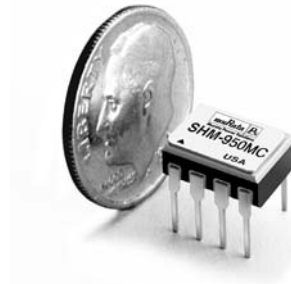


## ADVANCED PRODUCT DATA

### FEATURES

- 18 bit accuracy
- Small 8-pin DIP package
- 800ns max. acquisition time to ±0.001%
- 200ns max. sample-to-hold settling time to ±0.001%
- 16MHz small signal bandwidth
- 90dB feedthrough attenuation
- ±25 picoseconds aperture uncertainty
- 415mW maximum power dissipation



### GENERAL DESCRIPTION

Murata Power Solution'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 800 nanoseconds for a 10V step to ±0.001%.

Sample-to-hold settling time, to ±0.001% accuracy, is 200 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/H Control
3	Analog Input
4	Analog Return
5	-15v Supply
6	Analog Output
7	+15v Analog Supply
8	Power Ground

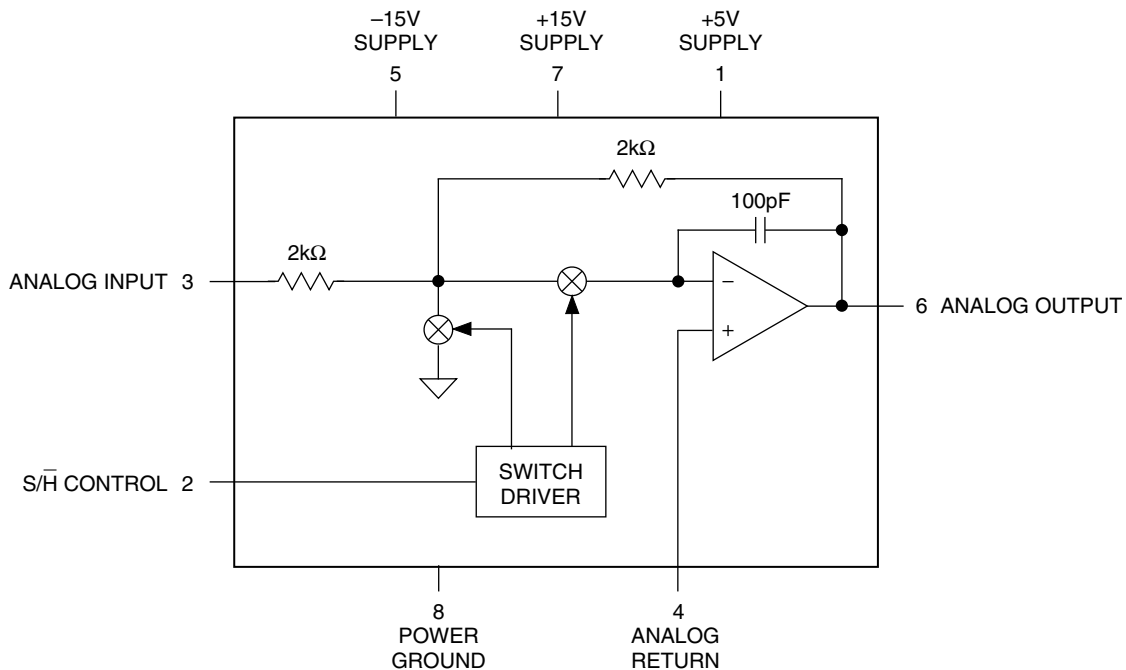


Figure 1. Functional Block Diagram

**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	±65 mA

**Functional Specifications**

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

ANALOG INPUT/OUTPUT	MIN.	TYP.	MAX.	UNITS
<b>Input/Output Voltage Range</b>				
±15V Nominal Supply	±10	±11.5	—	Volts
±12V Nominal Supply	±7	±8.5	—	Volts
<b>Input Impedance</b>	1.75	2	—	kΩ
<b>Output Current</b>	—	—	±40	mA
<b>Output Impedance</b>	—	0.1	—	Ω
<b>Capacitive Load</b>	100	250	—	pF

DIGITAL INPUT				
<b>Input Logic Levels</b>				
Logic 1	+2.0	—	+5.0	Volts
Logic 0	0	—	+0.8	Volts
<b>Loading</b>				
Logic 1	—	—	+5	μA
Logic 0	—	—	-5	μA

TRANSFER CHARACTERISTICS				
<b>Gain</b>	—	-1	—	V/V
<b>Gain Error, +25°C</b>	—	±0.05	±0.5	%
<b>Linearity Error ①</b>	—	±0.001	±0.005	%FS
<b>Sample Mode Offset, +25°C</b>	—	±2	±7	mV
<b>Sample-to-Hold Offset (Pedestal), +25°C ②</b>	—	±2.5	±25	mV
<b>Gain Drift</b>	—	±0.5	±15	ppm/°C
<b>Sample Mode Offset Drift ①</b>	—	±3	±15	ppm/°C
<b>Sample-to-Hold Off. (Pedestal) Drift</b>	—	±5	±20	ppm of FSR/°C

DYNAMIC CHARACTERISTICS				
<b>Acquisition Time</b>				
10V to ±0.001%FS (±1 mV)				
+25°C	—	160	200	ns
-55 to +125°C	—	—	265	ns
10V to ±0.1%FS (±10 mV)				
+25°C	—	100	150	ns
-55 to +125°C	—	—	215	ns
10V to ±1%FS (±100 mV)	—	200	—	ns
1V to ±1%FS (±10 mV)	—	205	—	ns
<b>Sample-to-Hold Settling Time</b>				
10V to ±0.01%FS (±1 mV)	—	100	100	ns
1V to ±1%FS (±10 mV)	—	100	80	ns
<b>Sample-to-Hold Transient</b>	—	100	—	mVp-p
<b>Aperture Delay Time</b>	—	10	15	ns
<b>Aperture Uncertainty (Jitter)</b>	—	±25	±50	ps
<b>Output Slew Rate</b>	±40	60	—	V/μs
<b>Output Droop</b>				
+25°C	—	±0.5	±15	μV/μs
0 to +70°C	—	±15	±30	μV/μs
-55 to +125°C	—	±1.2	±2.4	mV/μs
<b>Feedthrough Rejection</b>	—	-84	-78	dB

POWER REQUIREMENTS	MIN.	TYP.	MAX.	UNITS
<b>Voltage Range</b>				
+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
<b>Power Supply Rejection Ratio</b>	—	±0.5	±1	mV/V
<b>Quiescent Current Drain</b>				
+15V Analog Supply	—	+8	+13.5	mA
-15V Supply	—	-8	-13.5	mA
+5V Supply	—	+1	-1.5	Volts
<b>Power Consumption</b>	—	365	415	mW

PHYSICAL/ENVIRONMENTAL	
<b>Operating Temp. Range, Case</b>	
SHM-950MC	0 to +70°C
SHM-950MM	-55 to +125°C
<b>Storage Temperature Range</b>	-65 to +150°C
<b>Thermal Impedance</b>	
θjc	15°C/W
θca	35°C/W
<b>Package Type</b>	8-pin ceramic DIP

**Footnotes:**

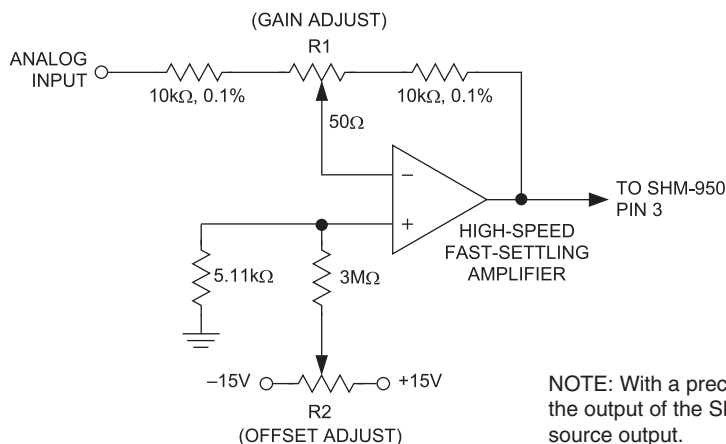
- ① Full Scale (FS) = 10V. Full Scale Range (FSR) = 20V.
- ② Sample-to-hold offset error (pedestal) is constant regardless of input/output level.

**Ordering Information**

MODEL	OPERATING TEMP. RANGE
<b>SHM-950MC</b>	0 to +70°C
<b>SHM-950MM</b>	-55 to +125°C
For availability of high-reliability versions of the SHM-950, contact Murata Power Solutions.	

**Technical Notes**

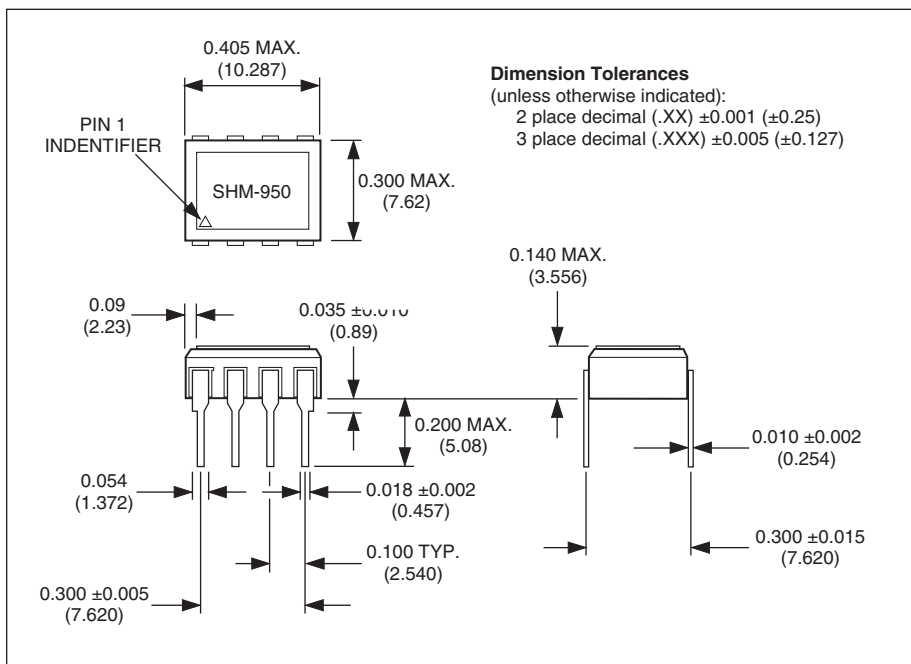
- All ground pins should be tied together and connected to system analog ground as close to the package as possible. It is recommended to use a ground plane under the device and solder ground pins directly to it. Take care to ensure that no ground potentials can exist between ground pins.
- External 0.1μF to 4.7μF tantalum bypass capacitors are required in critical applications.
- A logic 1 on S/H puts the unit in the sample mode. A logic 0 puts the unit in hold mode.
- 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.
- 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)



**ISO 9001**  
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