external compensation capabilities have been provided. This prevents introducing noise through the offset adjust terminals of the S/H amplifier and guarantees excellent gain linearity, offset drift and pedestal performance.
- A true sample/hold, the SHM-43 will return to the sample mode after three to four microseconds in the hold mode.

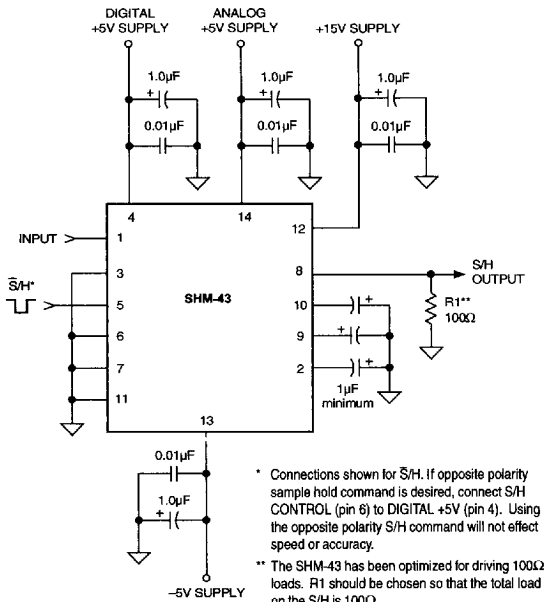


Figure 2. Test Circuit Connections

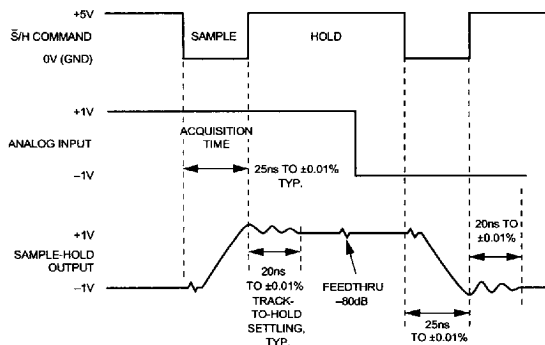
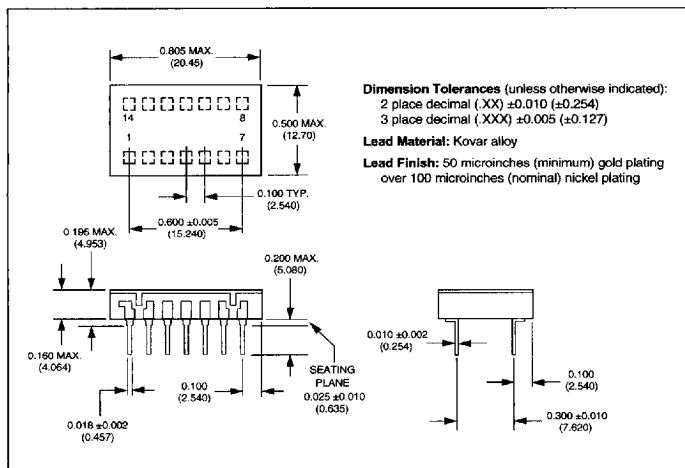


Figure 3. Test Method for Circuit Shown in Figure 2

MECHANICAL DIMENSIONS INCHES (MM)



ORDERING INFORMATION

MODEL NO. TEMPERATURE RANGE

SHM-43MC 0 to +70 °C
SHM-43MM -55 to +125 °C

Receptacles for pc board mounting are available from Amp, Inc. part number 3-331272-8 (component lead socket), 14 required.

Contact DATEL for availability of a high-reliability (QL) version.