

NEW *SMT Package*

FEATURES

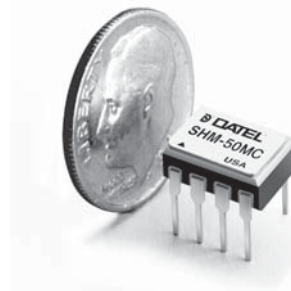
- Small 8-pin DIP or SMT package
- 30ns typical acquisition time to $\pm 0.01\%$, 40ns typical acquisition time to 0.005%
- 15ns typical sample-to-hold settling time to $\pm 0.01\%$
- 100MHz small signal bandwidth
- -78dB feedthrough attenuation
- ± 2 picoseconds aperture uncertainty
- 85mW typical, 135mW maximum power dissipation

GENERAL DESCRIPTION

DATEL's SHM-50 is a high-speed, highly accurate sample/hold designed for precision, high-speed analog signal processing applications. The SHM-50 features excellent dynamic specifications including a maximum acquisition time of only 40 nanoseconds for a 2V step to $\pm 0.01\%$.

Sample-to-hold settling time, to $\pm 0.01\%$ accuracy, is 20 nanoseconds maximum with an aperture uncertainty of ± 2 picoseconds.

The SHM-50 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	-5v Supply
6	Analog Output
7	+5v Analog Supply
8	Power Ground

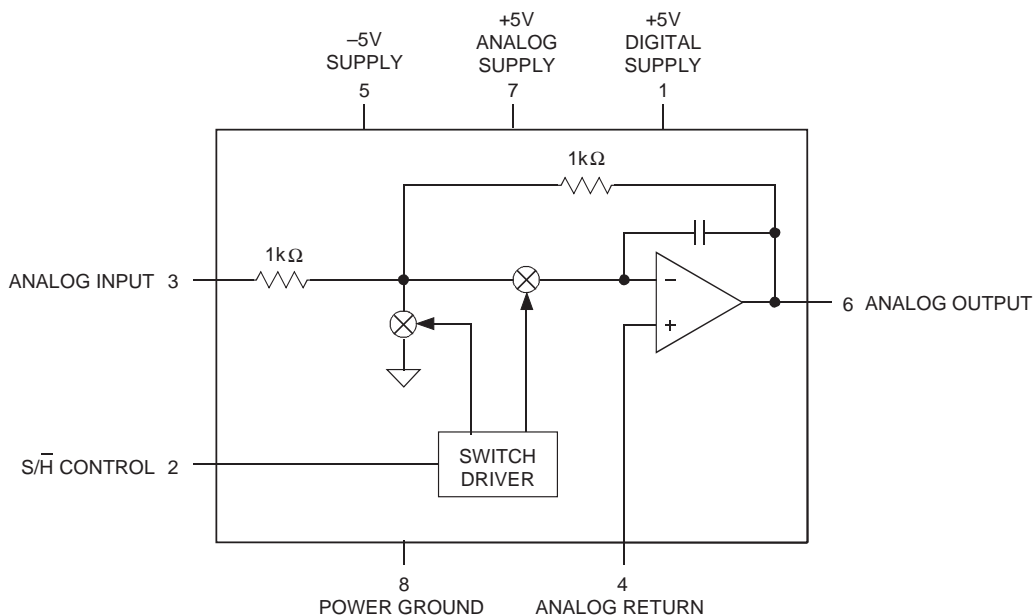


Figure 1. Functional Block Diagram

ABSOLUTE MAXIMUM RATINGS	
$\pm 5V$ Supply Voltages	$\pm 6.6V$
Analog Input	$\pm 4V$
Digital Input	$-0.5V$ to $+5.5V$
Output Current	± 65 mA

Functional Specifications

Apply over the operating temperature range with $\pm 5V_{dc}$ unless otherwise specified.

ANALOG INPUT/OUTPUT	MIN.	TYP.	MAX.	UNITS
Input/Output Voltage Range	-3.5	—	+3.5	Volts
Input Impedance	—	1000	—	Ω
Output Current	—	—	± 65	mA
Output Impedance	—	0.1	—	Ω
Capacitive Load	100	250	—	pF

DIGITAL INPUT

Input Logic Levels

Logic 1	+2.0	—	+5.0	Volts
Logic 0	0	—	+0.8	Volts

Loading

Logic 1	—	—	+5	μA
Logic 0	—	—	-5	μA

TRANSFER CHARACTERISTICS

Gain	—	-1.5	—	V/V
Gain Error, +25°C	—	± 0.05	± 0.25	%
Linearity Error ①	—	± 0.0035	± 0.005	%FS
Sample Mode Offset, +25°C	—	± 2	± 7	mV
Sample-to-Hold Offset (Pedestal), +25°C ②	—	± 30	60	mV
Gain Drift	—	± 1	± 15	ppm/°C
Sample Mode Offset Drift ①	—	± 3	± 15	ppm of FSR/°C
Sample-to-Hold Off. (Pedestal) Drift	—	± 5	± 20	ppm of FSR/°C

DYNAMIC CHARACTERISTICS

Acquisition Time

2V to $\pm 0.005\%$ FS ($\pm 100\mu V$)				
+25°C	—	40	50	ns
-55 to +125°C	—	70	TBD	ns
2V to $\pm 0.01\%$ FS ($\pm 200\mu V$)				
+25°C	—	30	40	ns
-55 to +125°C	—	40	50	ns
2V to $\pm 0.1\%$ FS (± 2 mV)	—	25	30	ns

Sample-to-Hold Settling Time

2V to $\pm 0.005\%$ FS ($\pm 100\mu V$)	—	15	25	ns
2V to $\pm 0.01\%$ FS ($\pm 200\mu V$)	—	10	20	ns
Sample-to-Hold Transient	—	100	—	mVp-p
Aperture Delay Time	—	2	4	ns
Aperture Uncertainty (Jitter)	—	± 2	± 4	ps
Output Slew Rate	600	± 650	—	V/ μs
Small Signal BW (-3dB)	90	100	—	MHz

Output Droop

+25°C	—	± 0.2	± 1.0	$\mu V/NS$
0 to +70°C	—	± 0.3	± 1.0	$\mu V/NS$
-55 to +125°C	—	± 5.0	± 12.0	$\mu V/NS$
Feedthrough Rejection	—	-78	—	dB

POWER REQUIREMENTS	MIN.	TYP.	MAX.	UNITS
Voltage Range				
+5V Supply	+4.75	+5.0	+5.25	Volts
-5V Supply	-4.75	-5.0	-5.25	Volts
Power Supply Rejection Ratio	—	± 0.5	± 1	mV/V
Quiescent Current Drain				
+5V Analog Supply	—	+7	+12	mA
-5V Supply	—	-10	-15	mA
Power Consumption	—	85	135	mW
PHYSICAL/ENVIRONMENTAL				
Operating Temp. Range, Case				
SHM-50MC, GC	0 to +70°C			
SHM-50ME, GE	-40 to +100°C			
SHM-50MM, GM	-55 to +125°C			
Storage Temperature Range	-65 to +150°C			
Thermal Impedance				
θ_{jc}	15°C/W			
θ_{ca}	35°C/W			
Package Type	8-pin ceramic DIP or SMT			

Footnotes:

- ① Full Scale (FS) = 2V. Full Scale Range (FSR) = 4V.
- ② Sample-to-hold offset error (pedestal) is constant regardless of input/output level.

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. A single +5V supply can be used for both +5V Digital Supply (pin 1) and +5V Analog Supply (pin 7).
2. External 0.1 μF to 4.7 μF tantalum bypass capacitors are required in critical applications.
3. A logic 1 on S/H puts the unit in the sample mode. A logic 0 puts the unit in hold mode.
4. 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 $\pm FS$ input. Adjust so that the output in the hold mode matches the input.

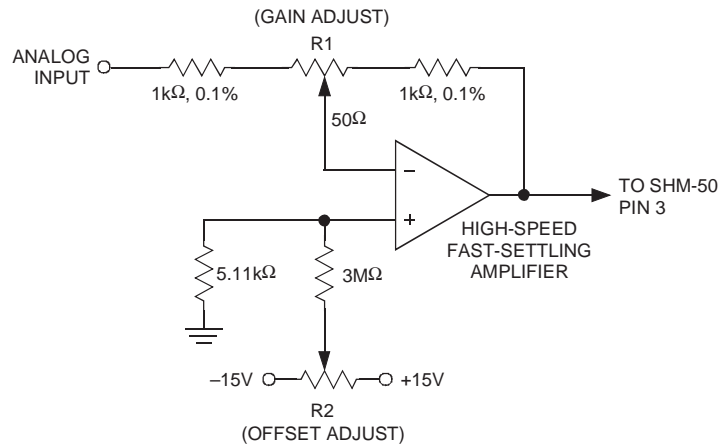


Figure 2. Offset and Gain Adjustments

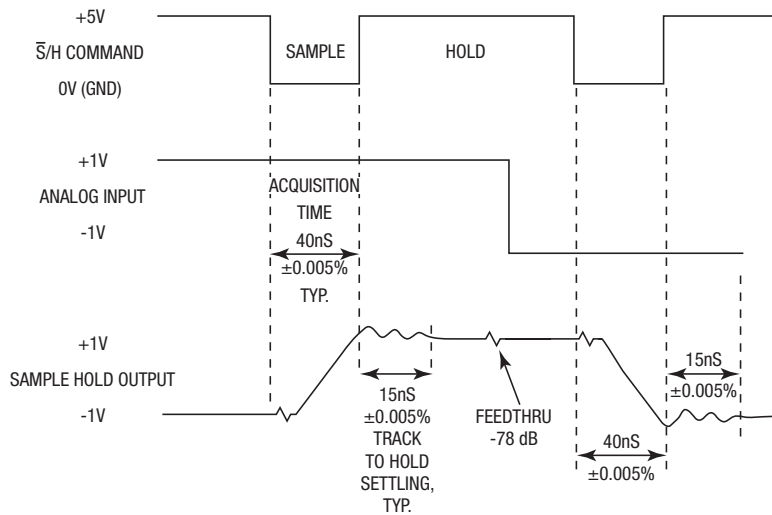


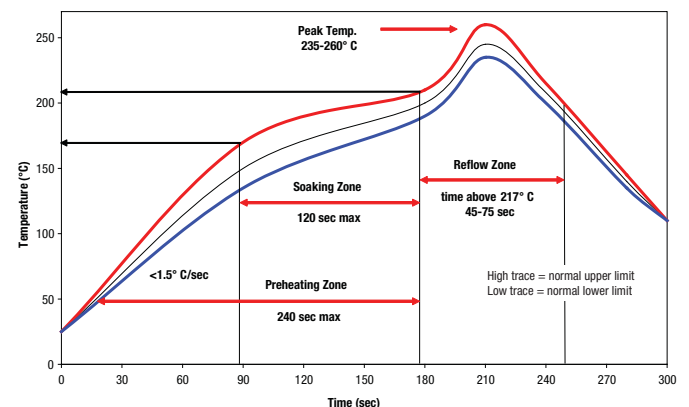
Figure 3. Timing Diagram

Soldering Guidelines

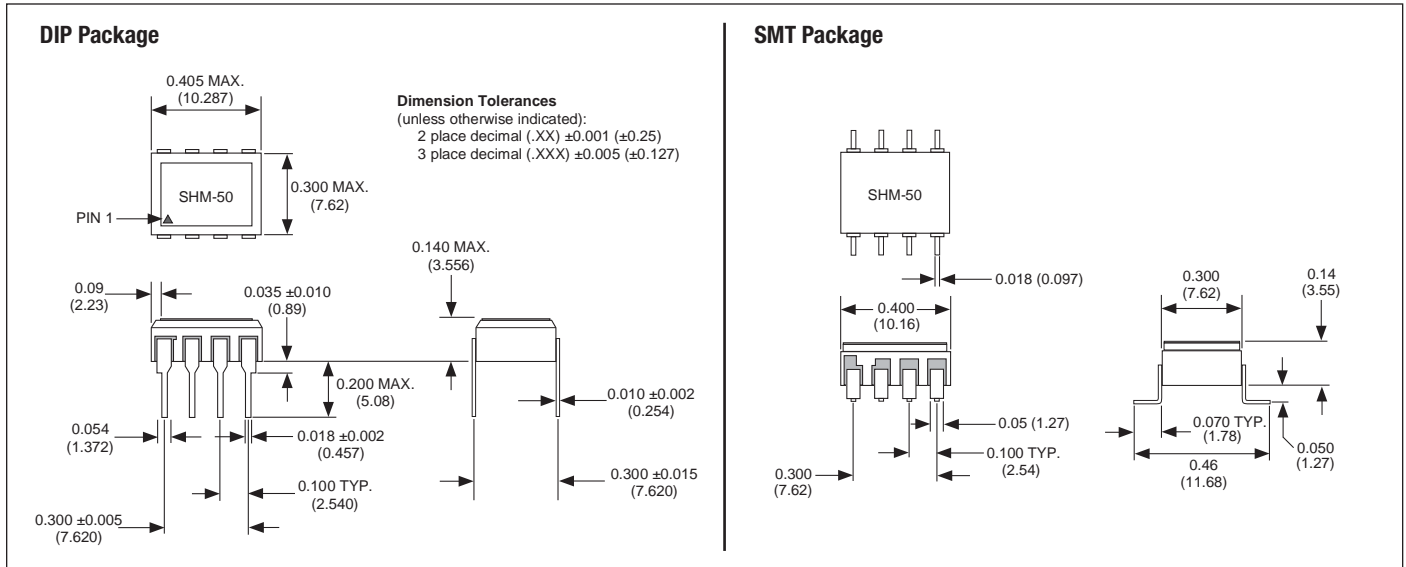
DATEL recommends the specifications below when installing these converters. These specifications vary depending on the solder type. Exceeding these specifications may cause damage to the product. Your production environment may differ therefore please thoroughly review these guidelines with your process engineers.

REFLOW SOLDER OPERATIONS FOR SURFACE-MOUNT PRODUCTS (SMT)	
For Sn/Ag/Cu based solders:	
Preheat Temperature	Less than 1 °C. per second
Time over Liquidus	45 to 75 seconds
Maximum Peak Temperature	260 °C.
Cooling Rate	Less than 3 °C. per second
For Sn/Pb based solders:	
Preheat Temperature	Less than 1 °C. per second
Time over Liquidus	60 to 75 seconds
Maximum Peak Temperature	235 °C.
Cooling Rate	Less than 3 °C. per second

Recommended Lead-free Solder Reflow Profile



MECHANICAL DIMENSIONS Inches (mm)



ISO 9001
REGISTERED

ORDERING INFORMATION			
Model Number	Operating Temp. Range	Package	RoHS
SHM-50MC	0 to +70°C	DIP	No
SHM-50ME	-40 to +100°C	DIP	No
SHM-50MM	-55 to +125°C	DIP	No
SHM-50GC	0 to +70°C	SMT	No
SHM-50GE	-40 to +100°C	SMT	No
SHM-50GM	-55 to +125°C	SMT	No
SHM-50MC-C	0 to +70°C	DIP	Yes
SHM-50ME-C	-40 to +100°C	DIP	Yes
SHM-50MM-C	-55 to +125°C	DIP	Yes
SHM-50GC-C	0 to +70°C	SMT	Yes
SHM-50GE-C	-40 to +100°C	SMT	Yes
SHM-50GM-C	-55 to +125°C	SMT	Yes

For availability of high-reliability versions of the SHM-50, contact DATEL.

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