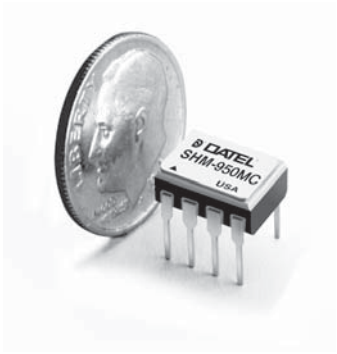
SHM-950

Miniature, High-Speed ±0.001% Sample-Hold Amplifiers

ADVANCED PRODUCT DATA

FEATURES

- 18 bit accuracy
- Small 8-pin DIP package
- 1.5µs max. acquisition time to ±0.001%
- 90ns max. sample-to-hold settling time to ±0.001%
- 70 V/µs slew rate
- 84dB feedthrough attenuation
- ±25 picoseconds aperture uncertainty
- 280mW maximum power dissipation



GENERAL DESCRIPTION

DATEL's SHM-950 is a high-speed, highly accurate sample/hold designed for precision, high-speed analog signal processing applications. The SHM-950 features excellent dynamic specifications including a maximum acquisition time of only 1.5 microseconds for a 10V step to ±0.001%.

Sample-to-hold settling time, to ±0.001% accuracy, is 90 nanoseconds maximum with an aperture uncertainty of ±25 picoseconds.

The SHM-950 is a complete sample/hold circuit, containing a precision MOS hold capacitor and a MOSFET switching configuration which results in faster switching and better feedthrough attenuation. Additionally, a FET input amplifier design allows faster acquisition and settling times while maintaining a considerably lower droop rate.

INPUT/OUTPUT CONNECTIONS

Pin	Function
1	+5v Digital Supply
2	S/$\overline{H}$ Control
3	Analog Input
4	Analog Return
5	–15v Supply
6	Analog Output
7	+15v Analog Supply
8	Power Ground

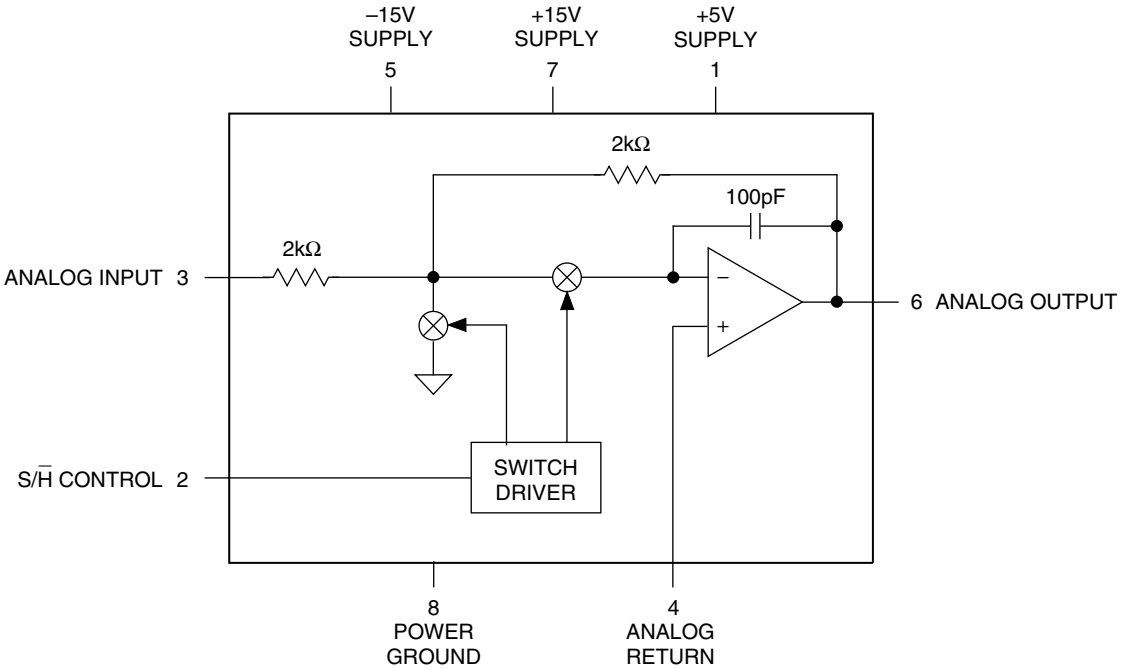


Figure 1. Functional Block Diagram

Absolute Maximum Ratings

±15V Supply Voltages	±18V
+5V Supply Voltages	–0.5V to +7V
Analog Input	±18V
Digital Input	–0.5V to +5.5V
Output Current	±55 mA

Functional Specifications

(Apply over the operating temperature range with ±15V and +5V supplies unless otherwise specified.)

ANALOG INPUT/OUTPUT	MIN.	TYP.	MAX.	UNITS
Input/Output Voltage Range				
±15V Nominal Supply	±10	±11.5	—	Volts
±12V Nominal Supply	±7	±8.5	—	Volts
Input Impedance	1.75	2	—	kΩ
Output Current	—	—	±40	mA
Output Impedance	—	0.1	—	Ω
Capacitive Load	100	250	—	pF
DIGITAL INPUT				
Input Logic Levels				
Logic 1	+2.0	—	—	Volts
Logic 0	—	—	+0.8	Volts
Loading				
Logic 1	—	—	+5	µA
Logic 0	—	—	–5	µA
TRANSFER CHARACTERISTICS				
Gain	—	–1	—	V/V
Gain Error, +25°C	—	±0.05	±0.5	%
Gain Error, -55 to +85°C	—	±0.05	±0.6	%
Sample Mode Offset, +25°C	—	±2	±7	mV
Sample Mode Offset, -55 to +85°C	—	±5	±10	mV
Sample-to-Hold Offset, +25°C ②	—	±5	±20	mV
Sample-to-Hold Offset, -55 to +85°C	—	±10	±50	mV
Linearity Error ①	—	±0.001	±0.005	%FS
DYNAMIC CHARACTERISTICS				
Acquisition Time				
10V to ±0.001%FS (±0.1 mV)				
+25°C	—	1000	1500	ns
–55 to +85°C	—	—	1600	ns
10V to ±0.01%FS (±1 mV)				
+25°C	—	700	1200	ns
–55 to +85°C	—	—	1400	ns
1V to ±1%FS (±10 mV)	—	350	500	ns
Sample-to-Hold Settling Time				
±0.001%FS (±0.1 mV)	—	60	90	ns
±0.1%FS (±10 mV)	—	30	50	ns
Sample-to-Hold Transient	—	50	—	mVp-p
Aperture Delay Time	—	15	20	ns
Aperture Uncertainty (Jitter)	—	±25	±50	ps
Output Slew Rate	±40	70	—	V/µs
Output Droop				
+25°C	—	±0.5	±15	µV/µs
0 to +70°C	—	±15	±80	µV/µs
–55 to +85°C	—	±1.2	±2.4	mV/µs
Feedthrough Rejection	—	–84	–74	dB

POWER REQUIREMENTS	MIN.	TYP.	MAX.	UNITS
Voltage Range				
+15V Supply	+11.5	+15.0	+15.5	Volts
–15V Supply	–11.5	–15.0	–15.5	Volts
+5V Supply	+4.75	+5.0	+5.25	Volts
Power Supply Rejection Ratio	—	110	100	dB
Quiescent Current Drain				
+15V Analog Supply	—	+7	+9	mA
–15V Supply	—	–7	–9	mA
+5V Supply	—	+1	+1.5	mA
Power Consumption	—	215	280	mW
PHYSICAL/ENVIRONMENTAL				
Operating Temp. Range, Case				
SHM-950MC		0 to +70°C		
SHM-950ME		–40 to +100°C		
Storage Temperature Range		–65 to +150°C		
Thermal Impedance				
θjc		15°C/W		
θca		35°C/W		
Package Type		8-pin ceramic DIP		

Footnotes:

① Full Scale (FS) = 10V. Full Scale Range (FSR) = 20V.

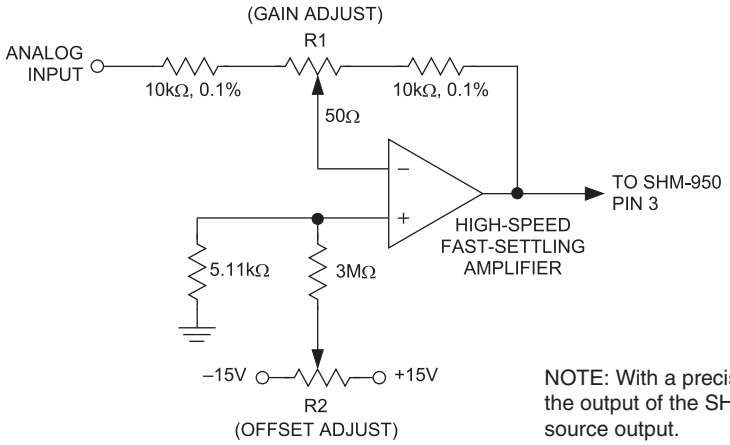
② Sample-to-hold offset error (pedestal) is constant regardless of input/output level.

ORDERING INFORMATION			
Model Number	**Operating Temperature Range**	**Package**	**RoHS**
SHM-950MC	0 to +70°C	DIP	No
SHM-950ME	-40 to +100°C	DIP	No
SHM-950GC	0 to +70°C	SMT	No
SHM-950GE	-40 to +100°C	SMT	No
SHM-950MC-C	0 to +70°C	DIP	Yes
SHM-950ME-C	-40 to +100°C	DIP	Yes
SHM-950GC-C	0 to +70°C	SMT	Yes
SHM-950GE-C	-40 to +100°C	SMT	Yes

For availability of high-reliability versions of the SHM-950, contact DATEL.

Technical Notes

1. All ground pins should be tied together and connected to system analog ground as close to the package as possible. It is recommended to use a ground plane under the device and solder ground pins directly to it. Take care to ensure that no ground potentials can exist between ground pins.
2. External 0.1µF to 4.7µF tantalum bypass capacitors are required in critical applications.
3. A logic 1 on S/$\overline{H}$ puts the unit in the sample mode. A logic 0 puts the unit in hold mode.
4. The maximum capacitive load to avoid oscillation is typically 250pF. Recommended resistive load is 500Ω, although values as low as 250Ω may be used. Acquisition and sample-to-hold settling times are relatively unaffected by resistive loads down to 250Ω and capacitive loads up to 50pF. Greater load capacitances will affect both acquisition and settling time.
5. Gain and offset adjusting can be accomplished using the external circuitry shown in Figure 2. Adjust offset with a 0V input. Adjust gain with a ±FS input. Adjust so that the output in the hold mode matches the input.

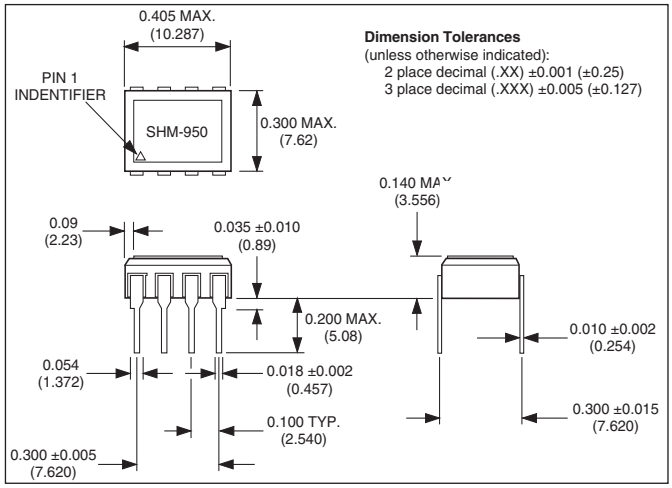


NOTE: With a precision source, adjust R1 and R2 so that the output of the SHM-950 in the hold mode matches the source output.

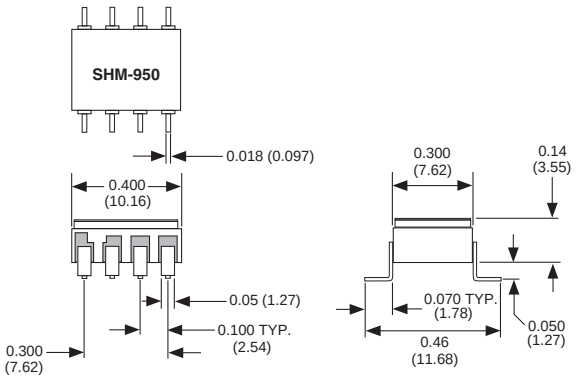
Figure 2. Offset and Gain Adjustments

MECHANICAL DIMENSIONS Inches (mm)

DIP Package



SMT Package



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