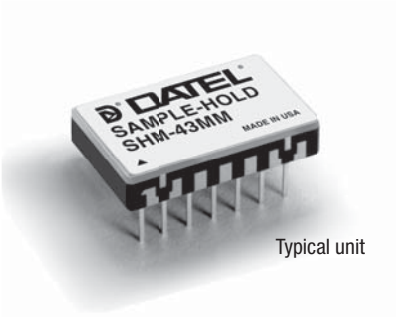
SHM-43

High-Speed, 0.01% Hybrid Sample/Hold



Typical unit

FEATURES

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

PRODUCT OVERVIEW

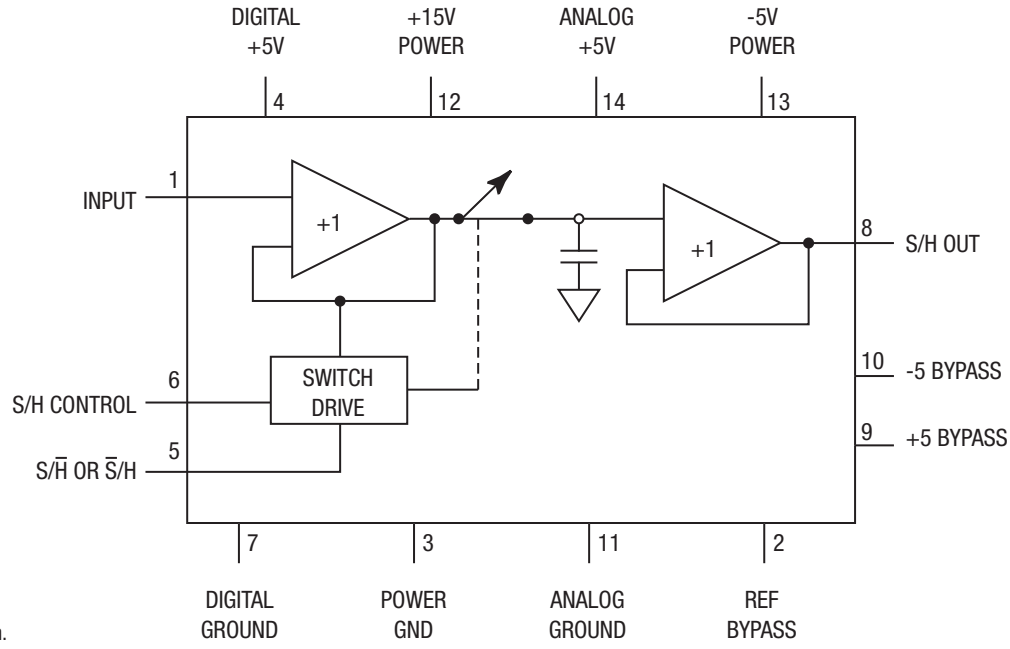
The SHM-43 sample-hold utilizes a proprietary architecture in delivering an acquisition time of 35 nanoseconds maximum to 0.01% and 20 nanoseconds maximum to 0.1% accuracy.

Operation requires +15V and ±5V supplies and the analog input range is ±2V. 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 (25 nS, ±0.01%), fast hold mode settling (20nS, ±0.01%), wide bandwidth, and the ability to drive resistive (100Ω), and capacitive (50 pF) 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: the commercial 0 to+70 ˚C and military -55 to +125 ˚C.

SIMPLIFIED SCHEMATIC



Typical topology is shown.

Figure 1. Simplified Block Diagram

Functional Specifications

Apply over the operating temperature range, ±1 Volt input range, 100Ω load, +15V, ±5V nominal supplies, unless otherwise specified.

PARAMETERS	MIN	TYP	MAX	UNITS
Input Voltage Range	-2	—	+2	Volts
Input Impedance	50	160	—	Kohms
Digital Imputs (Digital Supply = +5V)				
Logic Levels				
Logic 1	3.8	—	—	Vdc
Logic 0	—	—	1.35	Vdc
Logic Loading				
Logic 1	—	1	5	µA
Logic 0	—	1	5	µA
OUTPUTS				
Voltage Range	±2	—	—	V
Output Current	50	—	—	mA
Output Impedance (DC)	—	0.1	0.25	Ohms
Stable Capacative Load	50	—	—	pF
PERFORMANCE				
Nonlinearity, DC (±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
-55to +125 ˚C	—	±25	±35	mV
Pedestal, 25 ˚C	—	±15	±30	mV
0 to +70 ˚C	—	—	±40	mV
-55 to +125 ˚C	—	—	±40	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	nSec.
0 to + 70 ˚C	—	10	20	nSec.
-55 to +125 ˚C	—	10	20	nSec.
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/µSec.
Full Power BW, ±1.5V	20	25	—	MHz
Small Signal Bandwidth	100	50	—	MHz
Harmonic Distortion				
±1V, DC to 5 MHz	-70	-74	—	dB
±1V, 5 to 10 MHz, +25 ˚C	-60	-70	—	dB
0 to +70 ˚C	-50	—	—	dB
-55 to +125 ˚C	-50	—	—	dB
Acq Time 0.01%, ±1V, +25 ˚C ①	—	25	35	nSec.
0 to +70 ˚C	—	—	35	nSec.
-55 to +125 ˚C	—	—	45	nSec.
Acq Time 0.1%, ±1V, +25 ˚C ①	—	15	25	nSec.
0 to +70 ˚C	—	—	35	nSec.
-55 to +125 ˚C	—	—	35	nSec.
Hold Mode Settling,				
0.01%, +25 ˚C	—	20	30	nSec.
0 to +70 ˚C	—	—	50	nSec.
-55 to +125 ˚C	—	—	50	nSec.

PERFORMANCE, CONT.	MIN	TYP	MAX	UNITS
Hold Mode Settling,				
0.1%, +25 ˚C	—	—	20	nSec.
0 to +70 ˚C	—	—	35	nSec.
-55 to +125 ˚C	—	—	35	nSec.
Output Noise, Hold Mode	—	50	100	µV rms
Feedthrough Rejection 2V Step	-76	-80	—	dB
Droop Rate, +25 ˚C	—	1	5	µV/µS
0 to +70 ˚C	—	—	50	µV/µS
-55 to +125 ˚C	—	25	50	µV/µS
POWER SUPPLY REQUIREMENTS				
Range				
Analog +5V	+4.75	+5.0	+5.25	Vdc
Digital +5V	+4.75	+5.0	+5.25	Vdc
-5V	-4.75	-5.0	-5.25	Vdc
+15V	+14.25	+15.0	+15.75	Vdc
Current Usage				
Analog +5V pin 14	—	+38	+45	mA
Digital +5V pin 4	—	+10	+50	mA
-5V pin 13	—	-47	-50	mA
+15V pin 12	—	8	12	mA
Power Dissipation	—	545	655	mW
Power Supply Rejection Ratio	-52	-60	—	dB
ENVIRONMENTAL				
Operating Temp. Range				
-MC, ambient	0	—	+70	˚C
-MM, case	-55	—	+125	˚C
Storage Temp. Range	-65	—	+150	˚C
Package Type	14-Pin metal DIP			

① DATEL uses the conservative definition of Acquisition time, which includes the Aperture Delay time.

Absolute Maximum Ratings

PARAMETERS	LIMITS	UNITS
+15V supply (pin 12)	-0.5 to +18	Vdc
+5V supply (pin 4, 14)	-0.5 to +6	Vdc
-5V supply (pin 13)	+0.5 to -7	Vdc
Analog input (pin 1)	+5V Supply +1 -5V Supply -1	Vdc Vdc
Digital inputs (pins 5, 6)	-0.5 to +6	Vdc
Lead temperature (10 sec.)	300	˚C
Short circuit to ground	70	mA

Output shorted to any supply will cause permanent damage.

TECHNICAL NOTES

1. Bypass the ±5V analog, +5V digital, +15V supplies with a 1µF, 25V tantalum capacitor in parallel with a 0.01 µF ceramic capacitor mounted as close to the pin as possible.

To achieve optimum performance-

2. Additional bypass capacitors are necessary, because of internal high switching speeds, and high slew rates of internal components. REF BYPASS (pin 2), +5 BYPASS (pin 9), and -5 BYPASS (pin 10) are internal connections that must be bypassed with a minimum 1µF tantalum capacitor mounted as close to the pin as possible. The polarity of the connections are shown on the test circuit drawing, Figure 2.
3. As with all high speed analog circuits, it is essential that good grounding tcehniques 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.
4. 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 galn linearity, offset drift, and pedestal performance.

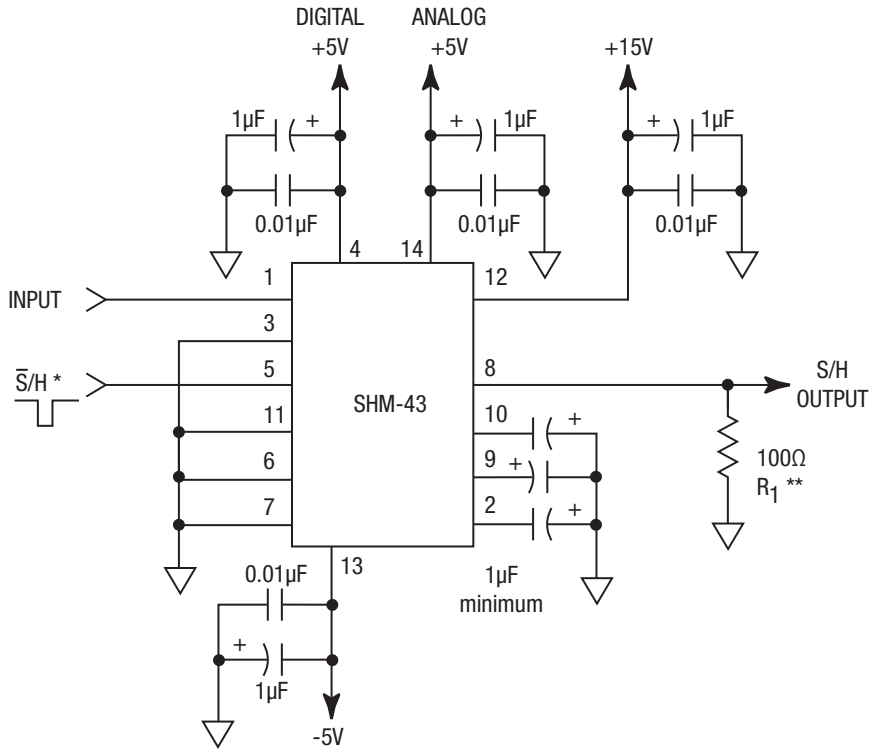


Figure 2. Test Clrcuit Connections

* Connections shown for $\overline{S/H}$; if opposite polarity sample hold command Is desired, connect S/H CONTROL (pin 6) to DIGITAL +5V (pin 4). Using the opposite polarity S/H command will **not** effect speed or accuracy.

** The SHM-43 MS been optimized tor driving 100Ω loads. R1 should be chosen so that the total load on the S/H is 100Ω.

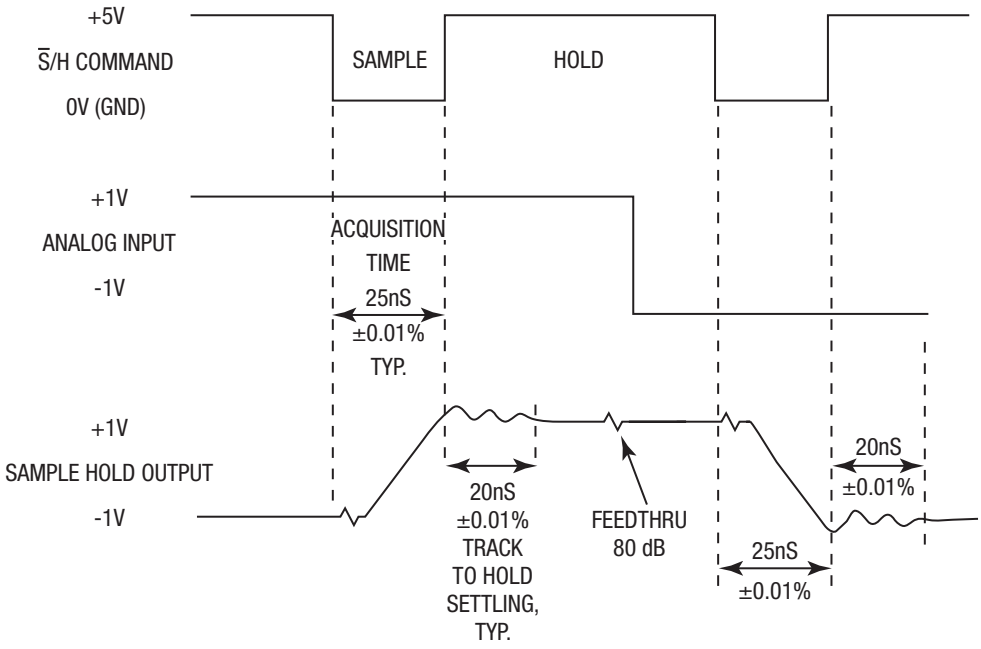


Figure 3. Test Method tor Circuit Shown In Flgure 2

ORDERING GUIDE SUMMARY

Model Number	Temperature Range	RoHS
SHM-43MC	0 to +70 °C	No
SHM-43MC-C	0 to +70 °C	Yes*
SHM-43MM	-55 to +125 °C	No

*Does not claim EU RoHS exemption 7b – lead in solder.

Contact DATEL for availability of MIL-STD-883 versions.

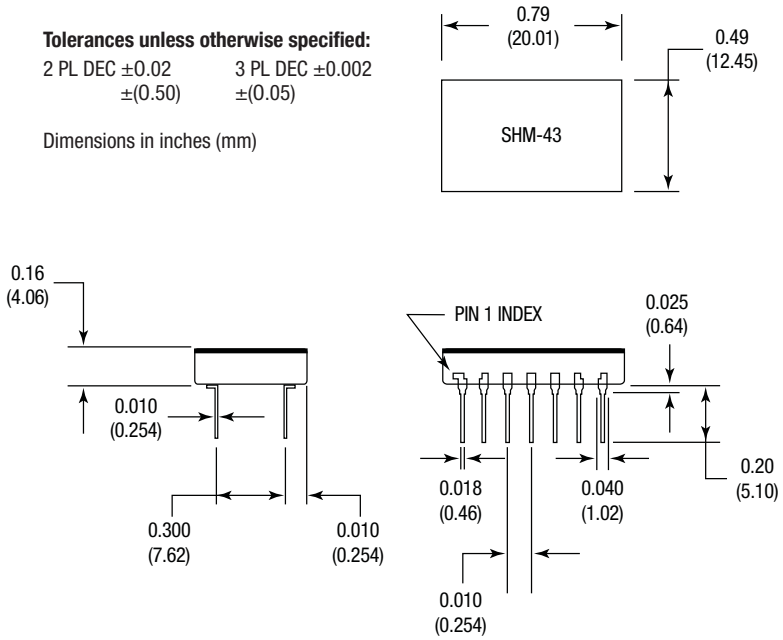
MECHANICAL DIMENSIONS

Tolerances unless otherwise specified:

2 PL DEC ±0.02 ±(0.50)

3 PL DEC ±0.002 ±(0.05)

Dimensions in inches (mm)



INPUT/OUTPUT CONNECTIONS

Pin	Function	Pin	Function
1	Input	8	S/H Out
2	Ref Bypass	9	+5 Bypass
3	Power Gnd	10	-5 Bypass
4	Digital +5V	11	Analog Ground
5	S/$\overline{H}$ or $\overline{S}$/H	12	+15V Power
6	S/H Control	13	-15V Power
7	Digital Ground	14	Analog +5V

11 Cabot Boulevard, Mansfield, MA 02048-1151 USA

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